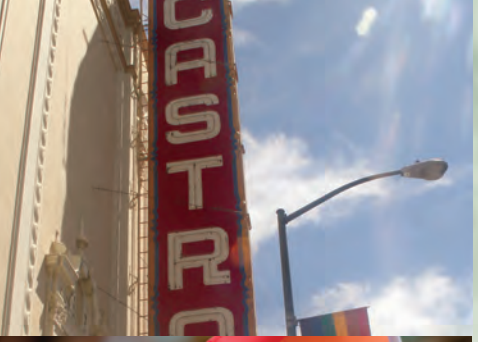

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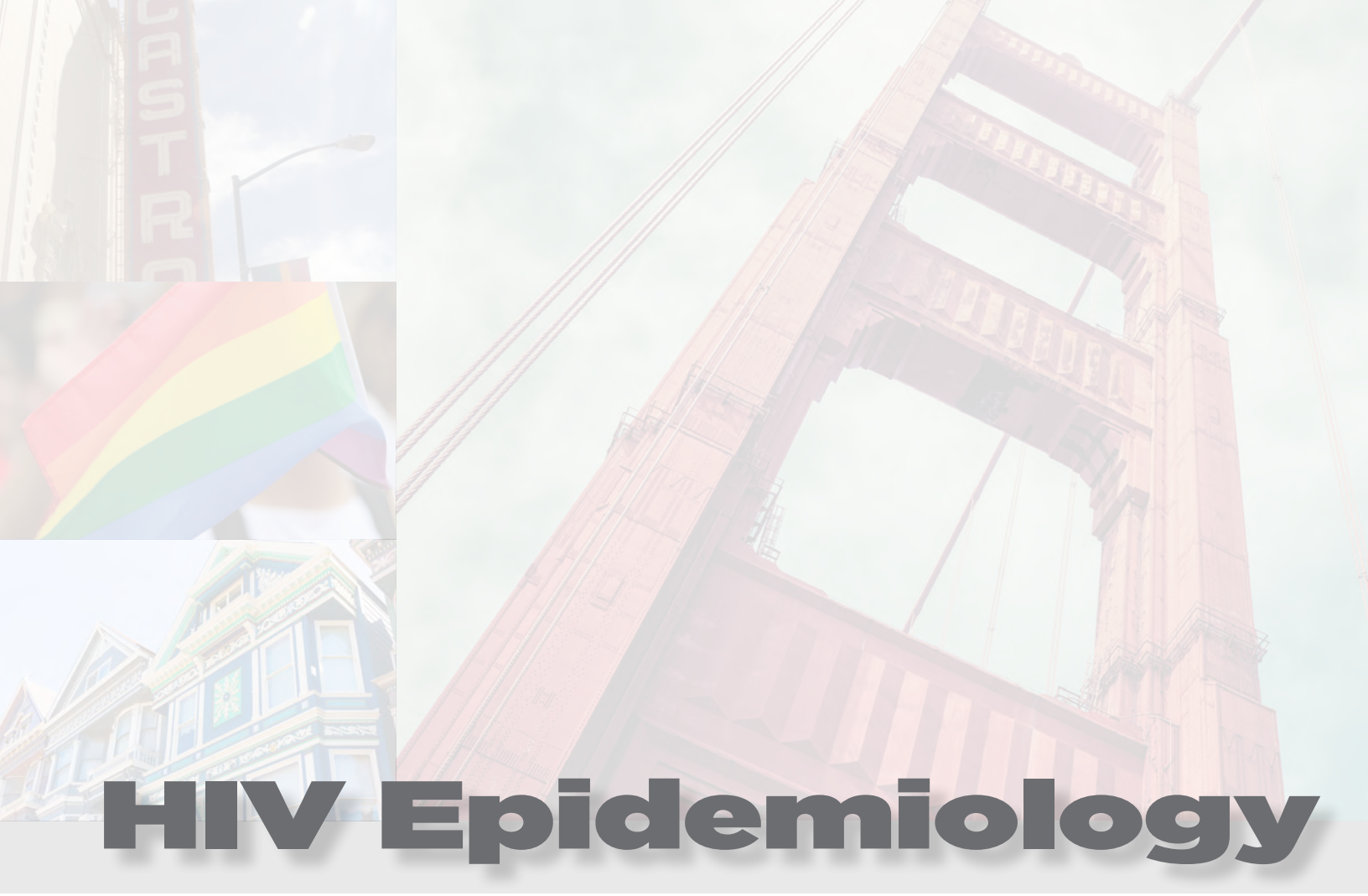

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Abbreviations

ART	Antiretroviral therapy
CDC	Centers for Disease Control and Prevention
MMP	Medical Monitoring Project
MSM	Men who have sex with men
MSM-PWID	Men who have sex with men and who also inject drugs
NHBS	National HIV Behavioral Surveillance
OOJ	Out-of-jurisdiction
PLWH	Persons living with HIV
PrEP	Pre-exposure prophylaxis
PWID	People who inject drugs
SFDPH	San Francisco Department of Public Health
STD	Sexually transmitted diseases

Introduction

Public health surveillance refers to the ongoing systematic collection, analysis, and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practices. With advances in our understanding of HIV, including the availability of increasingly effective antiretroviral therapy (ART), methods to prevent infections and reduce morbidity and mortality have changed. HIV surveillance has adapted to these changes and now monitors HIV care-related indicators including early diagnosis, entry into care, ART initiation, retention in care, use of ART, and viral suppression. This year, we present data from three prevention programs which aim to: 1) prevent perinatal HIV transmission, 2) prevent HIV acquisition among populations at high risk for HIV, and 3) both reduce morbidity and mortality among persons living with HIV and reduce HIV transmission to their partners.

First, the HIVE program aims to prevent peri- and post-natal HIV transmission through comprehensive, multidisciplinary preconception, prenatal, gynecologic and sexual health care and case management services to women living with HIV. The findings from HIVE indicate an improvement over time in the proportion of pregnant women who received ART, who were retained in care during pregnancy and post-partum, and who were virally suppressed at delivery and at 6 and 12 months post-partum (Figure 10.4 on page 68).

Second, pre-exposure prophylaxis (PrEP), a daily anti-HIV medication, is a rapidly emerging HIV prevention strategy that substantially reduces the risk of HIV infection in men who have sex with men (MSM), heterosexual men and women, and people who inject drugs. In 2014 efforts to increase PrEP use were initiated in San Francisco. These include city-wide social media campaigns, provider education, and active screening and prescription of PrEP throughout San Francisco. These efforts have focused primarily on MSM and trans women, the groups most severely impacted by HIV. Results from a series of surveys of MSM between 2014 and 2017 found a steep increase in the proportion of MSM reporting PrEP use, although use in some groups, particularly African American MSM has been lower than in other racial and ethnic groups (Figure 18.1 on page 85 and Figure 18.2 on page 86).

Third, the RAPID ART program aims to have all persons newly diagnosed with HIV receiving care within five days of diagnosis and prescribed ART at the first clinic visit. The program uses linkage navigators to facilitate enrollment at clinics that offer ART on the first visit. Between 2013 and 2016, the time from diagnosis to care, time from care to ART initiation and the time from diagnosis to viral suppression all substantially decreased (Table 3.1 on page 21).

The collective impact from these HIV prevention efforts, as well as other public health and clinical interventions, is a continued reduction in new HIV infections and HIV-related deaths as well as an improvement in care related indicators among persons with HIV. The ability to monitor these outcomes and to adapt to changes in the epidemic and advances in HIV prevention and care comes from a robust and flexible HIV surveillance system that includes the collection of baseline and follow-up HIV laboratory and clinical information from medical records and laboratories.

1 Overview of HIV in San Francisco

From the beginning of the HIV epidemic, HIV case surveillance in San Francisco has been conducted through active and passive methods and routinely evaluated. As of December 31, 2017, there were 15,952 San Francisco residents diagnosed and living with HIV (Table 1.1). These persons comprised 12% of California's living HIV cases and 2% of persons living with HIV (PLWH) in the United States. Compared to cases reported in California and the United States, San Francisco living HIV cases were more likely to be men and white, and men who have sex with men (MSM), including MSM who also inject drugs (MSM-PWID).

Compared to persons newly diagnosed with HIV nationally, newly diagnosed people with HIV in San Francisco were more likely to be men and white. Compared to all San Franciscans living with HIV, San Francisco newly diagnosed persons in 2017 had greater proportion of women, persons of color, and non-MSM who inject drugs (PWID). San Francisco's newly diagnosed persons were similar to California's newly diagnosed persons in 2016 by gender, but differed by racial/ethnic group and transmission category distribution; San Francisco's newly diagnosed persons had higher proportions of whites, Asian/Pacific Islanders, and PWID (MSM and non-MSM).

Table 1.1 Characteristics of persons living with HIV and persons newly diagnosed with HIV in San Francisco, California and the United States

	Living HIV Cases			Newly Diagnosed HIV Cases		
	San Francisco[1] (N = 15,952) %	California[2] (N = 132,405) %	United States[3] (N = 991,289) %	San Francisco[1], 2017 (N = 221) %	California[2], 2016 (N = 5,061) %	United States[3], 2016 (N = 39,782) %
Gender[4]						
Men	92%	87%	76%	86%	87%	81%
Women	6%	12%	24%	12%	12%	19%
Trans Women	2%	1%	--	2%	2%	--
Race/Ethnicity						
White	59%	40%	31%	38%	27%	26%
African American	12%	18%	42%	17%	19%	44%
Latino	19%	35%	22%	25%	45%	25%
Asian/Pacific Islander	6%	4%	1%	13%	7%	3%
Native American	<1%	<1%	<1%	1%	1%	1%
Other/Unknown[5]	3%	2%	4%	6%	1%	1%
Transmission Category[6]						
MSM	74%	67%	55%	60%	63%	67%
PWID	6%	6%	13%	11%	4%	6%
MSM-PWID	15%	7%	5%	14%	3%	3%
Heterosexual	4%	15%	26%	6%	19%	24%
Other/Unidentified	2%	5%	1%	8%	11%	<1%

1 San Francisco data are reported through May 3, 2018 for cases diagnosed through December 31, 2017.

2 California data are reported through January 26, 2018, for cases diagnosed as of December 31, 2016.

3 U.S. data are reported through June 30, 2017 and reflect cases diagnosed through December 31, 2016. U.S. living case data are available through December 31, 2015 due to delays in death reporting. U.S. data reflect unadjusted numbers for 50 states and 6 dependent areas and may be found in the Centers for Disease Control and Prevention. HIV Surveillance Report, 2016; vol. 28. http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Published November 2017. Accessed [May 31, 2018].

4 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status." Data on trans women and trans men are not reported by the United States.

5 U.S. racial/ethnic group data for new diagnoses only reflect persons with racial/ethnic group information.

6 Transmission category data reported by the United States have been statistically adjusted for missing values.

The number of San Francisco residents diagnosed with HIV stage 3 (AIDS) reached a peak of 2,327 in 1992 and has declined in all subsequent years (Figure 1.1). Beginning in 1995, the number of deaths among people living with HIV ever classified as stage 3 has decreased dramatically due to effective combination antiretroviral therapies (ART). From 1999 the number of new stage 3 diagnoses and the number of deaths have continued to decline but at a slower rate than from 1995 to 1998. Beginning in 2013, the number of deaths among people with stage 3 diagnosis has exceeded the number of new stage 3 diagnoses which may reflect the impact of pre-exposure prophylaxis, behavioral interventions to prevent HIV transmission, and use of ART that reduces both the risk of HIV transmission and disease progression among those living with HIV. The result of declining deaths is that the number of San Franciscans living with HIV ever classified as stage 3 increased from 1980 through 2012 and then modestly declined. By the end of 2017, there were 9,227 San Francisco residents living with HIV ever classified as stage 3.

The number of deaths in 2017 is approximately 90% complete due to matching to the National Death Index Early Release Program[1]. In addition, the case definition for HIV disease stage 3 (AIDS) was updated in 2014, and persons who have a lower CD4 T-lymphocyte percentage (<14%) but whose CD4 count >200 cells/μL are no longer considered as stage 3 cases (see Technical Notes "Stage of Disease at HIV Diagnosis"). This change in definition may have reduced the number of people diagnosed with stage 3 in 2014 and onward.

1 https://www.cdc.gov/nchs/ndi/ndi_early_release.htm. Accessed [May 31, 2018]

Figure 1.1 HIV disease stage 3 (AIDS) cases, deaths, and prevalence, 1980-2017, San Francisco

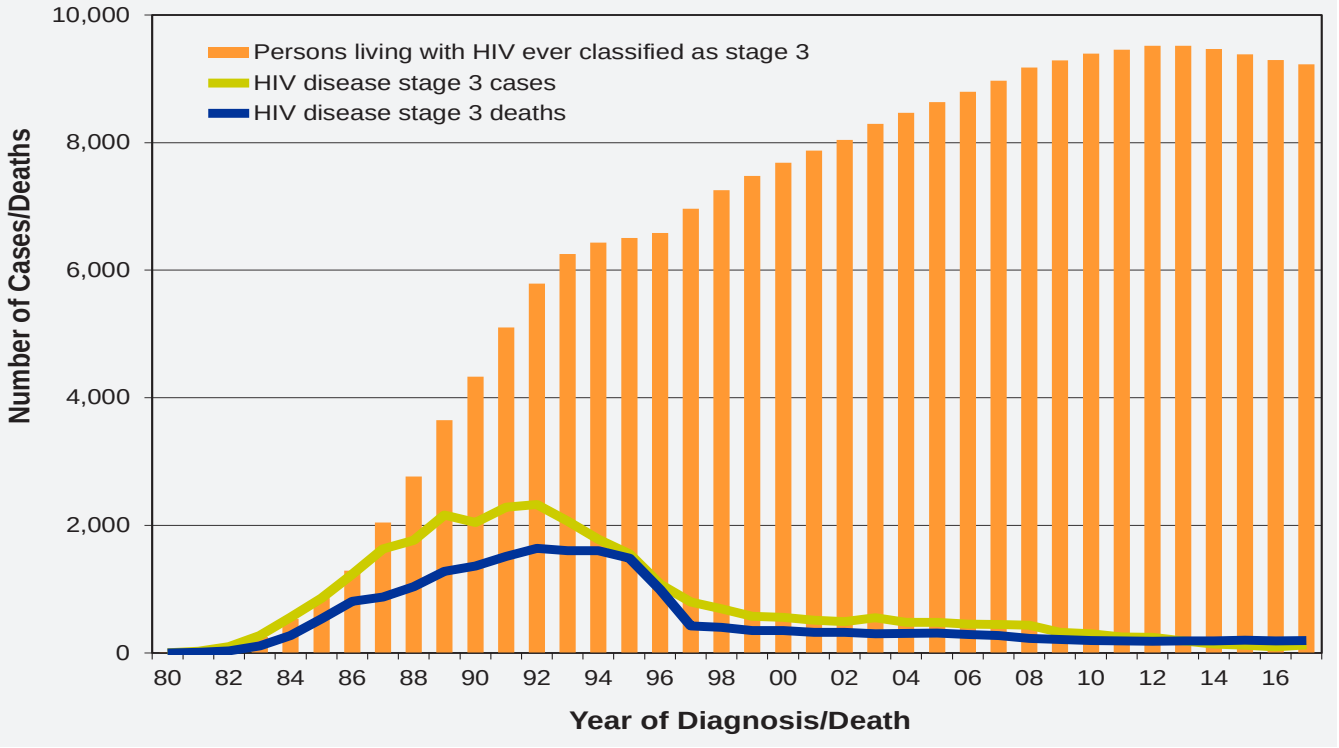
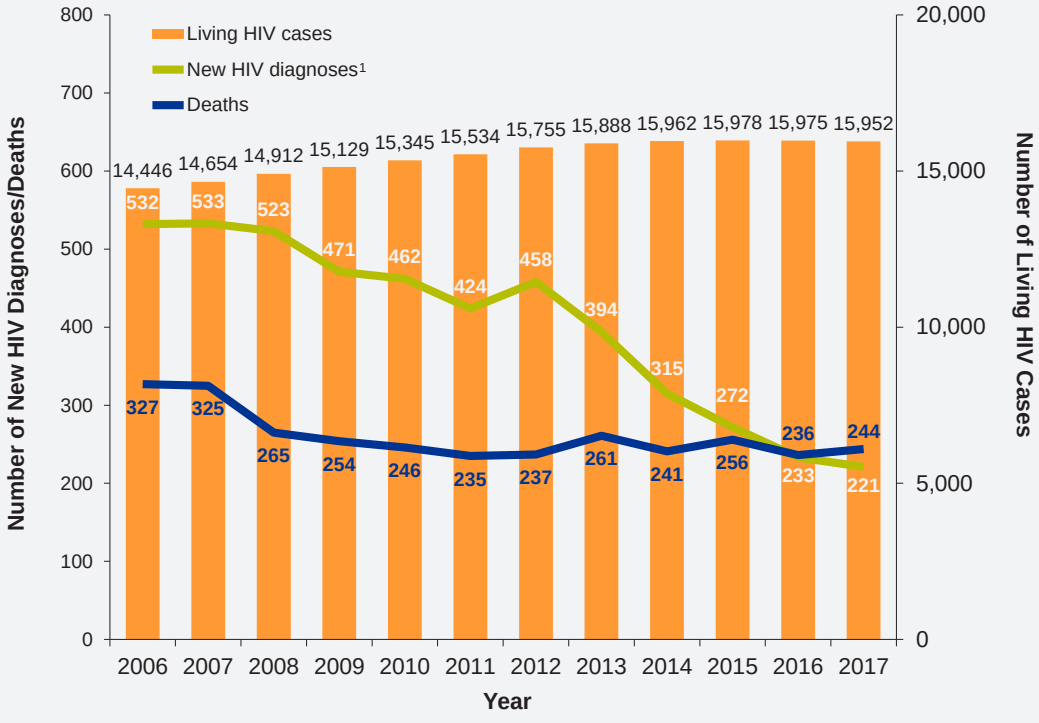


Figure 1.2 illustrates the number of persons newly diagnosed with HIV (green line), number of deaths each year (blue line), and number of PLWH (orange bars) between 2006 and 2017. Reporting of HIV cases (except for stage 3 HIV) prior to 2006 is incomplete because name-based HIV case reporting was not in place until 2006. The number of new HIV diagnoses declined from 532 in 2006 to 221 in 2017. The number of deaths each year fluctuated but remained relatively stable from 2008 to 2017. The numbers of new diagnoses and deaths each year have been converging, and beginning in 2016, deaths in PLWH exceeded the number of new diagnoses.

The number of PLWH includes persons who were diagnosed with HIV during or prior to the year shown and not known to have died by the end of that year. The number of PLWH increased from 14,446 in 2006 to a peak of 15,978 in 2015. In 2017 the number of PLWH was 15,952. The number of PLWH increased each year until deaths in PLWH began to exceed new diagnoses in 2016. These data only include people who have been diagnosed with HIV (all disease stages) and reported to the health department. People who are unaware (undiagnosed) and persons diagnosed with an anonymous HIV test are not included unless they also tested confidentially or entered care in San Francisco. Death reporting in 2017 is approximately 90% complete. With small, upward revisions of new diagnoses and annual deaths expected, these figures may underestimate the true prevalence and incidence of HIV in San Francisco.

Figure 1.2 New HIV diagnoses, deaths, and prevalence, 2006-2017, San Francisco



1 See Technical Notes "Date of Initial HIV Diagnosis."

Table 1.2 shows the characteristics of persons newly diagnosed with HIV between 2006 and 2017. The majority were MSM. Trends in race/ethnicity distributions show small increases in proportions of African Americans, Latinos and Asian/Pacific Islanders and declines in proportions of whites since 2012. Over time, most new diagnoses are among people aged 30-39 years. While the annual number of diagnoses among women was small, the proportion of women diagnosed trended upward in 2015 through 2017. No children (<13 years) were diagnosed with HIV during these years.

Table 1.2 Trends in persons newly diagnosed with HIV by demographic and risk characteristics, 2006-2017, San Francisco

	Year of Initial HIV Diagnosis[1]											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Number	532	533	523	471	462	424	458	394	315	272	233	221
Gender[2]												
Men	91%	86%	89%	89%	89%	87%	93%	91%	93%	88%	87%	86%
Women	7%	9%	8%	6%	8%	10%	5%	6%	4%	10%	10%	12%
Trans Women	2%	5%	4%	5%	4%	3%	2%	3%	3%	3%	3%	2%
Race/Ethnicity												
White	55%	50%	49%	48%	48%	51%	50%	46%	43%	41%	39%	38%
African American	14%	15%	15%	13%	13%	15%	10%	12%	10%	15%	14%	17%
Latino	22%	20%	23%	24%	23%	20%	24%	25%	28%	27%	29%	25%
Asian/Pacific Islander	6%	9%	8%	8%	9%	8%	12%	12%	13%	11%	15%	13%
Native American	<1%	0%	<1%	<1%	<1%	<1%	1%	1%	<1%	<1%	0%	1%
Multi-race	3%	6%	5%	6%	6%	5%	3%	4%	5%	6%	3%	6%
Unknown	0%	0%	0%	<1%	<1%	<1%	<1%	<1%	0%	<1%	<1%	0%
Age at HIV Diagnosis (years)												
13 - 17	0%	1%	1%	<1%	1%	0%	0%	0%	<1%	1%	0%	1%
18 - 24	13%	10%	11%	13%	12%	10%	13%	14%	12%	14%	13%	10%
25 - 29	12%	19%	15%	14%	14%	16%	16%	20%	18%	23%	24%	18%
30 - 39	34%	35%	35%	30%	31%	27%	31%	29%	29%	30%	32%	33%
40 - 49	28%	25%	29%	26%	28%	31%	29%	25%	23%	21%	15%	20%
50+	14%	11%	9%	17%	14%	16%	12%	12%	17%	11%	15%	16%
Transmission Category												
MSM	69%	64%	71%	69%	65%	71%	78%	77%	74%	75%	70%	60%
PWID	7%	8%	6%	5%	8%	7%	4%	5%	7%	6%	9%	11%
MSM-PWID	17%	17%	13%	17%	15%	14%	10%	12%	13%	9%	9%	14%
Heterosexual	5%	8%	7%	5%	8%	7%	5%	4%	3%	7%	6%	6%
Other/Unidentified	2%	3%	2%	3%	4%	2%	2%	2%	3%	3%	5%	8%

1 Data include persons diagnosed with HIV in any stage and reported as of May 3, 2018. Percentages may not add to 100 due to rounding. See Technical Notes "Date of Initial HIV Diagnosis."

2 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

The number of PLWH slowly increased each year until 2017. The recent decline in the number of PLWH likely reflects fewer persons newly diagnosed with HIV and a small increase in the number of deaths in 2017. Persons were counted as living in a year if their HIV diagnosis date was in or before that year and they were known to be alive at the end of the year. Gender, racial/ethnic and risk distributions of PLWH remained mostly stable between 2013 and 2017; cases were predominately men, white, and MSM (including MSM-PWID) (Table 1.3). Persons living with HIV continued to shift into older age groups with the largest proportional increase observed among persons aged 60-69 years (16% to 22% from 2013 to 2017).

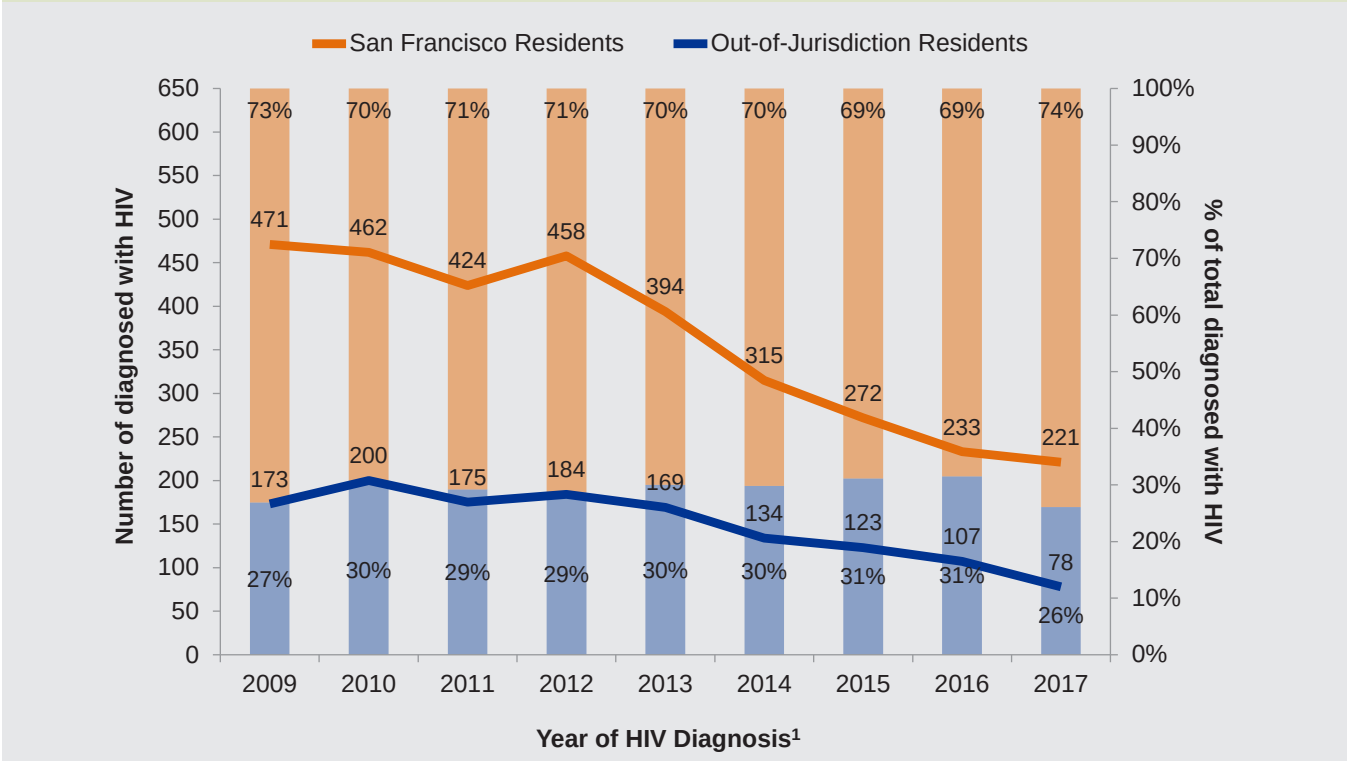
Table 1.3 Trends in persons living with HIV by demographic and risk characteristics, 2013-2017, San Francisco

	2013		2014		2015		2016		2017	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Gender										
Men	14,582	(92)	14,666	(92)	14,677	(92)	14,681	(92)	14,656	(92)
Women	911	(6)	904	(6)	903	(6)	900	(6)	907	(6)
Trans Women	391	(2)	388	(2)	394	(2)	389	(2)	384	(2)
Trans Men	4	(<1)	4	(<1)	4	(<1)	5	(<1)	5	(<1)
Race/Ethnicity										
White	9,530	(60)	9,528	(60)	9,494	(59)	9,443	(59)	9,369	(59)
African American	1,959	(12)	1,936	(12)	1,928	(12)	1,910	(12)	1,905	(12)
Latino	2,946	(19)	3,000	(19)	3,042	(19)	3,079	(19)	3,100	(19)
Asian/Pacific Islander	856	(5)	894	(6)	916	(6)	947	(6)	973	(6)
Native American	63	(<1)	64	(<1)	65	(<1)	65	(<1)	67	(<1)
Multi-race	527	(3)	533	(3)	525	(3)	522	(3)	529	(3)
Unknown	7	(<1)	7	(<1)	8	(<1)	9	(<1)	9	(<1)
Age in Years (at end of each year)										
0 - 12	3	(<1)	3	(<1)	3	(<1)	2	(<1)	0	(0)
13 - 17	4	(<1)	3	(<1)	5	(<1)	3	(<1)	5	(<1)
18 - 24	161	(1)	136	(1)	133	(1)	113	(1)	101	(1)
25 - 29	491	(3)	477	(3)	449	(3)	428	(3)	390	(2)
30 - 39	1,916	(12)	1,889	(12)	1,835	(11)	1,785	(11)	1,745	(11)
40 - 49	4,758	(30)	4,346	(27)	3,957	(25)	3,649	(23)	3,371	(21)
50 - 59	5,554	(35)	5,754	(36)	5,849	(37)	5,880	(37)	5,879	(37)
60 - 69	2,533	(16)	2,781	(17)	3,067	(19)	3,305	(21)	3,510	(22)
70+	468	(3)	573	(4)	680	(4)	810	(5)	951	(6)
Transmission Category										
MSM	11,656	(73)	11,748	(74)	11,811	(74)	11,848	(74)	11,852	(74)
PWID	954	(6)	937	(6)	911	(6)	896	(6)	884	(6)
MSM-PWID	2,488	(16)	2,478	(16)	2,442	(15)	2,401	(15)	2,366	(15)
Heterosexual	546	(3)	546	(3)	558	(3)	564	(4)	569	(4)
Transfusion/Hemophilia	25	(<1)	25	(<1)	25	(<1)	25	(<1)	25	(<1)
Other/Unidentified	219	(1)	228	(1)	231	(1)	241	(2)	256	(2)
Total[1]	**15,888**		**15,962**		**15,978**		**15,975**		**15,952**	

1 Persons living with HIV at the end of each year.

In addition to reporting HIV cases who were residents of San Francisco at time of diagnosis, the San Francisco Department of Public Health (SFDPH) reports cases who resided outside San Francisco but were diagnosed by a provider or facility within San Francisco (out-of-jurisdiction, OOJ, residents). Beginning in 2009, case surveillance and reporting of OOJ residents was done in the same manner as San Francisco residents. Figure 1.3 compares the annual case counts and trends of San Francisco residents and OOJ residents at diagnosis from 2009 to 2017. These data show that among all new cases reported by the SFDPH each year 26% to 31% resided outside of San Francisco at the time of diagnosis.

Figure 1.3 New San Francisco HIV cases and new out-of-jurisdiction HIV cases diagnosed in San Francisco, 2009-2017, San Francisco



1 See Technical Notes "Date of Initial HIV Diagnosis."

The overall number of PLWH in San Francisco is affected by 1) out-migration: San Francisco residents at the time of diagnosis who later moved out of San Francisco, and 2) in-migration: OOJ residents at the time of diagnosis who moved to and received care in San Francisco. As of December 31, 2017, 15,952 San Francisco residents at diagnosis were alive and 9,919 (62%) of these residents were still living in the city based on their most recent available address (Table 1.4). Additionally, more than 3,000 OOJ residents at diagnosis have a current San Francisco address and received care in San Francisco at some point after their diagnosis.

The demographic and risk distributions of San Francisco residents at diagnosis who were still living in San Francisco were very similar to all living San Francisco residents at diagnosis. A greater proportion of OOJ residents at diagnosis now living in San Francisco were under 50 years and MSM compared to San Francisco residents at diagnosis.

Table 1.4 Characteristics of persons living with HIV as of December 2017 by residence status, San Francisco

	PLWH who were SF residents at diagnosis		PLWH who were SF residents based on most recent address			
			SF residents at diagnosis		OOJ residents at diagnosis	
	Number	(%)	Number	(%)	Number	(%)
Gender[1]						
Men	14,656	(92)	8,999	(91)	2,882	(94)
Women	907	(6)	642	(6)	105	(3)
Trans Women	384	(2)	273	(3)	79	(3)
Race/Ethnicity						
White	9,369	(59)	5,509	(56)	1,654	(54)
African American	1,905	(12)	1,212	(12)	432	(14)
Latino	3,100	(19)	2,129	(21)	658	(21)
Asian/Pacific Islander	973	(6)	698	(7)	149	(5)
Native American	67	(<1)	39	(<1)	10	(<1)
Other/Unknown	538	(3)	332	(3)	163	(5)
Age in Years (as of 12/31/2017)						
0 - 12	0	(0)	0	(0)	0	(0)
13 - 17	5	(<1)	3	(<1)	0	(0)
18 - 24	101	(1)	71	(1)	44	(1)
25 - 29	390	(2)	271	(3)	165	(5)
30 - 39	1,745	(11)	1,104	(11)	687	(22)
40 - 49	3,371	(21)	2,087	(21)	765	(25)
50 - 59	5,879	(37)	3,544	(36)	986	(32)
60 - 69	3,510	(22)	2,193	(22)	360	(12)
70+	951	(6)	646	(7)	59	(2)
Transmission Category						
MSM	11,852	(74)	7,191	(72)	2,408	(79)
PWID	884	(6)	632	(6)	126	(4)
MSM-PWID	2,366	(15)	1,507	(15)	382	(12)
Heterosexual	569	(4)	398	(4)	80	(3)
Transfusion/Hemophilia	25	(<1)	11	(<1)	1	(<1)
Other/Unidentified	256	(2)	180	(2)	69	(2)
Total	**15,952**		**9,919**		**3,066**	

1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

White MSM (non-PWID) comprised half of men living with HIV in San Francisco. There were a lower proportion of MSM (non-PWID) and a higher proportion of PWID among African American men. White and African American men had similar age distributions at the end of 2017, while Latino, Asian/Pacific Islander, Native American, and multi-racial men were younger than whites and African Americans (Table 1.5).

White and African American women accounted for the majority of women living with HIV in San Francisco. Injection drug use was the predominant transmission category for white, African American, and multi-racial women while heterosexual sex was the predominant transmission category for Latinas and Asian/Pacific Islander and Native American women combined.

Latinas and African Americans each accounted for 34% and 33%, respectively, of trans women living with HIV. Whites comprised 18%, Asians/Pacific Islanders and Native Americans together comprised 10% and multi-racial persons comprised 5% of trans women living with HIV.

Table 1.5 Characteristics of persons living with HIV as of December 2017, San Francisco

	White		African American		Latino		Asian/Pacific Islander & Native American		Multi-Race		Total
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number[1]
Men											
Transmission Category											
MSM	7,380	(82)	848	(59)	2,279	(82)	788	(85)	344	(73)	11,640
PWID	170	(2)	195	(14)	66	(2)	20	(2)	16	(3)	467
MSM-PWID	1393	(15)	293	(20)	328	(12)	81	(9)	102	(22)	2,197
Heterosexual	30	(<1)	65	(5)	52	(2)	20	(2)	6	(1)	173
Transfusion/Hemophilia	6	(<1)	2	(<1)	2	(<1)	3	(<1)	1	(<1)	14
Other/Unidentified	54	(1)	39	(3)	44	(2)	17	(2)	5	(1)	165
Age in Years (as of 12/31/2017)											
0 - 12	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0
13 - 17	0	(0)	0	(0)	0	(0)	1	(<1)	1	(<1)	2
18 - 24	23	(<1)	14	(1)	26	(1)	11	(1)	5	(1)	79
25 - 29	109	(1)	47	(3)	124	(4)	47	(5)	15	(3)	343
30 - 39	662	(7)	147	(10)	480	(17)	189	(20)	69	(15)	1547
40 - 49	1,627	(18)	267	(19)	738	(27)	288	(31)	136	(29)	3,059
50 - 59	3,551	(39)	495	(34)	955	(34)	270	(29)	152	(32)	5,424
60 - 64	2,358	(26)	395	(27)	365	(13)	98	(11)	79	(17)	3,297
65+	703	(8)	77	(5)	83	(3)	25	(3)	17	(4)	905
Men Total	**9,033**		**1,442**		**2,771**		**929**		**474**		**14,656**
Women											
Transmission Category											
PWID	147	(56)	169	(50)	61	(31)	13	(18)	24	(67)	414
Heterosexual	89	(34)	139	(41)	106	(54)	49	(69)	8	(22)	391
Transfusion/Hemophilia	5	(2)	2	(1)	2	(1)	2	(3)	0	(0)	11
Other/Unidentified	22	(8)	27	(8)	29	(15)	7	(10)	4	(11)	91
Age in Years (as of 12/31/2017)											
0 - 12	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0
13 - 17	0	(0)	1	(<1)	1	(1)	0	(0)	1	(3)	3
18 - 24	3	(1)	7	(2)	7	(4)	0	(0)	3	(8)	20
25 - 29	6	(2)	7	(2)	9	(5)	3	(4)	0	(0)	25
30 - 39	32	(12)	32	(9)	38	(19)	11	(15)	4	(11)	117
40 - 49	59	(22)	64	(19)	41	(21)	21	(30)	11	(31)	197
50 - 59	107	(41)	130	(39)	54	(27)	22	(31)	13	(36)	327
60 - 64	46	(17)	80	(24)	36	(18)	13	(18)	3	(8)	178
65+	10	(4)	16	(5)	12	(6)	1	(1)	1	(3)	40
Women Total	**263**		**337**		**198**		**71**		**36**		**907**
Trans Women	**70**		**125**		**130**		**40**		**19**		**384**

1 Includes persons whose racial/ethnic information is not available. Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

Persons diagnosed with stage 0 HIV infection

The surveillance case definition includes five HIV infection stages (See Technical Notes "Stage of Disease at HIV Diagnosis"). Stage 0 is designed to capture early HIV infection which includes acute HIV infection (generally infection within two weeks before diagnosis) and infections within 180 days before diagnosis. The criteria for stage 0 infection is generally established by a sequence of discordant HIV test results indicative of early HIV infection in which a negative or indeterminate result was within 180 days of a positive result. The date of negative HIV test is based on laboratory documentation and, for this analysis, patient's self-report of last negative test in the absence of laboratory documentation. Classification of stage 0 supersedes criteria for other stages. Stage 0 cases may be underestimated due to under-reporting of HIV negative test results.

Of the 891 San Francisco residents diagnosed with HIV in 2014-2016, 259 (29%) were diagnosed at stage 0, 429 (48%) stage 1 or 2, 119 (13%) stage 3, and 84 (9%) could not be staged due to not having a CD4 T-lymphocyte test within three months of diagnosis reported (Table 1.6). The proportion of stage 0 diagnoses was higher among trans women, whites, Latinos, persons with other or unknown race/ethnicity, persons under age 30 years at time of diagnosis, and MSM (including MSM-PWID).

Table 1.6 Stage of HIV infection at diagnosis among persons newly diagnosed with HIV in 2014-2016, San Francisco

	New Diagnoses[1]	Stage at diagnosis							
		Stage 0		Stage 1-2		Stage 3		Unknown	
	Number	Number	(%[2])	Number	(%[2])	Number	(%[2])	Number	(%[2])
Total	**891**	**259**	**(29)**	**429**	**(48)**	**119**	**(13)**	**84**	**(9)**
Gender[3]									
Men	799	234	(29)	381	(48)	111	(14)	73	(9)
Women	68	15	(22)	38	(56)	7	(10)	8	(12)
Trans Women	23	10	(43)	9	(39)	1	(4)	3	(13)
Race/Ethnicity									
White	358	113	(32)	176	(49)	43	(12)	26	(7)
African American	110	19	(17)	59	(54)	18	(16)	14	(13)
Latino	253	82	(32)	118	(47)	32	(13)	21	(8)
Asian/Pacific Islander	126	31	(25)	59	(47)	19	(15)	17	(13)
Other/Unknown	44	14	(32)	17	(39)	7	(16)	6	(14)
Age at HIV Diagnosis (years)									
13-24	114	47	(41)	52	(46)	4	(4)	11	(10)
25-29	178	62	(35)	89	(50)	13	(7)	14	(8)
30-39	276	75	(27)	126	(46)	40	(14)	35	(13)
40-49	191	53	(28)	89	(47)	37	(19)	12	(6)
50+	132	22	(17)	73	(55)	25	(19)	12	(9)
Transmission Category									
MSM	660	208	(32)	303	(46)	85	(13)	64	(10)
PWID	60	11	(18)	30	(50)	12	(20)	7	(12)
MSM-PWID	88	30	(34)	45	(51)	7	(8)	6	(7)
Heterosexual	53	6	(11)	33	(62)	11	(21)	3	(6)
Other/Unidentified	30	4	(13)	18	(60)	4	(13)	4	(13)
Year of HIV Diagnosis									
2014	330	98	(30)	153	(46)	51	(15)	28	(8)
2015	296	83	(28)	136	(46)	45	(15)	32	(11)
2016	265	78	(29)	140	(53)	23	(9)	24	(9)

1 Includes persons diagnosed in the time period based on a confirmed laboratory HIV test regardless of whether the patient had an earlier self-report of HIV positive date.

2 Percent of new diagnoses.

3 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

Persons diagnosed with late stage HIV infection

Late HIV diagnosis was defined as having a stage 3 (AIDS) diagnosis within three months of HIV diagnosis. The proportion of persons newly diagnosed with HIV whose diagnosis occurred late in the stage of HIV disease decreased from 21% in 2012 to 11% in 2016 (Table 1.7). In 2016, the proportion of new diagnoses that occurred late was higher among African Americans, persons aged 40 years or older at time of diagnosis, and heterosexual persons.

Efforts to diagnose persons earlier in the course of disease which can improve health outcomes and reduce forward transmission should continue. The racial and transmission risk disparities highlight populations in need of improved efforts to identify early disease.

Table 1.7 Late diagnoses among persons newly diagnosed with HIV in 2012-2016 by demographic and risk characteristics, San Francisco

	Year of diagnosis[1]									
	2012		2013		2014		2015		2016	
	Number of new diagnoses (% of who had a late diagnosis[2])									
Total	**457**	**(21%)**	**399**	**(18%)**	**330**	**(16%)**	**296**	**(17%)**	**265**	**(11%)**
Gender[3]										
Men	424	(20%)	360	(18%)	307	(17%)	262	(16%)	230	(11%)
Women	25	(36%)	27	(22%)	14	(7%)	26	(23%)	28	(11%)
Trans Women	8	(25%)	12	(17%)	9	(0%)	8	(13%)	6	(0%)
Race/Ethnicity										
White	231	(20%)	181	(17%)	144	(13%)	117	(17%)	97	(10%)
African American	47	(17%)	50	(20%)	35	(23%)	39	(13%)	36	(17%)
Latino	115	(22%)	101	(14%)	94	(16%)	86	(19%)	73	(7%)
Asian/Pacific Islander	44	(25%)	50	(30%)	40	(23%)	35	(11%)	51	(12%)
Other/Unknown	20	(20%)	17	(12%)	17	(24%)	19	(21%)	8	(13%)
Age at Diagnosis										
13-24	56	(11%)	51	(10%)	35	(6%)	46	(7%)	34	(3%)
25-29	68	(15%)	79	(11%)	55	(9%)	60	(7%)	61	(10%)
30-39	143	(18%)	115	(17%)	99	(19%)	93	(15%)	86	(10%)
40-49	134	(27%)	100	(24%)	81	(19%)	65	(26%)	44	(16%)
50+	56	(29%)	54	(28%)	60	(22%)	32	(34%)	40	(13%)
Transmission Category										
MSM	357	(19%)	298	(16%)	249	(16%)	226	(15%)	185	(11%)
PWID	19	(21%)	24	(25%)	20	(20%)	19	(32%)	21	(10%)
MSM-PWID	44	(11%)	46	(15%)	39	(5%)	24	(17%)	25	(4%)
Heterosexual	28	(50%)	22	(41%)	11	(45%)	20	(20%)	22	(18%)
Other/Unidentified	9	(22%)	9	(11%)	11	(18%)	7	(29%)	12	(8%)
Housing Status										
Housed	416	(21%)	369	(18%)	295	(17%)	268	(16%)	237	(10%)
Homeless	41	(20%)	30	(13%)	35	(9%)	28	(21%)	28	(14%)

1 Date of HIV diagnosis is based on a confirmed laboratory HIV test and does not take into account patient self-report of HIV positive.
2 Percent of new diagnoses in the year who developed AIDS within 3 months of HIV diagnosis.
3 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

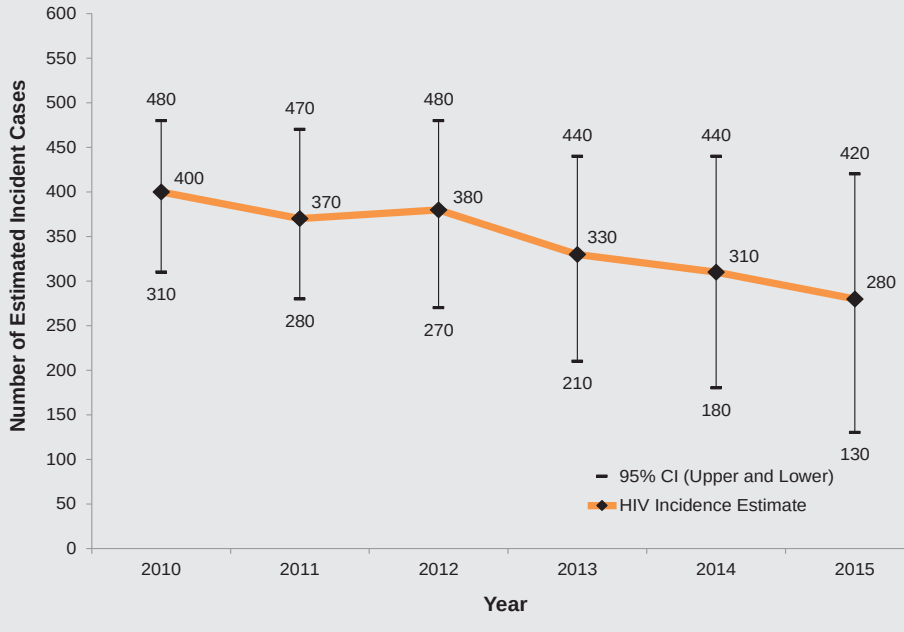
HIV incidence estimates

Estimates of new HIV infections track the leading edge of the HIV epidemic and are critical for allocating resources and evaluating effectives of prevention programs. The SFDPH adopted the new CD4-based model (see Technical Notes "CD4-Based Model"), developed by the Centers for Disease Control and Prevention (CDC), to estimate new infections during 2010-2015 in San Francisco.

The CD4-based model uses the first CD4 values among persons newly diagnosed with HIV that provide an indication of HIV disease progression and are collected in routine HIV case surveillance. The time from infection to the date of first CD4 test and the distribution of delay from infection to diagnosis was estimated based on a well-characterized CD4 depletion model to derive the annual number of new HIV infections (diagnosed and undiagnosed). The CD4-based model can be produced quickly and cost-effectively compared to the biomarker-based model used in our previous annual reports. The biomarker-based model required additional testing and treatment history information and retesting remnant blood specimens from persons newly diagnosed to classify their HIV infection recency at diagnosis, and was subject to the availability of remnant specimens and continued changes in testing technology.

Overall, the estimated number of new HIV infections from the CD4-based model has declined since 2010, however, the confidence intervals overlap from year to year indicating a relative stable trend (Figure 1.4).

Figure 1.4 Estimated number of new HIV infections, 2010-2015, San Francisco



CI: Confidence Interval.

Table 1.8 presents the estimated rate of new infections per 100,000 population by demographic and risk characteristics. The rate of new infections among MSM is disproportionately high: 369 infections per 100,000 MSM in 2015 compared to an overall rate of 36 in San Francisco. With caution given to the large margin of error, the data suggest higher incidence among African Americans and Latinos compared to whites for the years we are able to provide an estimate.

Table 1.8 Estimated rate of new HIV infections per 100,000 population[1] by demographic and risk characteristics, 2010-2015, San Francisco

	2010	2011	2012	2013	2014	2015
	Rate per 100,000 (95% Confidence Interval)					
Overall	55 (43 - 66)	51 (38 - 63)	50 (36 - 64)	43 (28 - 59)	40 (23 - 57)	36 (17 - 55)
Sex at Birth						
Male	99 (77 - 121)	92 (69 - 115)	93 (66 - 119)	80 (51 - 110)	75 (42 - 108)	63 (28 - 98)
Female	**	**	**	**	**	**
Age (years)						
13-24	65 (32 - 99)	59 (21 - 97)	74 (27 - 120)	**	**	**
25-34	81 (52 - 110)	74 (43 - 104)	75 (40 - 110)	68 (29 - 107)	**	**
35-44	87 (54 - 121)	75 (39 - 111)	66 (30 - 102)	**	**	**
45-54	49 (22 - 76)	55 (23 - 88)	**	**	**	**
55+	**	**	**	**	**	**
Race/Ethnicity						
American Indian/Alaska Native	**	**	**	-	-	-
Asian	**	**	**	**	**	**
African American	135 (60 - 211)	**	**	**	**	**
Latino	90 (50 - 130)	83 (39 - 126)	104 (52 - 156)	84 (28 - 141)	**	**
Native Hawaiian/Other PI	**	**	**	-	-	-
White	58 (42 - 75)	60 (41 - 78)	55 (35 - 75)	39 (19 - 60)	43 (19 - 66)	**
Multiple races	**	**	**	**	**	**
Transmission Category						
MSM	503 (381 - 625)	510 (373 - 646)	505 (351 - 658)	431 (257 - 604)	412 (216 - 607)	369 (152 - 586)
PWID	**	**	**	**	**	**
MSM-PWID	**	**	**	**	**	**
Heterosexual	**	**	**	**	**	**

1 The population data by year, sex, race/ethnicity, and age are obtained from California Department of Finance. Demographic Research Unit. 2017. State and county population projections 2010-2060 [P-3: State and County Projections Dataset]. Sacramento: California Department of Finance. February 2, 2017. Revised June 20, 2017. The MSM population data are obtained from Hughes AJ, Chen YH, Scheer S, et al. A novel modeling approach for estimating patterns of migration into and out of San Francisco by HIV status and race among men who have sex with men. J Urban Health (2017). doi:10.1007/s11524-017-0145-2.

** Incidence estimate with the relative standard error (RSE)>=30% is not displayed due to high estimation error.

- Data are suppressed due to small number.

HIV testing history

HIV testing and treatment history is collected in routine surveillance activities for calculations including recency and stage of HIV diagnosis. Self-reported information about the number of negative HIV tests was collected as part of HIV testing and treatment history. Using these data, we assessed trends in the following: (a) the proportion of persons who ever had a HIV negative test, (b) the proportion of persons who had a recent HIV negative test within the two years before diagnosis, and (c) the number of times a person tested negative in that two year time frame. Data from a person's case report(s) with earliest self-reported HIV positive date were included in this analysis. If a person reported different numbers of HIV negative tests, the largest number was analyzed.

Table 1.9 shows that among persons diagnosed from 2007 to 2017, the proportion of persons who ever had a HIV negative test peaked in 2011 (73%). Among the persons diagnosed who ever had a negative test, the proportion with one or more negative tests in the two years before diagnosis increased from 64% in 2007 to 76% in 2015 and slightly dropped in 2016-2017. The mean number of HIV negative tests in the two-year time period evaluated remained relatively stable in recent years (range 2.1-2.4). The sustained proportions and average number of annual diagnosed persons who ever had negative test results suggest wide adoption of the CDC's recommendation[1] to test persons at high risk at least annually.

1 CDC. Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-Care. MMWR 2006. 55(RR14):1-17

Table 1.9 Mean and median number of HIV tests in 2 years before positive test among HIV new diagnoses by year of diagnosis, 2007-2017, San Francisco

HIV diagnosis Year[1]	New diagnoses	Ever had a negative test		# of negative tests in 2 years before 1st positive test among persons who ever had a negative test			
				>=1		# of Negative tests	
	Number	Number	(%[2])	Number	(%[3])	Mean	Median
2007	538	323	(60)	206	(64)	1.8	1
2008	521	347	(67)	233	(67)	1.8	1
2009	473	332	(70)	228	(69)	1.8	1
2010	449	311	(69)	207	(67)	1.9	1
2011	422	309	(73)	220	(71)	2.2	1
2012	457	314	(69)	223	(71)	2.4	2
2013	399	267	(67)	204	(76)	2.5	2
2014	330	215	(65)	162	(75)	2.4	2
2015	296	172	(58)	131	(76)	2.3	2
2016	265	171	(65)	117	(68)	2.3	1
2017	247	152	(62)	111	(73)	2.1	1

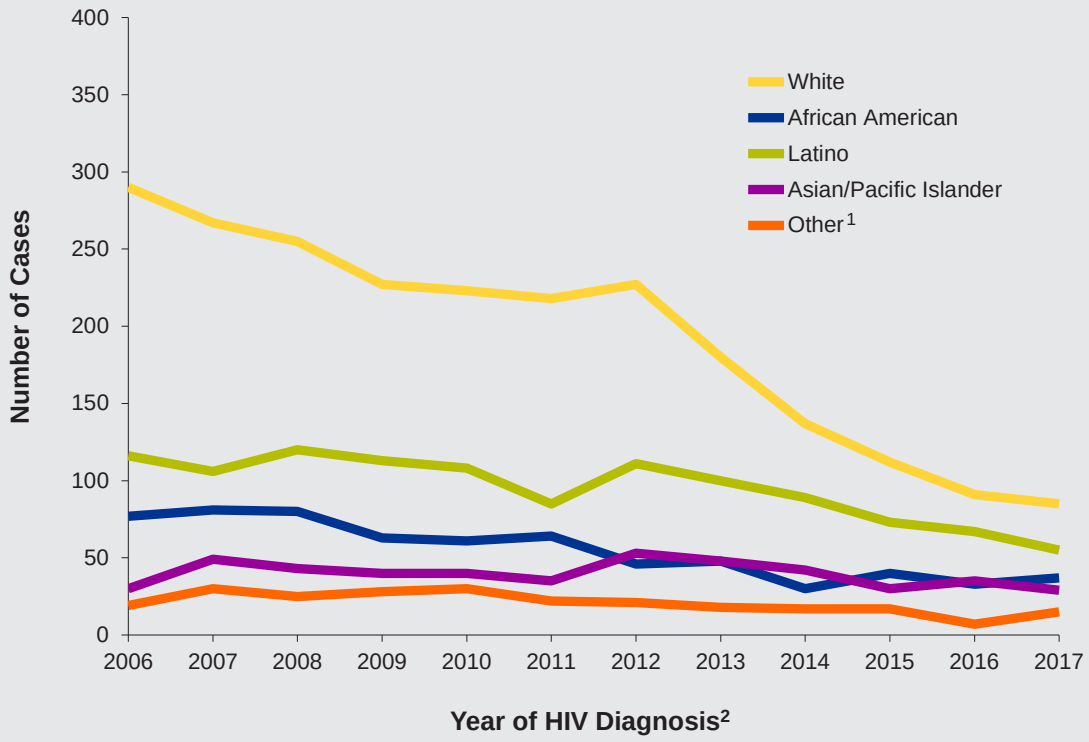
1 Year of HIV diagnosis is based on the evidence of a confirmed HIV test and does not take into account patient self-report of HIV infection.
2 Percent of new diagnoses.
3 Percent of persons who ever had a negative test.

2 Trends in HIV Diagnoses

Race/ethnicity

Trends by racial/ethnic category for persons newly diagnosed with HIV show that, from 2006 through 2017, whites accounted for the largest number of newly diagnosed cases (Figure 2.1). The number of HIV diagnoses among whites declined for most of this time period, leveled off between 2009 and 2012, and then continued to decline through 2017. The number of diagnoses among African Americans declined from 77 cases in 2006 to 37 cases in 2017, with some indication that annual diagnoses have leveled since 2015. The annual number of diagnoses among Asian/Pacific Islanders was similar to African Americans from 2012 and onward. The number of HIV diagnoses among Latinos increased from 2006 to 2008 and then declined from 120 diagnoses to 55 diagnoses in 2017.

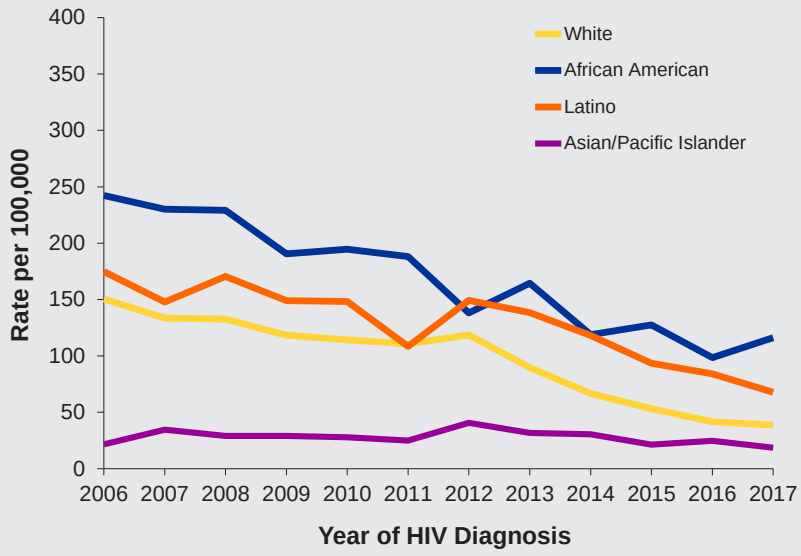
Figure 2.1 Number of persons newly diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco



1 Cases in the "Other" racial/ethnic category include 7% Native Americans, 90% muti-race, and 3% unknown.
2 See Technical Notes "Date of Initial HIV Diagnosis."

Among men, annual rates of HIV diagnosis declined for most racial/ethnic groups from 2006 through 2017. The annual gender and race/ethnicity specific population rates of HIV diagnosis were generally highest among African American men (ranging from 242 per 100,000 in 2006 to 116 per 100,000 in 2017 (Figure 2.2). The rates of HIV diagnosis for white men in this time period also declined from 151 per 100,000 in 2006 to 39 per 100,000 in 2017. HIV rates for Latino men declined from 175 per 100,000 in 2006 to 68 per 100,000 in 2017. Asian and Pacific Islander men had fairly stable diagnosis rates in this time period.

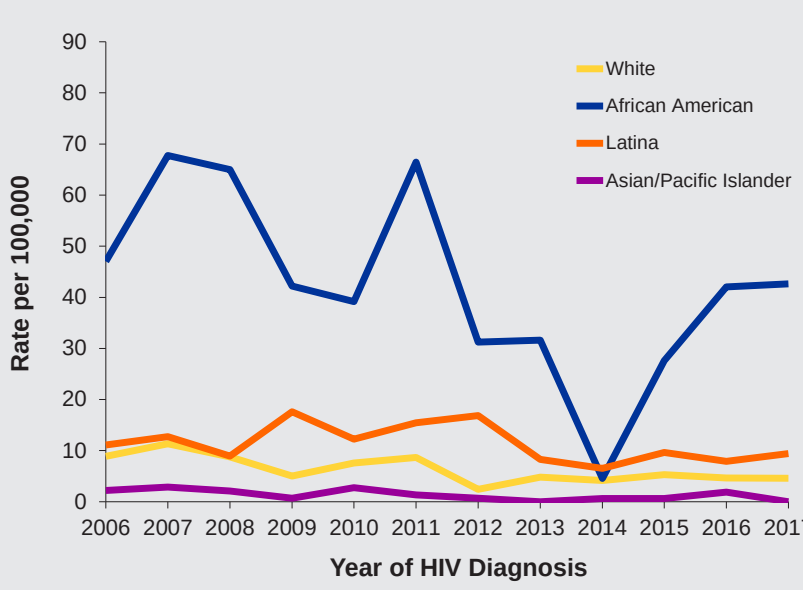
Figure 2.2 Annual rates[1] of men newly diagnosed with HIV per 100,000 population by race/ethnicity, 2006-2017, San Francisco



1 See Technical Notes "HIV Case Rates and HIV Mortality Rates." Includes persons with HIV by year of their initial HIV diagnosis. Rates for Native American and multi-racial cases are not calculated due to small numbers.

In San Francisco, annual gender and race/ethnicity specific population rates of HIV diagnosis were substantially lower among women, compared to men, and the rates tend to fluctuate. For the period of 2006 to 2017, the annual rates of HIV diagnosis were higher for African American women compared to other single racial/ethnic groups, from 47 per 100,000 in 2006 to 43 per 100,000 in 2017 (Figure 2.3). Data from last two years show increases in the rate for African American women compared to 2012 to 2015. Annual rates of diagnosis for white women have been under 10 per 100,000 since 2008. Rates for Latina women peaked at 18 per 100,000 in 2009 and declined to 9 per 100,000 in 2017.

Figure 2.3 Annual rates[1] of women newly diagnosed with HIV per 100,000 population by race/ethnicity, 2006-2017, San Francisco

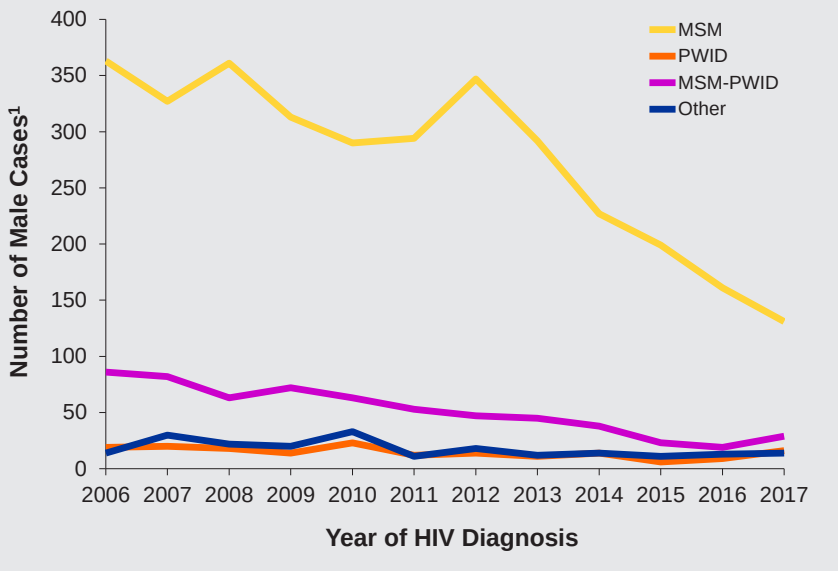


1 See Technical Notes "HIV Case Rates and HIV Mortality Rates." Includes persons with HIV by year of their initial HIV diagnosis. Rates for Native American and multi-racial cases are not calculated due to small numbers.

Transmission category

The majority of men newly diagnosed with HIV in San Francisco are MSM (non-PWID), and while the annual number fluctuated, the overall trend declined (Figure 2.4). The annual number of MSM-PWID diagnoses declined each year beginning in 2010 to 2016 but rose in the most recent year. Annual diagnoses in heterosexual PWID also declined in 2015 and 2016 but increased in 2017. In 2017, 69% of men diagnosed with HIV were MSM, 15% were MSM-PWID, and 8% were heterosexual PWID.

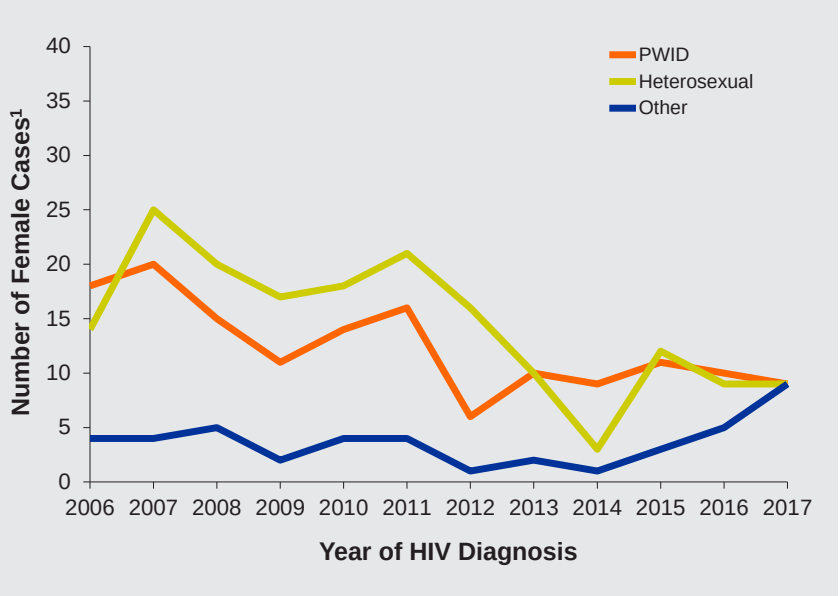
Figure 2.4 Number of men newly diagnosed with HIV by transmission category, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis.

From 2006 to 2017, the annual number of women newly diagnosed with HIV due to heterosexual contact was very similar to that for female PWID (Figure 2.5). In 2017, the number of San Francisco women diagnosed was 27 with diagnoses distributed evenly among PWID, women who acquired HIV through heterosexual contact, and women who acquired HIV through other or not reported transmission routes.

Figure 2.5 Number of women newly diagnosed with HIV by transmission category, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis.

Age

Table 2.1 shows the annual number of HIV diagnoses between 2013 and 2017 by gender and age at HIV diagnosis. The annual number of men diagnosed declined from 360 in 2013 to 190 in 2017. Among men, the proportion in the 40-49 years age group decreased each year in this time period. The proportion of men in the 30-39 years age group increased in this time period from 29% to 36%. Slight proportional increases were also observed in recent years for men aged 50 years and older (13% in 2016 and 16% in 2017). Overall, most new diagnoses who were men occurred in the 30-39 years age group, followed by men in 40-49 years of age.

In this time period, the annual number of women diagnosed showed a slight pattern of increase. In 2017, women aged 40-49 years accounted for one third of annual diagnoses in women, followed by women aged 50 years and older with 22% of annual diagnoses.

Table 2.1 Number of persons newly diagnosed with HIV by gender[1] and age at diagnosis, 2013-2017, San Francisco

	Year of Initial HIV Diagnosis[2]									
	2013		2014		2015		2016		2017	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Men (Age in years)										
0 - 12	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
13 - 17	0	(0)	1	(0)	2	(1)	0	(0)	1	(1)
18 - 24	54	(15)	33	(11)	35	(15)	28	(14)	20	(11)
25 - 29	74	(21)	53	(18)	56	(23)	48	(24)	37	(19)
30 - 39	105	(29)	88	(30)	69	(29)	67	(33)	68	(36)
40 - 49	88	(24)	69	(24)	51	(21)	32	(16)	34	(18)
50+	39	(11)	49	(17)	26	(11)	27	(13)	30	(16)
Men Total	**360**		**293**		**239**		**202**		**190**	
Women (Age in years)										
0 - 12	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
13 - 17	0	(0)	0	(0)	1	(4)	0	(0)	2	(7)
18 - 24	1	(5)	2	(15)	1	(4)	2	(8)	3	(11)
25 - 29	3	(14)	1	(8)	5	(19)	5	(21)	2	(7)
30 - 39	3	(14)	1	(8)	10	(38)	6	(25)	5	(19)
40 - 49	6	(27)	4	(31)	4	(15)	4	(17)	9	(33)
50+	9	(41)	5	(38)	5	(19)	7	(29)	6	(22)
Women Total	**22**		**13**		**26**		**24**		**27**	

1 Data on trans women and trans men by age are not presented due to small numbers and potential small population.
2 See Technical Notes "Date of Initial HIV Diagnosis."

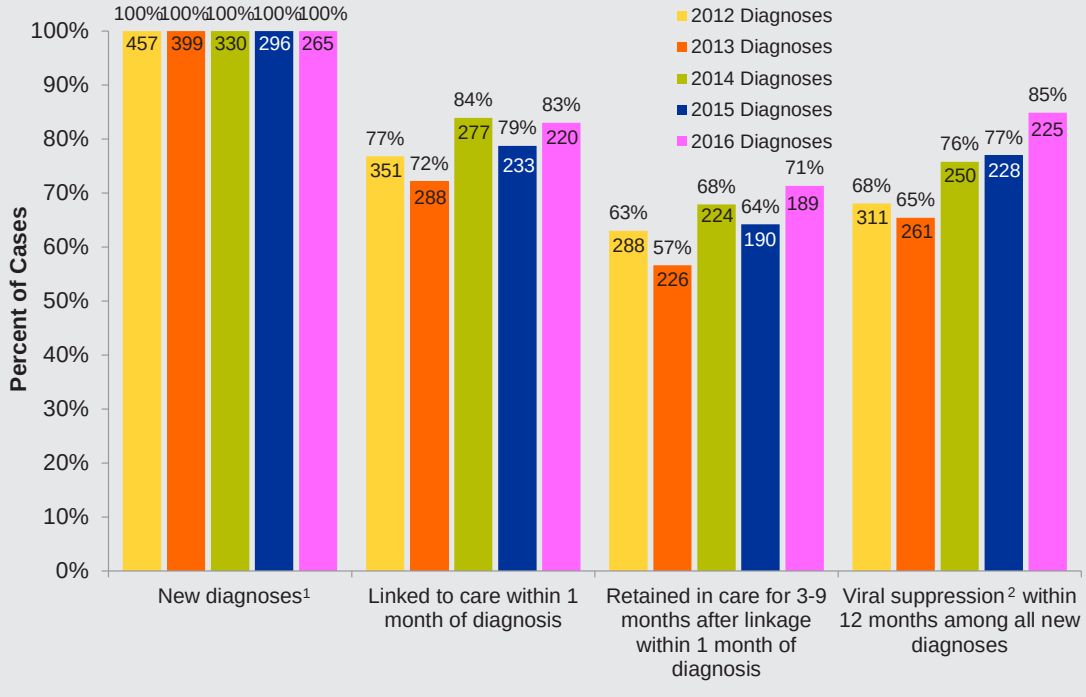
3 Spectrum of Engagement in HIV Prevention and Care

Continuum of HIV care among persons newly diagnosed with HIV

To prevent adverse health outcomes among persons newly diagnosed with HIV, rapid entry into health care, continuous engagement in care, and use of antiretroviral therapy (ART) to achieve viral suppression is required. The San Francisco Department of Public Health (SFDPH) monitors these outcomes using reports of CD4, viral load and genotype tests as indicators of care, and viral load test results to measure viral suppression (defined as a viral load less than 200 copies/mL). The date of HIV diagnosis is determined based on a confirmed HIV test and does not take into account patient self-report of HIV infection.

During the period 2012 through 2016, the number of persons newly diagnosed with HIV declined from 457 in 2012 to 265 in 2016 (Figure 3.1). In this time period, the proportion of newly diagnosed persons who entered care within one month fluctuated between 72% and 84%. However, not all persons who entered care continued to receive care; 57%-71% of persons diagnosed in 2012 to 2016 remained in care three to nine months after initial linkage to care (i.e., had a subsequent laboratory test after their first laboratory test). The proportion of newly diagnosed persons who achieved viral suppression within 12 months increased from 68% in 2012 to 85% in 2016. The continued increase in the proportion virally suppressed from 2013 to 2016 reflects expanded San Francisco citywide activities to ensure timely and sustained receipt of care and ART to achieve viral suppression.

Figure 3.1 Continuum of HIV care among persons newly diagnosed with HIV, 2012-2016, San Francisco



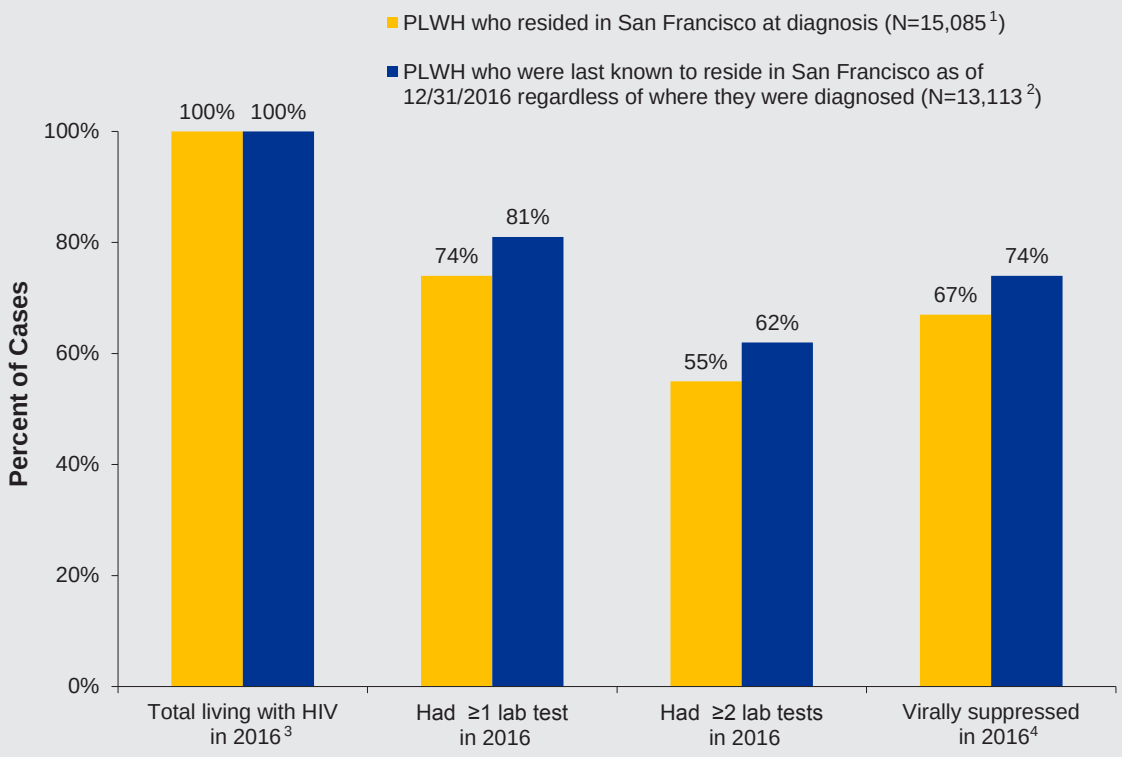
1 Number of new diagnoses shown each year is based on the evidence of a confirmed HIV test and does not take into account patient self-report of HIV infection.
2 Defined as the latest viral load test within 12 months of HIV diagnosis <200 copies/mL.

Continuum of HIV care among persons living with HIV

As of December 31, 2016 there were 15,085 persons living with HIV (PLWH) who were diagnosed through the end of 2015 and who resided in San Francisco at time of diagnosis. Of these, 74% had at least one CD4, viral load or genotype test (received care), 55% had two or more laboratory tests at least three months apart (retained in care), and 67% were virally suppressed in 2016 (Figure 3.2).

Because in- and out-migration occur and the residence at time of diagnosis may differ from the current residence among PLWH, SFDPH collects and updates information regarding current residence for PLWH who resided in San Francisco at time of diagnosis as well as PLWH who resided elsewhere at time of diagnosis but receive care in San Francisco. There were 13,113 PLWH who had a most recent address in San Francisco. This includes 10,055 persons who were San Francisco residents at time of diagnosis and still in San Francisco and 3,058 persons who resided in another jurisdiction at time of diagnosis and moved to San Francisco after diagnosis. Of these, 81% received care, 62% were retained in care and 74% were virally suppressed in 2016.

Figure 3.2 Continuum of HIV care among persons living with HIV, 2016, San Francisco



1 Includes residents of San Francisco at time of diagnosis. Excludes persons who were non-San Francisco residents at time of HIV diagnosis but San Francisco residents at stage 3 HIV (AIDS) diagnosis.

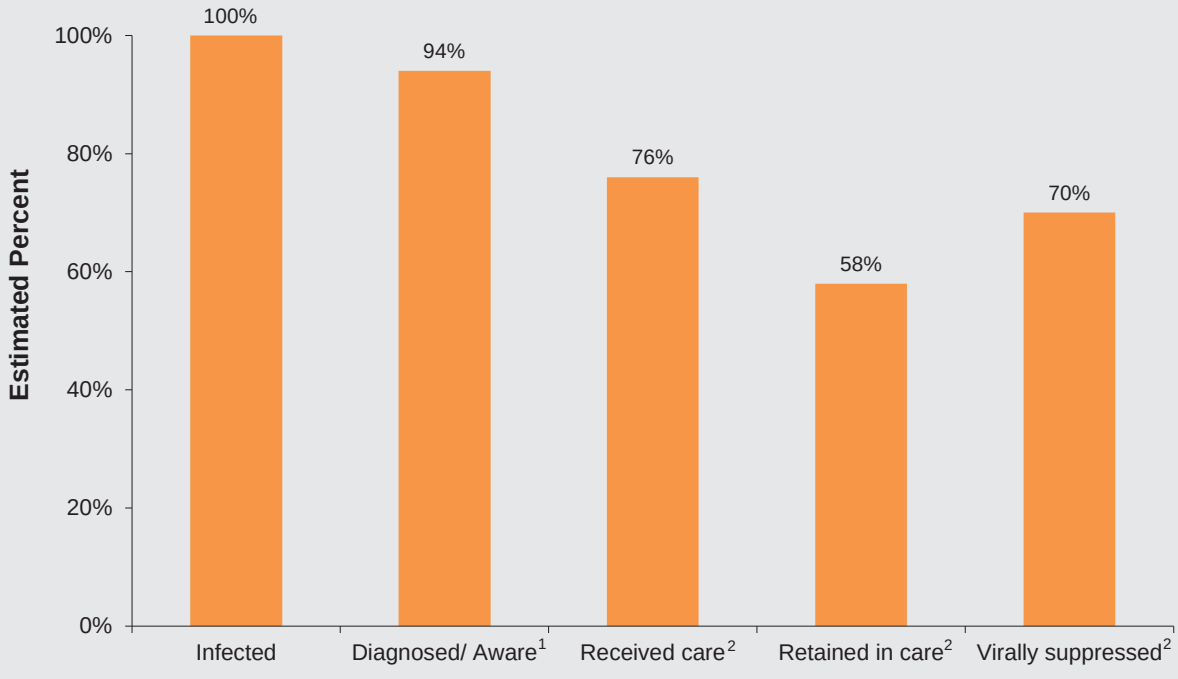
2 Includes persons whose most recent address was in San Francisco: 10,055 San Francisco residents at diagnosis who were still in San Francisco and 3,058 persons who resided outside San Francisco at diagnosis and moved to San Francisco after diagnosis.

3 Includes persons living with HIV at the end of 2016 (≥ 13 years old) and diagnosed by the end of 2015.

4 Defined as the latest viral load in 2016 <200 copies/mL.

The continuum of HIV care among PLWH includes those aware of their HIV status (diagnosed) as well as those infected and not aware (undiagnosed) and is shown in Figure 3.3. This is estimated by applying the percent of persons infected with HIV who know their serostatus, from the CD4 depletion model, to the case surveillance data that assesses care indicators using the most recent residence information. It is estimated that 94% of all persons with HIV (diagnosed and undiagnosed) are aware of their infection, 76% received care, 58% retained in care, and 70% were virally suppressed in 2016. The lower proportion of PLWH retained in care relative to the proportion of PLWH virally suppressed may be because some PLWH receiving care did not have multiple laboratory tests in a year.

Figure 3.3 Continuum of HIV care among persons living with diagnosed or undiagnosed HIV infection, 2016, San Francisco



1 The estimated percent aware of HIV infection for San Francisco was derived from the CD4 depletion model. See Technical Notes "CD4-Based Model."

2 The estimated percent received care, retained in care, and virally suppressed among all infected was derived by applying the 94% diagnosed/aware to the 81% who had ≥1 lab tests, 62% who had ≥2 lab tests, and 74% who were virally suppressed among persons living with HIV who were last known to reside in San Francisco as shown in Figure 3.2, respectively.

HIV care and prevention indicators

Key HIV care and prevention indicators for 2013 through 2016 among persons with HIV in San Francisco are shown in Table 3.1. The proportion of late stage HIV diagnosis, defined as a new case who developed HIV infection stage 3 (AIDS) within three months of HIV diagnosis, decreased from 18% in 2013 to 11% in 2016. The median time from HIV diagnosis to viral suppression shortened from 134 days in 2013 to 63 days in 2016. All care indicators from diagnosis to viral suppression improved over time including time from HIV diagnosis to first care (from 8 days in 2013 to 5 days in 2016), time from receipt of care to ART initiation (from 27 days in 2013 to 0 day in 2016) and time from ART initiation to viral suppression (from 71 days in 2013 to 39 days in 2016). Care indicators were assessed among PLWH who were known to reside in San Francisco at the end of each year in 2013-2016 regardless of their residence at time of diagnosis. The proportion of PLWH who received care increased over time from 76% in 2013 to 81% in 2016, as did that proportion of who were virally suppressed from 66% in 2013 to 74% in 2016. The proportion of PLWH who received two or more CD4 or viral load tests decreased, perhaps suggesting stabilized health conditions among PLWH in care that required less frequent testing to monitor HIV.

Table 3.1 Care and prevention indicators among persons newly diagnosed with HIV and living with HIV, 2013-2016, San Francisco

Indicators	Year			
	2013	2014	2015	2016
New HIV diagnoses[1]	**N=399**	**N=330**	**N=296**	**N=265**
Proportion developed AIDS within 3 months of diagnosis	18%	16%	17%	11%
Proportion linked to care within 1 month of diagnosis	72%	84%	79%	83%
Proportion virally suppressed[2] within 12 months of diagnosis	65%	76%	77%	85%
Median time (days) from HIV diagnosis to first viral suppression	134	93	79	63
Median time (days) from HIV diagnosis to first care	8	7	7	5
Median time (days) from first care to ART initiation[3]	27	17	6	0
Median time (days) from ART initiation to first viral suppresssion[3]	71	53	50	39
Median CD4 count (cells/µL) at treatment initiation among those diagnosed with a CD4 count>500 cells/µL	675	660	672	687
Living HIV cases[4] (≥13 years old)	**N=14,241**	**N=13,259**	**N=13,841**	**N=13,113**
Proportion of cases who had ≥1 CD4/viral load test	76%	82%	82%	81%
Proportion received ≥2 tests among those with ≥1 test	79%	76%	76%	76%
Proportion virally suppressed[2] among living cases	66%	72%	74%	74%
Proportion virally suppressed among those with ≥1 viral load test	89%	90%	91%	92%

1 Includes persons diagnosed each year based on a confirmed HIV test and does not take into account patient self-report of HIV infection.

2 Defined as the latest viral load test within 12 months of HIV diagnosis <200 copies/mL. For living cases viral suppression is measured using the latest test in the year.

3 Calculation is limited to persons diagnosed with HIV who were known to have started ART. See Technical Notes "Estimate of ART Use."

4 Includes San Francisco residents living with HIV as of the end of each year and diagnosed as of the end of the previous year. Excludes persons known to have moved out of San Francisco after the specified year.

Care indicators among persons with HIV by demographic and risk characteristics

Although the majority of San Franciscans newly diagnosed with HIV in 2016 were linked to care within one month of diagnosis (83%), retained in care three to nine months after linkage to care (71%), and achieved viral suppression within 12 months after diagnosis (85%), there are noticeable differences in these care indicators by demographic and risk characteristics (Table 3.2). A lower proportion of linkage to care, retention in care, and viral suppression was observed among women and trans women, those aged 30 years and older, and PWID. Homeless persons had a similar level of linkage to and retention in care but lower proportion of viral suppression compared to persons who were housed at diagnosis.

Table 3.2 Care indicators among persons newly diagnosed with HIV in 2016 by demographic and risk characteristics, San Francisco

	Number of diagnoses[1]	% Linked to care within 1 month of diagnosis[2]	% Retained in care 3-9 months after linkage[2]	% Virally suppressed within 12 months of diagnosis[2]
Total	**265**	**83%**	**71%**	**85%**
Gender[3]				
Men	230	84%	72%	87%
Women	28	75%	64%	75%
Trans Women	6	83%	83%	50%
Race/Ethnicity				
White	97	81%	68%	77%
African American	36	83%	69%	86%
Latino	73	93%	79%	90%
Asian/Pacific Islander	51	73%	67%	92%
Other/Unknown	8	75%	75%	75%
Age at Diagnosis				
13-24	34	91%	79%	91%
25-29	61	89%	79%	89%
30-39	86	78%	67%	85%
40-49	44	82%	68%	82%
50+	40	80%	65%	78%
Transmission Category				
MSM	185	85%	72%	86%
PWID	21	76%	67%	67%
MSM-PWID	25	84%	76%	84%
Heterosexual	22	77%	68%	95%
Other/Unidentified	12	75%	58%	75%
Housing Status at Diagnosis				
Housed	237	83%	71%	86%
Homeless	28	82%	75%	71%

1 Includes persons diagnosed in 2016 based on a confirmed HIV test and does not take into account patient self-report of HIV infection.
2 Percent of total diagnoses.
3 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

Among PLWH in 2016 who were San Francisco residents at time of diagnosis, 67% were virally suppressed. The proportion who were virally suppressed was lower among African Americans, Latinos, persons younger than 50 years, PWID (including MSM-PWID), and homeless persons (Table 3.3).

Table 3.3 Care indicators among persons living with HIV in 2016 who resided in San Francisco at diagnosis, by demographic and risk characteristics

	Number of living cases[1]	% with >= 1 laboratory test in 2016[2]	% with >=2 laboratory tests in 2016[2]	% Virally suppressed (most recent viral load test in 2016 <200 copies/mL)[2]
Total	**15,085**	**74%**	**55%**	**67%**
Gender[3]				
Men	13,890	73%	55%	67%
Women	840	80%	60%	66%
Trans Women	352	80%	63%	68%
Race/Ethnicity				
White	9,028	74%	55%	68%
African American	1,771	75%	57%	64%
Latino	2,879	71%	55%	64%
Asian/Pacific Islander	870	74%	56%	68%
Other/Unknown	537	80%	57%	70%
Age in Years (as of 12/31/2016)				
13-24	83	73%	63%	60%
25-29	339	75%	53%	64%
30-39	1,568	69%	47%	58%
40-49	3,417	71%	49%	62%
50-59	5,649	73%	55%	67%
60-69	3,233	78%	63%	74%
70+	796	81%	69%	79%
Transmission Category				
MSM	11,262	74%	55%	68%
PWID	839	77%	58%	62%
MSM-PWID	2,214	75%	56%	63%
Heterosexual	526	78%	59%	68%
Other/Unidentified	244	52%	34%	46%
Housing Status, Most Recent				
Housed	14,794	74%	55%	68%
Homeless	291	55%	37%	33%

1 Includes San Francisco residents at diagnosis living with HIV at the end of 2016 (≥13 years old) and diagnosed by the end of 2015. Excludes persons who were non-San Francisco residents at time of HIV diagnosis but San Francisco residents at stage 3 HIV (AIDS) diagnosis.

2 Percent of total living cases.

3 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

We assessed care indicators among the 13,113 PLWH in 2016 who were known to reside in San Francisco based on their most recent available residence. This excludes San Francisco residents at diagnosis who subsequently moved outside of San Francisco and includes persons who resided elsewhere at time of HIV diagnosis and moved to San Francisco after diagnosis. Among the 13,113 San Francisco residents living with HIV, 74% were virally suppressed. Similar to that observed among all PLWH who were San Francisco residents at diagnosis in Table 3.3, the proportion of current San Francisco residents living with HIV (last known to reside in San Francisco) who were virally suppressed was lower among women, trans women, African Americans, Latinos, persons less than 50 years, PWID (including MSM-PWID), and homeless persons (Table 3.4).

Table 3.4 Care indicators among persons living with HIV in 2016 who were known to reside in San Francisco as of the end of 2016, by demographic and risk characteristics

	Number of living cases[1]	% with >= 1 laboratory test in 2016[2]	% with >=2 laboratory tests in 2016[2]	% Virally suppressed (most recent viral load test in 2016 <200 copies/mL)[2]
Total	**13,113**	**81%**	**62%**	**74%**
Gender[3]				
Men	12,025	81%	61%	74%
Women	729	82%	64%	68%
Trans Women	356	84%	67%	68%
Race/Ethnicity				
White	7,389	82%	61%	76%
African American	1,638	83%	64%	69%
Latino	2,755	78%	61%	70%
Asian/Pacific Islander	784	79%	61%	74%
Other/Unknown	547	85%	65%	73%
Age in Years (as of 12/31/2016)				
13-24	90	86%	71%	69%
25-29	409	78%	56%	70%
30-39	1,742	78%	54%	66%
40-49	3,125	78%	55%	68%
50-59	4,684	82%	63%	75%
60-69	2,443	86%	71%	82%
70+	620	87%	75%	85%
Transmission Category				
MSM	9,680	82%	62%	76%
PWID	759	83%	64%	67%
MSM-PWID	1,971	81%	62%	67%
Heterosexual	472	82%	62%	70%
Other/Unidentified	231	56%	42%	52%
Housing Status, Most Recent				
Housed	12,793	82%	62%	75%
Homeless	320	54%	36%	32%

1 Includes San Francisco residents living with HIV as of the end of 2016 (≥13 years old) and diagnosed by the end of 2015.
2 Percent of total living cases.
3 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

Table 3.5 displays care outcomes of clients who accepted and completed the SFDPH Linkage Integration Navigation Comprehensive Services (LINCS) program (see Technical Notes "Linkage Integration Navigation Comprehensive Services"). From January 1, 2016 through December 31, 2016, 154 PLWH who were referred to LINCS for linkage and navigation services accepted and completed LINCS navigation. The vast majority (80%) of those who completed the LINCS program had a viral load, CD4 test or genotyping test within three months of LINCS initiation.

Over half (64%) who completed LINCS had additional testing in the three to nine months after linkage, indicating retention in care. Sixty-two percent of linked individuals showed evidence of viral suppression at their most recent viral load in the 12 month period after they began the LINCS program. Linkage, retention and suppression rates varied by demographic factors, but small numbers and selection bias make it difficult to infer demographic differences in care outcomes from these data.

Table 3.5 Care indicators among persons who accepted and completed LINCS services in 2016 by demographic and risk characteristics, San Francisco

	Number of accepted and completed LINCS	% Linked to care within 3 months of LINCS initiation[1]	% Retained in care 3-9 months after linkage[1]	% Virally suppressed at most recent test in 12 months after LINCS initiation[1]
Total	**154**	**80%**	**64%**	**62%**
Gender				
Men	126	81%	64%	63%
Women	14	79%	64%	64%
Trans Women	14	71%	64%	50%
Race/Ethnicity				
White	59	75%	56%	54%
African American	42	88%	79%	74%
Latino	41	76%	56%	56%
Asian/Pacific Islander	4	100%	100%	75%
Other/Unknown	8	88%	75%	75%
Age in Years (as of 12/31/16)				
13-24	4	75%	75%	75%
25-29	17	71%	47%	65%
30-39	43	81%	74%	58%
40-49	48	81%	63%	60%
50+	42	81%	62%	64%
Transmission Category				
MSM	69	87%	67%	61%
PWID	27	85%	70%	67%
MSM-PWID	50	66%	54%	62%
Heterosexual	4	100%	100%	50%
Other/Unidentified	4	75%	75%	50%
Housing Status				
Housed	105	81%	64%	62%
Homeless	49	78%	65%	61%

1 Percent of persons accepted and completed LINCS.

Comparison of San Francisco HIV prevention and care indicators to California and the United States

HIV prevention and care indicator data for San Francisco, California, and the United States are displayed in Table 3.6 (year of the most recent available data is indicated in parentheses). Awareness of HIV status in San Francisco is high (94%) compared to all of California (86%) and the U.S. (86%). The proportion of persons with a late HIV diagnosis in San Francisco is lower than the proportion in California and the U.S. Access to HIV care and viral suppression among PLWH in San Francisco and California is assessed using the most current residence and does not include persons who are known to have moved outside of the jurisdiction. The proportions of PLWH who received care and were virally suppressed were higher in San Francisco than in California and the U.S. The higher proportion of persons with laboratory tests in San Francisco may reflect greater completeness of reporting CD4 and viral load test results in San Francisco compared to California and the U.S. The death rates per 1,000 persons with HIV or stage 3 HIV (AIDS) in San Francisco were slightly higher than that in California but lower than in the U.S. Of note, the California and the U.S. data were unavailable for more recent years therefore some of the observed differences may be due to the earlier time periods for the California and U.S. data.

Table 3.6 Comparison of HIV prevention and care indicators for San Francisco, California, and the United States

Indicators	San Francisco	California[2]	United States[2]
Awareness of HIV status[1]			
Estimated % persons living with HIV who know their serostatus	94% (2015)	86% (2015)	86% (2015)
Late HIV diagnosis			
% persons diagnosed with AIDS within 3 months of HIV diagnosis	11% (2016)	19% (2016)	21% (2016)
HIV care access and outcome[3]			
% newly diagnosed persons linked to care within 1 month of HIV diagnosis	83% (2016)	75% (2016)	76% (2016)
% PLWH who are in care (≥1 laboratory tests)	81% (2016)	75% (2015)	73% (2015)
% PLWH who are retained in care (≥2 laboratory tests)	62% (2016)	57% (2015)	57% (2015)
% PLWH who are virally suppressed	74% (2016)	64% (2015)	60% (2015)
% PLWH aged 13-24 years who are virally suppressed	69% (2016)	NA	51% (2015)
% PLWH PWID who are virally suppressed	67% (2016)	NA	52% (2015)
HIV mortality			
Death rate per 1,000 persons with HIV (including AIDS) diagnosis	14.6 (2017)	13.7 (2015)	16.5 (2015)
Death rate per 1,000 persons with AIDS diagnosis	21.1 (2017)	19.9 (2015)	24.4 (2015)

1 The estimated percent aware of HIV infection for San Francisco was derived using the CD4 depletion model. See Technical Notes "CD4-Based Model." Reference: Centers for Disease Control and Prevention. Estimated HIV incidence and prevalence in the United States, 2010–2015. HIV Surveillance Supplemental Report 2018;23(No. 1).

2 CDC HIV Surveillance Supplemental Report 2017;22(No. 2). http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Published June 2018.

3 The percentages of persons living with HIV diagnosis who are in care, retained in care, and virally suppressed are calculated among those diagnosed and last known to be living in San Francisco and California, respectively.

NA: Not Available.

Use of antiretroviral therapy

The estimated use of ART among PLWH as of December 31, 2017 and among persons diagnosed in 2016 is shown in Table 3.7. Persons with a medical record indicating that they were prescribed ART were assumed to have received it (see Technical Notes "Estimate of ART Use"). The lower level estimate shown in the table was calculated among all living HIV cases (N=15,952). The upper level estimate was calculated among living cases who had not known to move out of San Francisco and had follow-up information and chart review completed within the last two years (N=5,946). Overall, 90%-98% of PLWH received ART. ART use was slightly lower among women, African Americans, persons under 40 years, PWID, and the homeless.

Among 265 persons newly diagnosed with HIV in 2016, 89% received ART. ART use was lower among women, persons with race/ethnicity other than African American and Latino, persons aged 40 or older, and PWID. Receipt of ART was similar by housing status at diagnosis, suggesting that lack of housing did not bar access to ART among persons newly diagnosed with HIV.

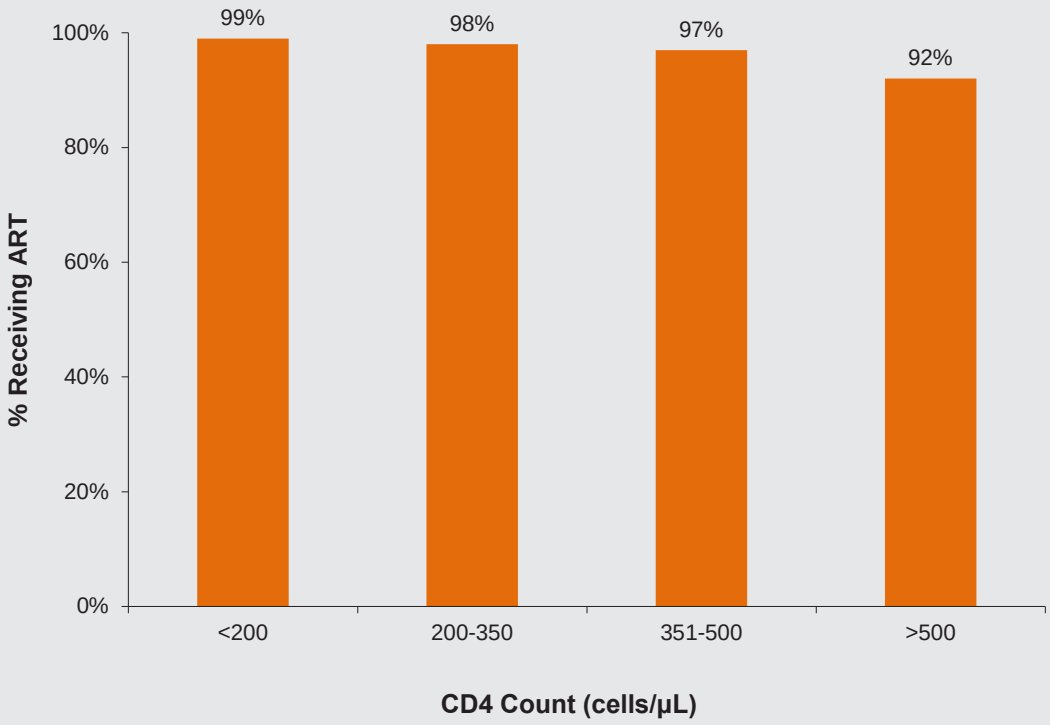
Table 3.7 Estimate of ART use among persons living with HIV as of December 2017 and diagnosed in 2016 by demographic and risk characteristics, San Francisco

	Persons living with HIV, December 2017 Percent receiving ART, ever		Persons newly diagnosed with HIV, 2016 Percent receiving ART
	Lower level estimate (N=15,952)	Upper level estimate (N=5,946)	(N=265)
Overall	**90%**	**98%**	**89%**
Gender[1]			
Men	90%	98%	90%
Women	90%	95%	82%
Trans Women	92%	98%	100%
Race/Ethnicity			
White	91%	98%	82%
African American	87%	96%	94%
Latino	91%	98%	100%
Asian/Pacific Islander	88%	98%	84%
Other/Unknown	89%	98%	75%
Age[2]			
13 - 24	87%	96%	97%
25 - 29	85%	93%	93%
30 - 39	84%	95%	88%
40 - 49	88%	98%	86%
50 +	93%	99%	80%
Transmission Category			
MSM	91%	98%	90%
PWID	86%	95%	86%
MSM-PWID	91%	98%	92%
Heterosexual	94%	98%	95%
Housing Status[3]			
Housed	91%	98%	89%
Homeless	74%	89%	89%
Insurance at HIV/AIDS Diagnosis			
Private	94%	98%	93%
Public	92%	97%	91%
None	87%	98%	91%

1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."
2 Age as of December 31, 2017 for PLWH. Age at HIV diagnosis for persons newly diagnosed with HIV.
3 Housing status is based on the most recent residence for PLWH and the residence at HIV diagnosis for persons newly diagnosed with HIV.

The estimated use of ART by the lowest CD4 count ever reported ("nadir CD4") among PLWH who had their medical chart reviewed between January 2016 and May 2018 is shown in Figure 3.4 (N=5,946). Persons without follow-up information within the last two years or those known to have moved out of San Francisco were excluded from the estimate. As expected, the proportion receiving ART was higher among persons with the lower CD4 count: 99% of cases with a nadir CD4 count below 200 cells/μL, 98% with a nadir CD4 count between 200-350 cells/μL, 97% with a nadir CD4 count between 351-500 cells/μL, and 92% with a nadir CD4 count above 500 cells/μL received ART.

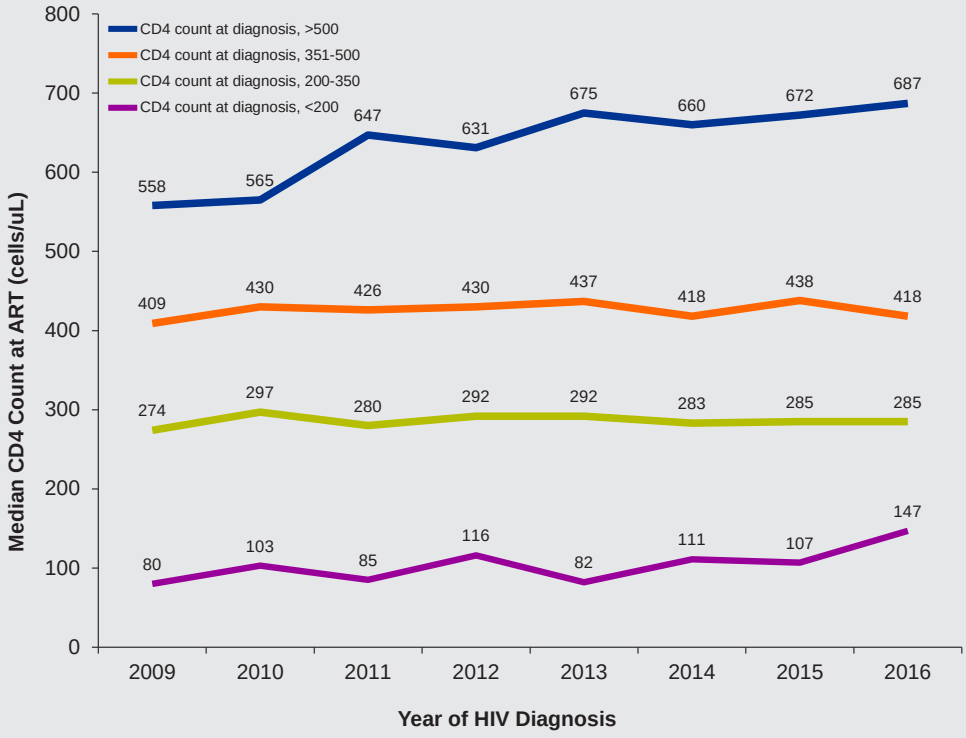
Figure 3.4 Estimate of ART use[1] among persons living with HIV and with chart review, by nadir CD4 level, December 2017, San Francisco



1 See Technical Notes "Estimate of ART Use."

Trends in median CD4 count at time of ART initiation by CD4 count at time of diagnosis for the years 2009-2016 are shown in Figure 3.5. Among persons newly diagnosed with HIV between 2009 and 2016 whose CD4 count at diagnosis was >500 cells/μL, the median CD4 count at ART initiation increased from 558 cells/μL in 2009 to 687 cells/μL in 2016. Among persons whose CD4 count at diagnosis was between 200 and 500 cells/μL, the median CD4 count at ART initiation remained relatively stable over time. The median CD4 count at ART initiation among persons whose CD4 count at diagnosis <200 cells/μL fluctuated between 80 and 116 cells/μL during 2009-2015 and increased to 147 cells/μL in 2016.

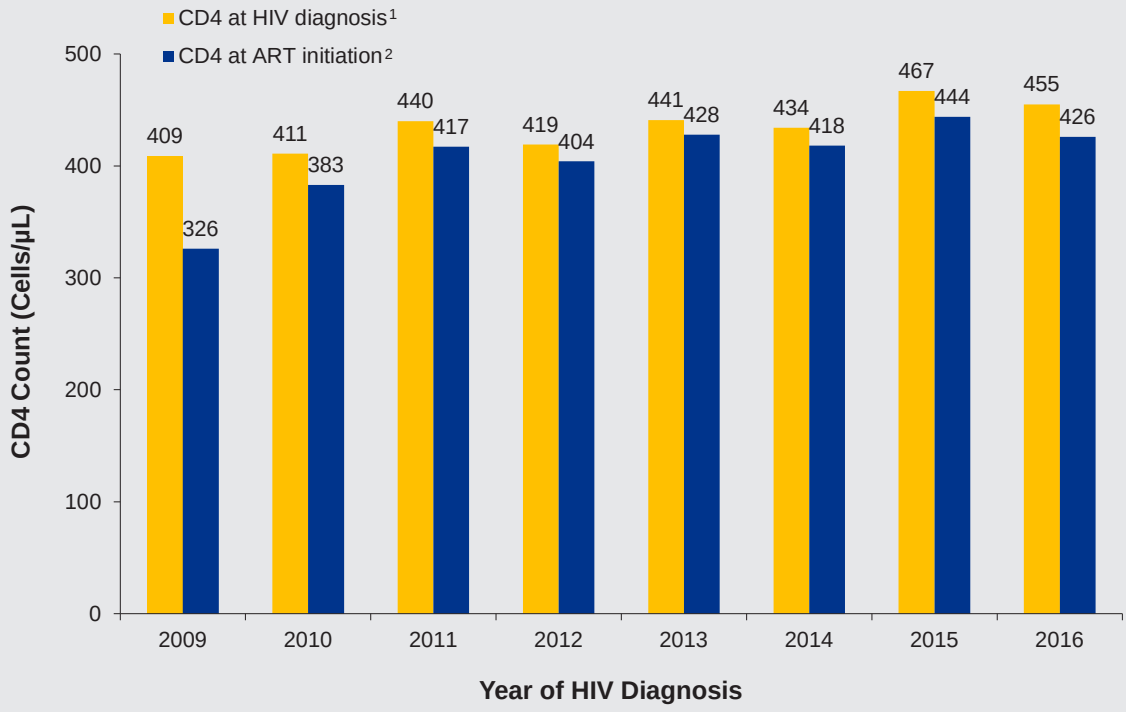
Figure 3.5 Trends in median CD4 count at time of ART initiation by CD4 count at time of diagnosis, 2009-2016, San Francisco



1 Median CD4 count at ART initiation was calculated among persons who started ART and whose CD4 count at HIV diagnosis and CD4 count at ART initiation were available (N=2,201).

Among 2,706 persons newly diagnosed with HIV between 2009 and 2016, the median CD4 count at HIV diagnosis increased from 409 cells/μL in 2009 to 455 cells/μL in 2016 (Figure 3.6). The increase in CD4 count at diagnosis likely reflects shorter time between HIV infection and HIV diagnosis. The temporal increase in CD4 count at ART initiation is more prominent: among persons who were diagnosed in 2009 and known to have started ART, the median CD4 count at ART initiation was 326 cells/μL while the median CD4 count at ART initiation for persons diagnosed in 2016 was 426 cells/μL, suggesting that the time between HIV diagnosis and ART initiation has shortened during 2009 to 2016, consistent with recommendations for early initiation of ART.

Figure 3.6 Trends in median CD4 count at time of diagnosis and at time of ART initiation among persons newly diagnosed with HIV, 2009-2016, San Francisco



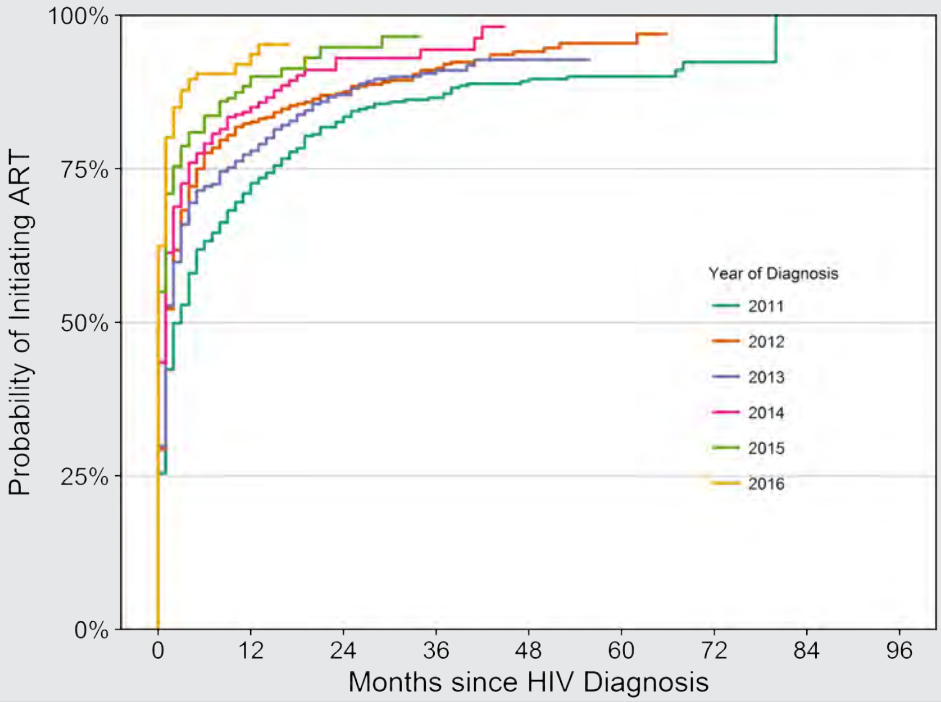
1 Median CD4 count at HIV diagnosis was calculated among persons whose CD4 count at HIV diagnosis was available (N=2,706).

2 Median CD4 count at ART initiation was calculated among persons who started ART and whose CD4 count at HIV diagnosis and CD4 count at ART initiation were available (N=2,201).

Trends in time from HIV diagnosis to ART initiation

Early entry into care and initiation of ART among persons diagnosed with HIV are essential to achieve optimal treatment outcomes. We estimated the time from HIV diagnosis to initiation of ART among 1,960 persons diagnosed with HIV between 2011 and 2016 who have evidence of receipt of care (had at least one CD4, viral load, or genotype test after diagnosis). The median time from diagnosis to ART initiation significantly decreased from three months (87 days) in 2011 to less than one month (14 days) in 2016 (Figure 3.7).

Figure 3.7 Kaplan-Meier estimates of time from HIV diagnosis to ART initiation among persons diagnosed with HIV by year of diagnosis, 2011-2016, San Francisco



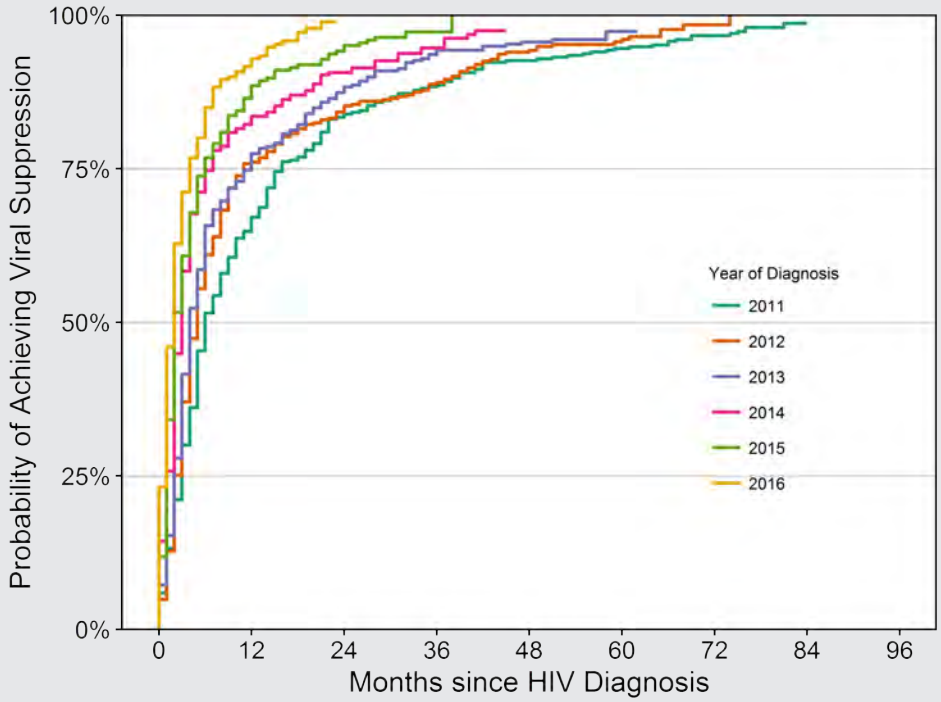
	Median time between diagnosis and ART initiation (months/days)	Total cases included[1]	No. initiated ART as of 05/03/2018	No. (%) censored at the last follow-up date
2011	3 / 87	389	335	54 (14%)
2012	1 / 55	415	372	43 (10%)
2013	1 / 50	362	302	60 (17%)
2014	1 / 34	299	263	36 (12%)
2015	<1 / 22	269	238	31 (12%)
2016	<1 / 14	226	196	30 (13%)

1 Includes persons diagnosed with HIV who were in care. Excludes 115 persons with an invalid ART initiation date. Time between HIV diagnosis and ART initiation was calculated using full dates (month, day, year).

Trends in time from HIV diagnosis to viral suppression

Among PLWH, viral suppression (HIV viral load less than 200 copies/mL) is associated with a lower risk of HIV-related morbidity and mortality and a lower risk of transmitting HIV to others. The treatment goal for PLWH is rapid and sustained viral suppression. The time from HIV diagnosis to viral suppression has significantly shortened among 2,075 persons diagnosed in more recent years who were in care (Figure 3.8). Among persons diagnosed with HIV in 2011, half achieved viral suppression in six months following their diagnosis (median time to viral suppression). The median time to viral suppression shortened steadily in each of the following years: five months for persons diagnosed in 2012, four months in 2013, three months in 2014, and two months for persons diagnosed in 2015 and 2016.

Figure 3.8 Kaplan-Meier estimates of time from HIV diagnosis to viral suppression among persons diagnosed with HIV by year of diagnosis, 2011-2016, San Francisco



	Median time between diagnosis and viral suppression (months/days)	Total cases included[1]	No. virally suppressed as of 5/3/2018	No. (%) censored at the last lab test date
2011	6 / 199	405	376	29 (7%)
2012	5 / 153	431	399	32 (7%)
2013	4 / 145	373	334	39 (10%)
2014	3 / 100	320	297	23 (7%)
2015	2 / 83	287	264	23 (8%)
2016	2 / 66	259	244	15 (6%)

1 Includes persons diagnosed with HIV who were in care. Time between HIV diagnosis and viral suppression was calculated using full dates (month, day, year).

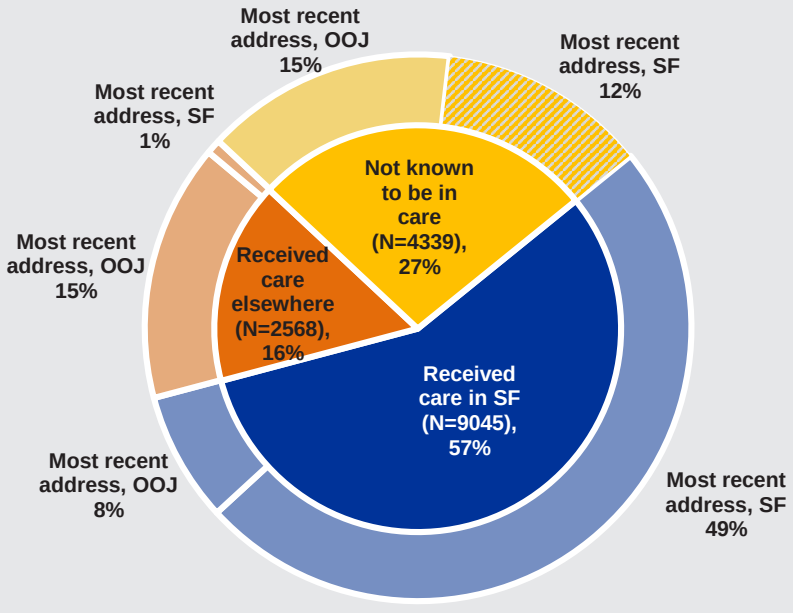
Receipt of HIV care among persons living with HIV by residence status

Local health jurisdictions are responsible for reporting all residents newly diagnosed with HIV/AIDS. However, gaps in follow-up data develop due to persons moving in or out of the jurisdiction following their diagnosis. Laboratory reports of CD4, viral load and genotype test results were used as indicators of care in 2017. Incomplete HIV-related care information may result for San Francisco HIV cases who received care outside of San Francisco. Therefore, to examine the receipt of care among PLWH, we used the most current address and initial residence at diagnosis to study two patterns: 1) San Francisco residents at time of diagnosis who currently live and receive care elsewhere, and 2) residents outside of San Francisco at the time of their initial HIV diagnosis who currently receive care in San Francisco. Current address information on PLWH is routinely updated through chart reviews, laboratory reports, and other external data sources such as Lexis-Nexis, a national database comprised of 37 million public records to update addresses for cases who have no follow-up information.

We included 15,952 PLWH in 2017 who resided in San Francisco at diagnosis and categorized them by their current address to examine receipt of HIV care patterns (Figure 3.9). Overall, 73% received HIV care in 2017 (57% received care in San Francisco, 16% received care outside of San Francisco) and 27% did not receive HIV care. Twelve percent (N=1,964) of all PLWH did not receive HIV care and had a San Francisco current address; these persons should be a high priority to be reengaged back into care.

Figure 3.9 Persons living with HIV in 2017 who resided in San Francisco at diagnosis by care and most recent residence status

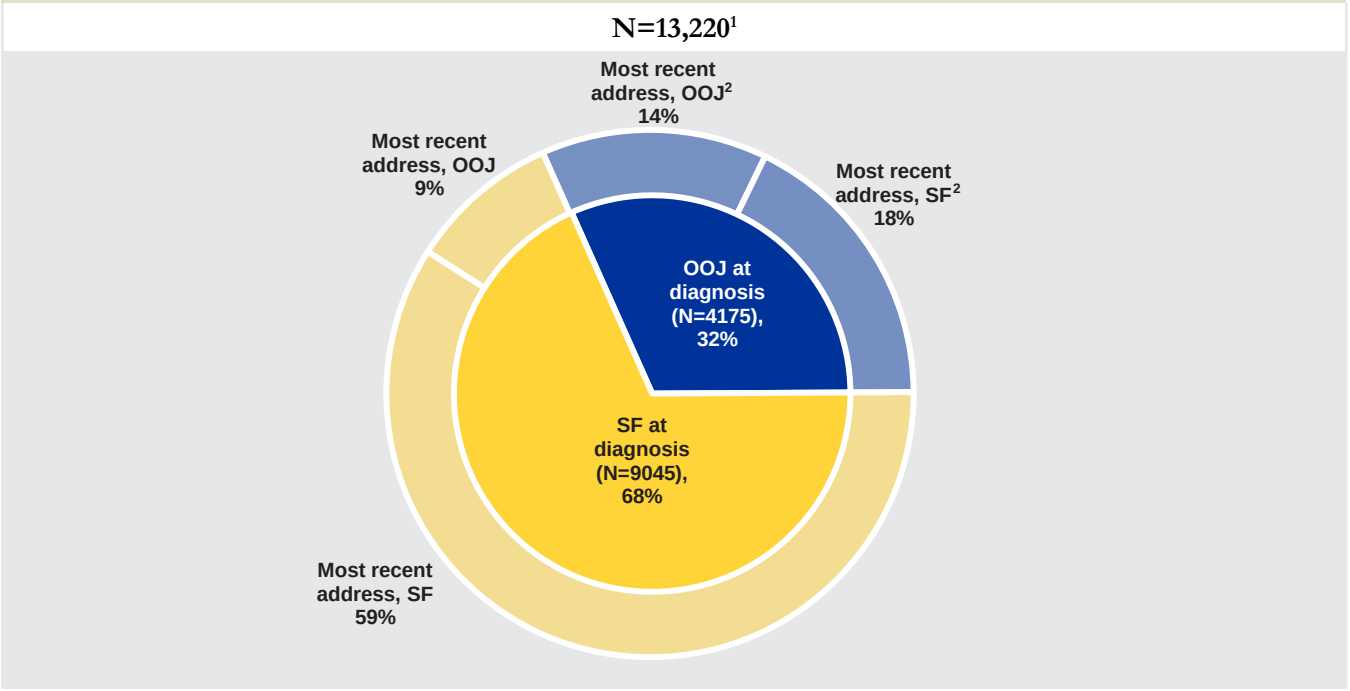
N=15,952[1]



1 Includes persons who resided in San Francisco at diagnosis and were alive as of December 2017 to assess where they live based on the most recent available address and where they receive care in 2017.

We also evaluated all PLWH who received care in San Francisco in 2017, regardless of their residence at time of HIV diagnosis. There were 13,220 persons who had an HIV-related test result (defined as a CD4, viral load or genotype test) in San Francisco in 2017. Of those receiving at least one HIV-related test in 2017 in San Francisco, 32% were originally diagnosed elsewhere (Figure 3.10). Twenty-three percent of PLWH who received care in San Francisco currently reside outside of San Francisco. This quantifies the pattern of care for those who travel to San Francisco for their HIV care. However, the extent of care utilization and HIV case migration patterns cannot be fully understood until more complete laboratory and residence information is collected and shared between jurisdictions.

Figure 3.10 Persons living with HIV who received care in San Francisco in 2017 by residence at diagnosis and most recent residence status



1 Includes persons who received HIV care in San Francisco in 2017 regardless of where they were initially diagnosed with HIV.
2 Most recent address for OOJ residents at diagnosis is less complete because the update on address information is not conducted regularly or consistently.

The majority of PLWH who received care in 2017 in San Francisco were male, white, over 50 years old, and MSM (Table 3.8). The distribution of characteristics among those currently known to live in San Francisco and those known to live in another jurisdiction was similar.

Table 3.8 Characteristics of persons living with HIV who received care in San Francisco in 2017 by most recent residence status

	Persons receiving HIV care in San Francisco[1]					
	Total cases receiving care in 2017		Most recent residence in San Francisco[2]		Most recent residence outside San Francisco[2]	
	Number	(%)	Number	(%)	Number	(%)
Total	**13,220**	**(100)**	**10,159**	**(100)**	**3,061**	**(100)**
Gender[3]						
Men	12,077	(91)	9,266	(91)	2,811	(92)
Women	798	(6)	600	(6)	198	(6)
Trans Women	339	(3)	289	(3)	50	(2)
Race/Ethnicity						
White	7,394	(56)	5,669	(56)	1,725	(56)
African American	1,765	(13)	1,296	(13)	469	(15)
Latino	2,639	(20)	2,089	(21)	550	(18)
Asian/Pacific Islander	852	(6)	667	(7)	185	(6)
Other/Unknown	570	(4)	438	(4)	132	(4)
Age in Years (as of 12/31/2017)						
0-12	7	(<1)	0	(0)	7	(<1)
13-24	152	(1)	93	(1)	59	(2)
25-29	467	(4)	339	(3)	128	(4)
30-39	1,773	(13)	1,321	(13)	452	(15)
40-49	2,754	(21)	2,111	(21)	643	(21)
50-59	4,575	(35)	3,568	(35)	1,007	(33)
60-69	2,770	(21)	2,144	(21)	626	(20)
70+	722	(5)	583	(6)	139	(5)
Transmission Category						
MSM	9,876	(75)	7,533	(74)	2,343	(77)
PWID	728	(6)	609	(6)	119	(4)
MSM-PWID	1,810	(14)	1,493	(15)	317	(10)
Heterosexual	535	(4)	380	(4)	155	(5)
Other/Unidentified	271	(2)	144	(1)	127	(4)

1 Includes persons living with HIV at end of 2017 who received care in San Francisco in 2017 regardless of where they were initially diagnosed with HIV. Receipt of care in San Francisco is defined as having at least one CD4, viral load, or genotype test ordered by San Francisco HIV providers.

2 Based on most recent available address.

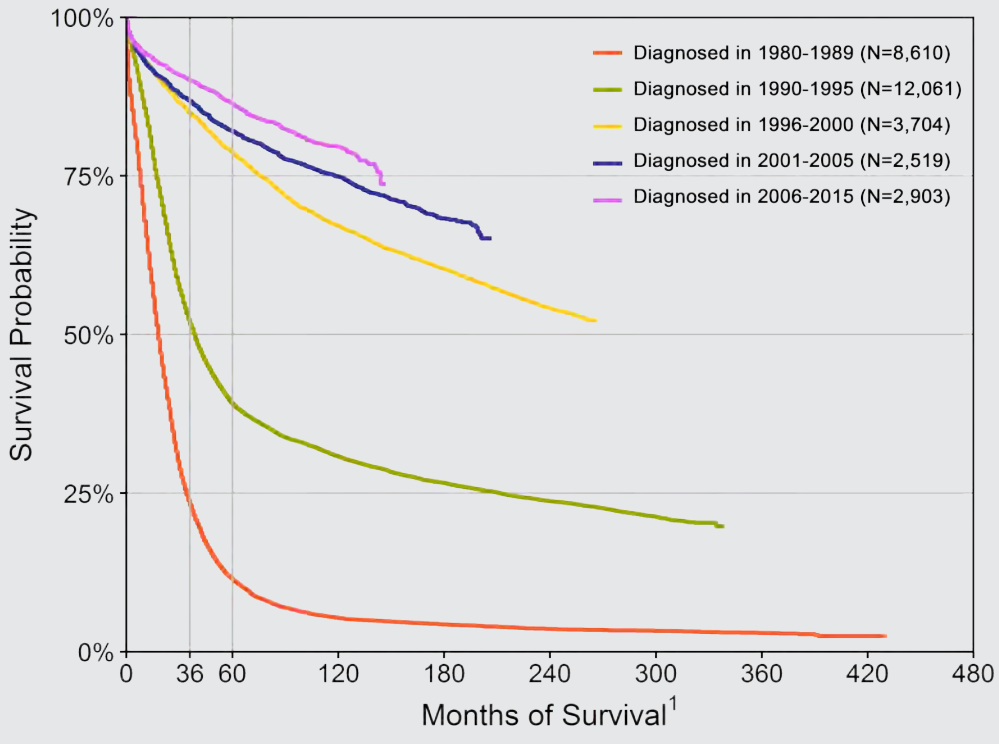
3 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

4 Survival among Persons with HIV Disease Stage 3 (AIDS)

The Kaplan-Meier survival curves in Figure 4.1 demonstrate continual improvement in survival after stage 3 HIV (AIDS) diagnosis since the 1980s with the greatest improvement in survival beginning in 1996, when highly active antiretroviral therapy became widely available. Survival was poor for persons diagnosed in the first ten years of the epidemic (1980-1989) with a median survival time (survival probability of 50%) of 18 months after stage 3 HIV diagnosis. The median survival time increased to 38 months for persons diagnosed between 1990 and 1995. Survival among stage 3 HIV cases diagnosed in the two most recent time periods shows continued improvement. Survival after HIV stage 3 diagnosis was calculated for persons diagnosed through 2015 to allow for at least 24 months follow-up time after diagnosis.

The survival probability at three years (36 months) among stage 3 HIV diagnoses increased from 23% in the period 1980-1989 to 52% in the period 1990-1995 followed by an increase to 85% in the period 1996-2000 and smaller but continued increase in more recent years' diagnoses (87% in 2001-2005, 90% in 2006-2015, respectively). The survival probability at five years (60 months) after stage 3 HIV diagnosis followed a similar pattern: only 11% of HIV stage 3 cases diagnosed in 1980-1989 survived for five years while persons diagnosed with stage 3 HIV in the years 2006-2015 had a five-year survival probability of 86%.

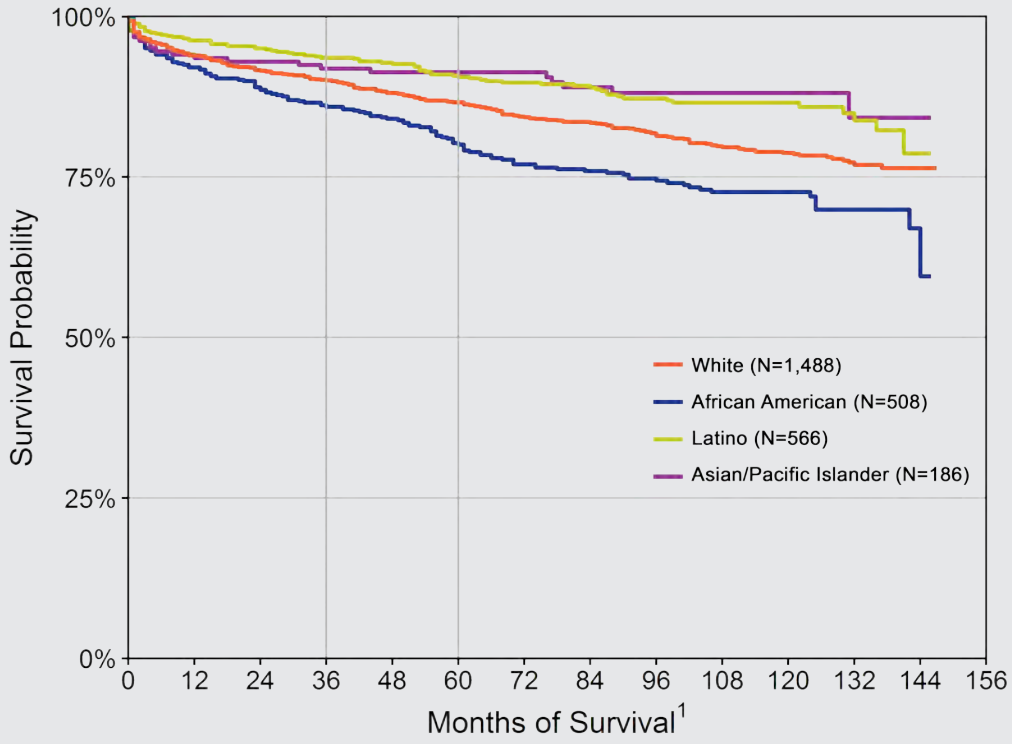
Figure 4.1 Kaplan-Meier survival curves for persons diagnosed with stage 3 HIV (AIDS) in five time periods, San Francisco



1 See Technical Notes "HIV Disease Stage 3 (AIDS) Survival."

Among persons diagnosed with stage 3 HIV (AIDS) in the years 2006-2015, survival probability at both three and five years was lower among African Americans compared to whites, Latinos, and Asian/Pacific Islanders (Figure 4.2). The three- and five-year survival probability for African Americans after HIV stage 3 diagnosis was 86% and 80%, respectively, compared to 90% and 87% among whites, 94% and 91% among Latinos, and 92% and 91% among Asian/Pacific Islanders.

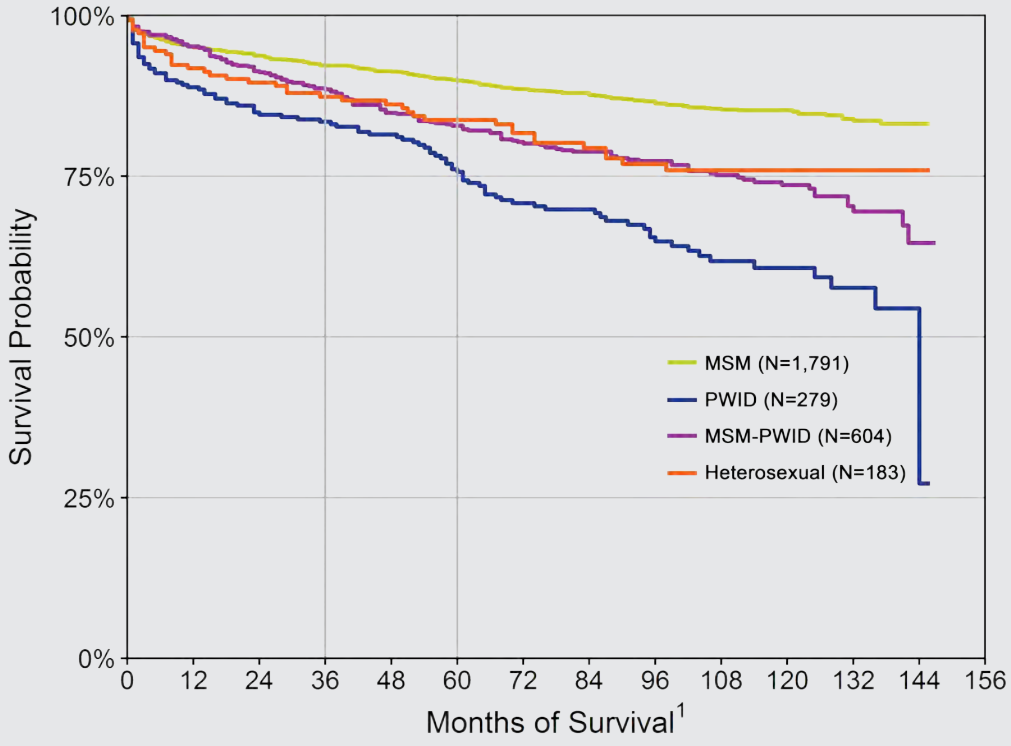
Figure 4.2 Kaplan-Meier survival curves for persons diagnosed with stage 3 HIV (AIDS) between 2006 and 2015 by racial/ethnic group, San Francisco



1 See Technical Notes "HIV Disease Stage 3 (AIDS) Survival."

For stage 3 HIV (AIDS) cases diagnosed from 2006 through 2015, the three- and five-year survival probability after stage 3 HIV diagnosis has been highest for MSM at 92% and 90%, respectively, and worst for heterosexual PWID at 83% and 76% (Figure 4.3). Worse survival among MSM-PWID (compared with MSM non-PWID) partly reflects higher death rates from causes associated with drug use such as overdose, liver disease, viral hepatitis, and other infections.

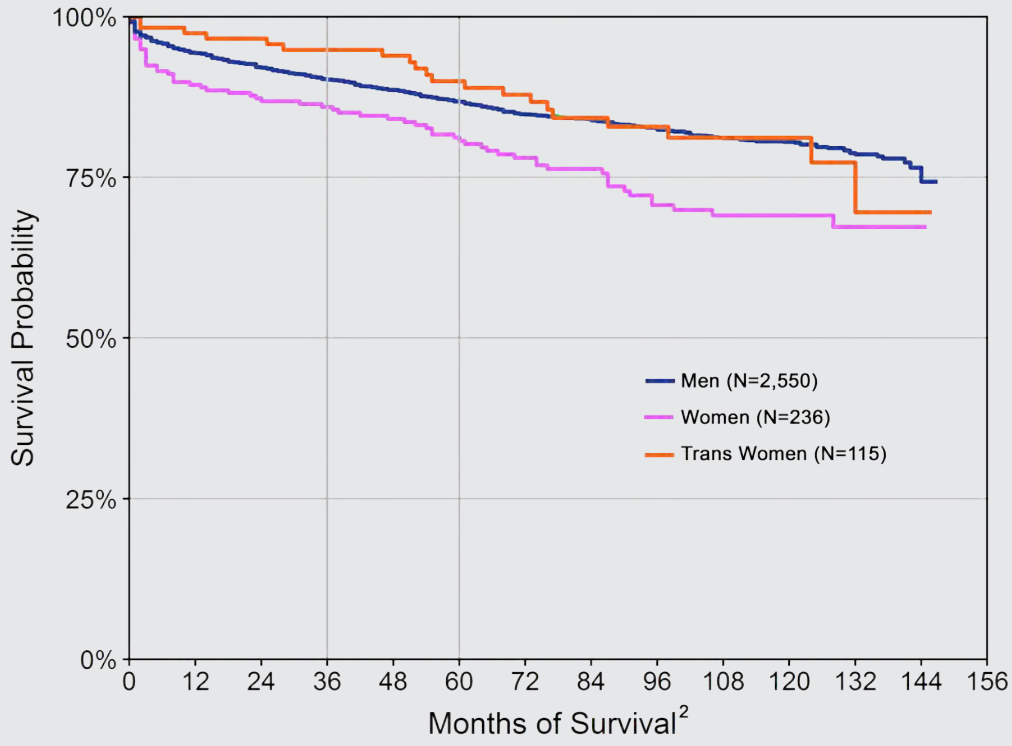
Figure 4.3 Kaplan-Meier survival curves for persons diagnosed with stage 3 HIV (AIDS) between 2006 and 2015 by transmission category, San Francisco



1 See Technical Notes "HIV Disease Stage 3 (AIDS) Survival."

Survival among women with stage 3 HIV (AIDS) diagnosis from 2006 through 2015 was lower than survival among men and trans women (Figure 4.4). The three- and five-year survival probability among women was 86% and 81%, respectively compared to 90% and 87% respectively among men and 95% and 89% among trans women. The differences in survival by gender are consistent with lower use of ART and higher proportion of PWID among women.

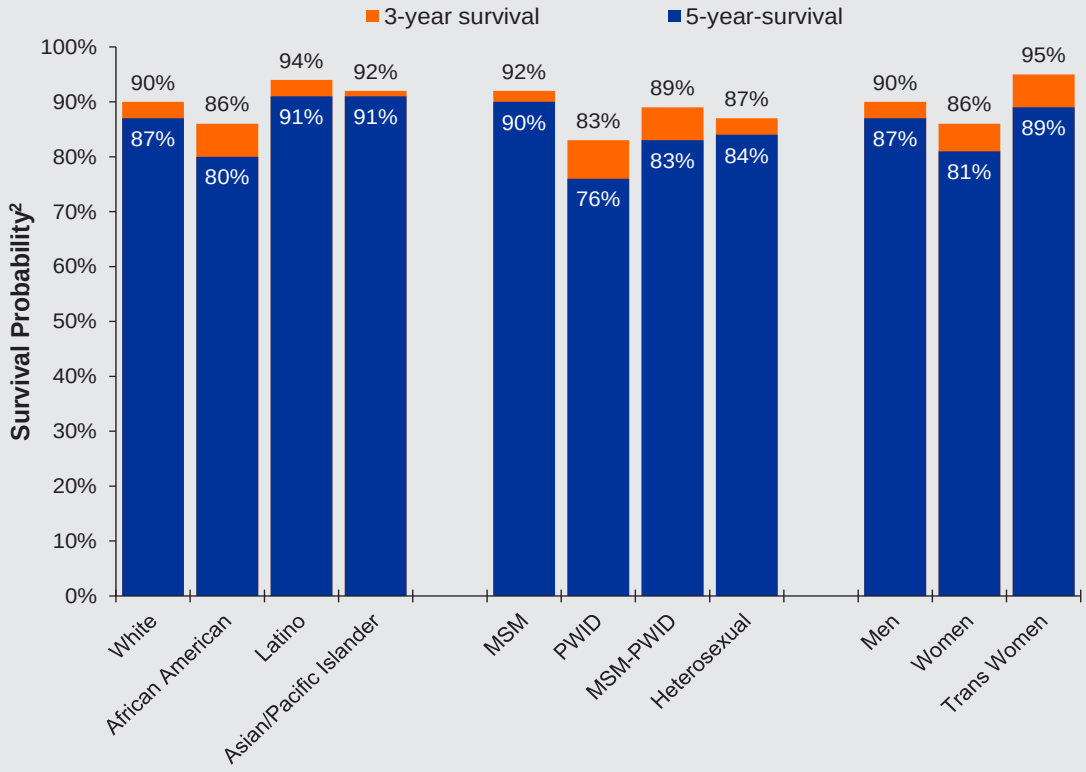
Figure 4.4 Kaplan-Meier survival curves for persons diagnosed with stage 3 HIV (AIDS) between 2006 and 2015 by gender[1], San Francisco



1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."
2 See Technical Notes "HIV Disease Stage 3 (AIDS) Survival."

The overall three-year and five-year survival probability after stage 3 HIV (AIDS) for persons diagnosed between 2006 and 2015 was 90% and 86%, respectively. Differences in survival occurred across race/ethnicity, transmission category, and gender groups (Figure 4.5). African Americans, PWID, and women had lower three-year and five-year survival probabilities compared to other groups.

Figure 4.5 Three-year and five-year survival probability after stage 3 HIV (AIDS) for persons diagnosed between 2006 and 2015 by racial/ethnic group[1], transmission category, and gender[1], San Francisco



1 Native American, multi-racial, trans men data are not released separately due to small numbers.
2 Calculated from Kaplan-Meier method.

5 Trends in HIV Mortality

As of December 31, 2017, the cumulative number of deaths among San Francisco HIV cases was 21,554 (Table 5.1). From 2012 to 2017 the proportions of deaths by gender was relatively stable. The proportions of deaths in whites and MSM-PWID have increased. The majority of deaths during each of these years continues to occur among persons aged 50 years and older (69% to 79%) with an increase in both number and proportion of deaths in persons aged 70 years and older in 2017.

Table 5.1 Deaths among persons diagnosed with HIV, by demographic and risk characteristics, 2012-2017, San Francisco

	Year of Death												Cumulative Totals as of 12/31/2017
	2012		2013		2014		2015		2016		2017		
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	
Gender[1]													
Men	211	(89)	222	(85)	209	(87)	228	(89)	199	(84)	215	(88)	20,368
Women	18	(8)	29	(11)	20	(8)	27	(11)	27	(11)	20	(8)	898
Trans Women	8	(3)	10	(4)	12	(5)	1	(<1)	10	(4)	9	(4)	287
Race/Ethnicity													
White	149	(63)	148	(57)	139	(58)	146	(57)	142	(60)	159	(65)	15,638
African American	45	(19)	49	(19)	53	(22)	48	(19)	51	(22)	42	(17)	2,779
Latino	31	(13)	39	(15)	35	(15)	31	(12)	30	(13)	34	(14)	2,281
Asian/Pacific Islander/ Native American	3	(1)	9	(3)	4	(2)	8	(3)	4	(2)	3	(1)	550
Multi-Race	9	(4)	16	(6)	10	(4)	23	(9)	9	(4)	6	(2)	306
Transmission Category													
MSM	134	(57)	150	(57)	141	(59)	142	(55)	127	(54)	128	(52)	15,628
PWID	42	(18)	49	(19)	40	(17)	43	(17)	35	(15)	37	(15)	1,821
MSM-PWID	50	(21)	54	(21)	51	(21)	60	(23)	63	(27)	67	(27)	3,521
Heterosexual	7	(3)	5	(2)	9	(4)	6	(2)	9	(4)	9	(4)	256
Other/Unidentified	4	(2)	3	(1)	0	(0)	5	(2)	2	(1)	3	(1)	328
Age at Death (years)													
0 - 29	2	(1)	3	(1)	4	(2)	7	(3)	1	(0)	4	(2)	1,116
30 - 39	12	(5)	12	(5)	11	(5)	15	(6)	11	(5)	10	(4)	7,369
40 - 49	58	(24)	57	(22)	37	(15)	37	(14)	40	(17)	37	(15)	7,722
50 - 59	83	(35)	100	(38)	90	(37)	100	(39)	76	(32)	83	(34)	3,566
60 - 69	60	(25)	66	(25)	70	(29)	66	(26)	78	(33)	61	(25)	1,344
70+	22	(9)	23	(9)	29	(12)	31	(12)	30	(13)	49	(20)	437
HIV Disease Stage													
Stage 0, 1, 2, or unknown	43	(18)	55	(21)	42	(17)	42	(16)	38	(16)	39	(16)	628
Stage 3 (AIDS)	194	(82)	206	(79)	199	(83)	214	(84)	198	(84)	205	(84)	20,926
Cause of Death[2]													
HIV/AIDS-related	84	(35)	103	(39)	106	(44)	99	(39)	77	(33)	78	(32)	--
Non-HIV/AIDS-related	150	(63)	151	(58)	132	(55)	147	(57)	156	(66)	158	(65)	--
Unknown	3	(1)	7	(3)	3	(1)	10	(4)	3	(1)	8	(3)	--
Total	**237**	**(100)**	**261**	**(100)**	**241**	**(100)**	**256**	**(100)**	**236**	**(100)**	**244**	**(100)**	**21,554**

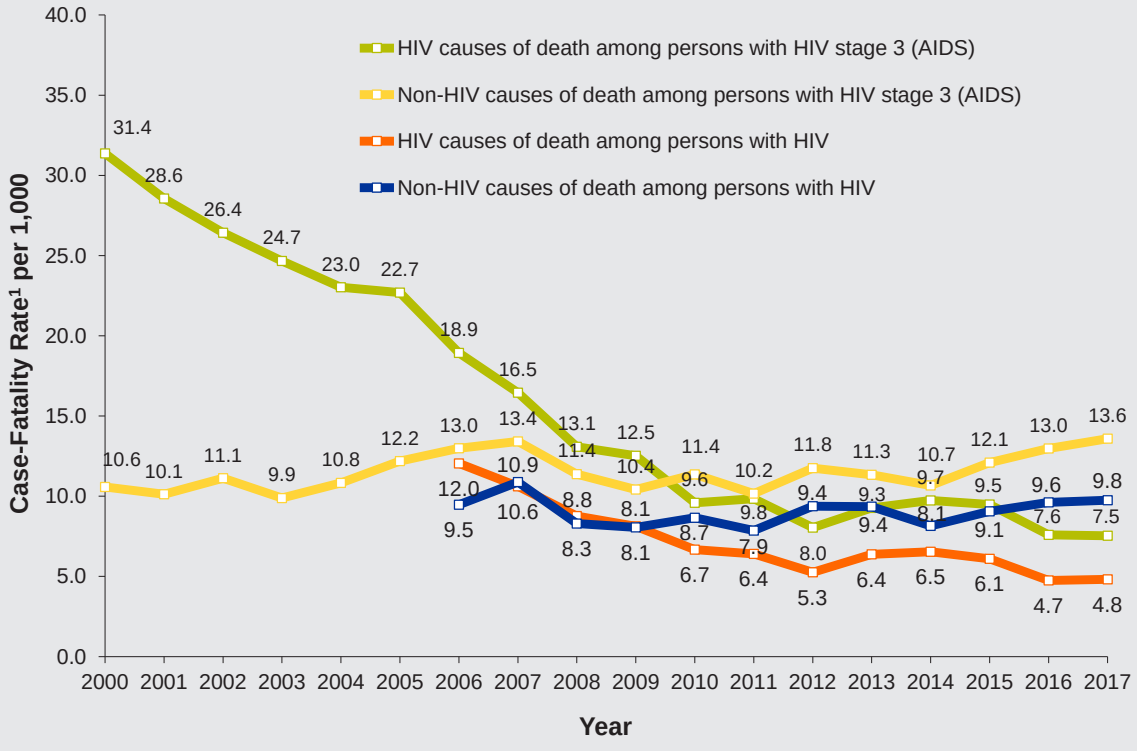
1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

2 Underlying cause of death obtained from the NDI is available through 2017. See Technical Notes "Death Ascertainment."

The trend in case-fatality rates in persons diagnosed with HIV was examined using the single, underlying cause of death for each person. Cause of death information was available for deaths through 2017. The case-fatality rate due to HIV-related causes among persons with HIV stage 3 diagnosis declined from 31.4 per 1,000 persons in 2000 to 7.5 per 1,000 persons for 2017 (Figure 5.1). Non-HIV-related causes of death among persons with HIV stage 3 diagnosis fluctuated during this time period and increased to the highest annual rate of 13.6 deaths per 1,000 persons.

When deaths in all stages of HIV disease were evaluated, case-fatality rates for HIV-related causes declined from 12.0 per 1,000 persons in 2006 to 4.8 per 1,000 persons in 2017. Case-fatality rates for non-HIV causes increased slightly to near 10 deaths per 1,000 persons in both 2016 and 2017.

Figure 5.1 Case-fatality rates due to HIV-related and non-HIV-related causes among persons diagnosed with HIV, 2000-2017, San Francisco

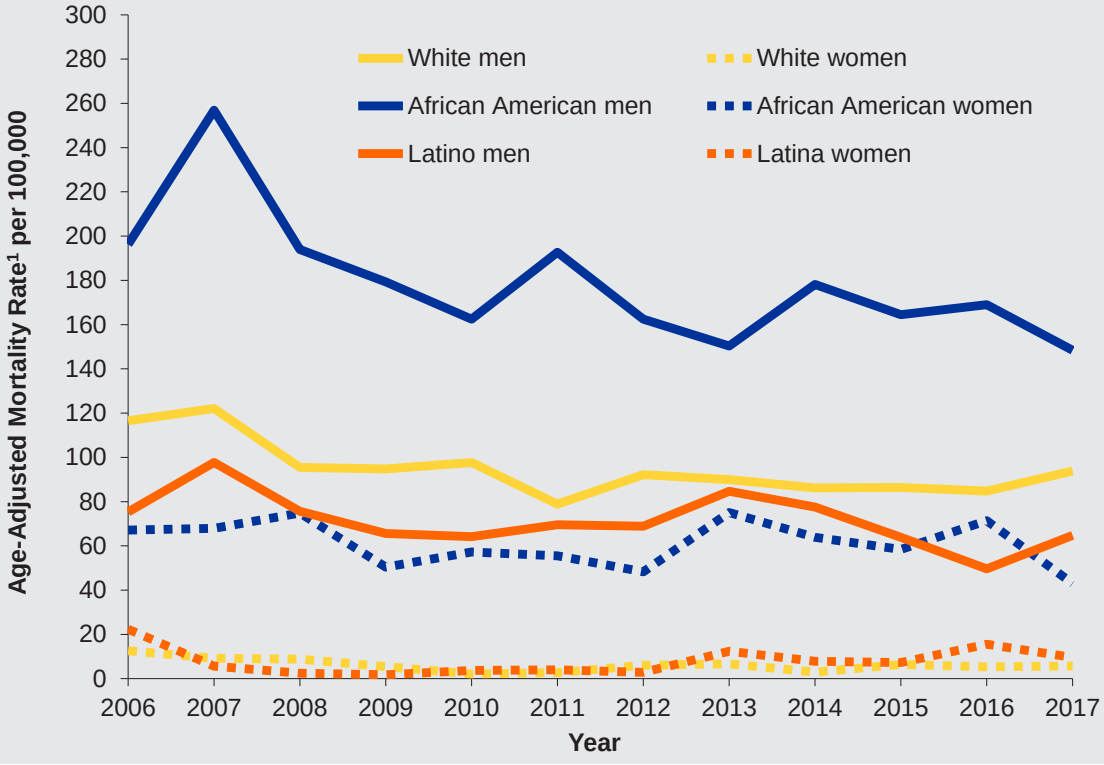


1 Case-fatality rates are calculated as the number of persons with HIV stage 3 (AIDS), or all HIV disease stages, who died each year divided by the number of total HIV stage 3 (AIDS), or HIV disease all stage, cases alive during that year. See Technical Notes for "Death Ascertainment."

In 2006-2017, the age-adjusted HIV mortality rates have been relatively steady across all sex and race/ethnicity groups with the exception for African American men (Figure 5.1). The HIV mortality rate among African American men has dropped 42% from its peak in 2007 (257 per 100,000) to 2017 (148 per 100,000). The mortality rate among African American men in 2017 rate was 1.6 times higher than white men (93 per 100,000) and 2.3 times higher than Latino men (65 per 100,000).

The HIV mortality rates for women were much lower than the rates for men. African American women experience not only higher HIV mortality rates but also a larger magnitude difference compared to white women and Latina women. In 2017, African American women had a mortality rate of 43 deaths per 100,000, which was 4.5 times higher than Latina women and 7.5 times higher than white women. The elevated African American women mortality rate is also comparable to Latino men rates from 2006 to 2017.

Figure 5.2 Age-adjusted mortality rates among persons aged 18 and older with HIV per 100,000 by sex and race/ethnicity, 2006-2017, San Francisco



1 Age-adjusted mortality rates are calculated for persons 18 and over. For each race/ethnicity and sex group, the number of HIV cases who died each year was divided by projected San Francisco population estimates across seven age groups (18-29, 30-39, 40-49,50-59,60-69,70-79, 80+) to generate crude rates applied to the standard population, defined using the California population estimates from the Department of Finance. See Technical Notes for "HIV Case Rates and HIV Mortality Rates."

For the years 2014 through 2017, HIV was the underlying cause of death for 37.8% of deaths among persons diagnosed with HIV demonstrating a continued decline in the proportion of underlying causes of death attributed to HIV disease (Table 5.2). Non-AIDS cancers continued to account for the second most frequent underlying cause of death in persons with HIV. Among the non-AIDS cancers, lung cancer was the most frequently occurring underlying cause. Accidents and other traumatic injury deaths constituted an important and relatively frequent cause of death among people with HIV. As HIV becomes a less frequent underlying cause of death, deaths linked to diseases of older age and substance use (e.g. drug, alcohol or tobacco use) are increasingly more common.

Table 5.2 Underlying causes of death among persons diagnosed with HIV, 2006-2017, San Francisco

	Year of Death					
	2006-2009 N=1,148		2010-2013 N=952		2014-2017 N=953	
Underlying Cause of Death[1]	Number	(%)	Number	(%)	Number	(%)
HIV	595	(51.8)	392	(41.2)	360	(37.8)
Non-AIDS cancer	124	(10.8)	136	(14.3)	139	(14.6)
Lung cancer	47	(4.1)	31	(3.3)	34	(3.6)
Liver cancer	18	(1.6)	22	(2.3)	13	(1.4)
Anal cancer	6	(0.5)	9	(0.9)	12	(1.3)
Colon cancer	9	(0.8)	5	(0.5)	6	(0.6)
Pancreatic cancer	4	(0.3)	8	(0.8)	6	(0.6)
Rectal cancer	4	(0.3)	4	(0.4)	3	(0.3)
Leukemia	0	(0.0)	6	(0.6)	1	(0.1)
Hodgkins lymphoma	2	(0.2)	2	(0.2)	0	(0.0)
Heart disease	87	(7.6)	83	(8.7)	101	(10.6)
Coronary heart disease	45	(3.9)	42	(4.4)	46	(4.8)
Cardiomyopathy	6	(0.5)	4	(0.4)	8	(0.8)
Accident	121	(10.5)	112	(11.8)	91	(9.5)
Drug overdose	93	(8.1)	97	(10.2)	74	(7.8)
Suicide	50	(4.4)	38	(4.0)	32	(3.4)
Liver disease	27	(2.4)	21	(2.2)	25	(2.6)
Alcoholic liver disease	11	(1.0)	6	(0.6)	15	(1.6)
Liver cirrhosis	14	(1.2)	14	(1.5)	7	(0.7)
Chronic obstructive pulmonary disease	25	(2.2)	17	(1.8)	22	(2.3)
Assault	8	(0.7)	9	(0.9)	12	(1.3)
Cerebrovascular disease	8	(0.7)	10	(1.1)	12	(1.3)
Mental disorders due to substance use	22	(1.9)	10	(1.1)	11	(1.2)
Diabetes	1	(0.1)	11	(1.2)	10	(1.0)
Viral hepatitis	10	(0.9)	8	(0.8)	7	(0.7)
Renal disease	9	(0.8)	3	(0.3)	7	(0.7)
Pneumonitis	2	(0.2)	2	(0.2)	5	(0.5)
Septicemia	2	(0.2)	2	(0.2)	5	(0.5)
Diseases of arteries	2	(0.2)	3	(0.3)	4	(0.4)
Hyperlipidemia	2	(0.2)	2	(0.2)	4	(0.4)
Undetermined intent	4	(0.3)	6	(0.6)	0	(0.0)

1 See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table.

We examined underlying causes of death by time period and sex, and in Table 5.3 we list the most frequently causes of death that occurred in the last time period. The most frequent, yet declining, underlying cause of death for males and females was HIV. The percentages of male and female decedents with HIV as the underlying cause of death were similar in 2006-2009 and 2010-2013. In these first two time periods, men with HIV had a higher proportion of deaths due to non-AIDS cancers than women. In all three time periods, men had a higher proportion of deaths due to heart disease and suicide as the underlying causes. During all three periods, women had a higher proportion of underlying causes of death due to chronic obstructive pulmonary disease than did men.

Table 5.3 Underlying causes of death among persons diagnosed with HIV by sex, 2006-2017, San Francisco

	Year of Death											
	2006-2009				2010-2013				2014-2017			
	Male		Female		Male		Female		Male		Female	
Underlying Cause of Death[1]	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Total	**1,029**		**119**		**865**		**87**		**861**		**92**	
HIV	534	(51.9)	61	(51.3)	358	(41.4)	34	(39.1)	322	(37.4)	38	(41.3)
Non-AIDS cancer	119	(11.6)	5	(4.2)	131	(15.1)	5	(5.7)	125	(14.5)	14	(15.2)
Heart disease	81	(7.9)	6	(5.0)	76	(8.8)	7	(8.0)	97	(11.3)	4	(4.3)
Accident	104	(10.1)	17	(14.3)	94	(10.9)	18	(20.7)	83	(9.6)	8	(8.7)
Suicide	48	(4.7)	2	(1.7)	38	(4.4)	0	(0.0)	32	(3.7)	0	(0.0)
Liver disease	22	(2.1)	5	(4.2)	19	(2.2)	2	(2.3)	23	(2.7)	2	(2.2)
Chronic obstructive pulmonary disease	18	(1.7)	7	(5.9)	14	(1.6)	3	(3.4)	18	(2.1)	4	(4.3)
Assault	8	(0.8)	0	(0.0)	8	(0.9)	1	(1.1)	11	(1.3)	1	(1.1)
Cerebrovascular disease	8	(0.8)	0	(0.0)	8	(0.9)	2	(2.3)	11	(1.3)	1	(1.1)
Mental disorders due to substance use	16	(1.6)	6	(5.0)	9	(1.0)	1	(1.1)	10	(1.2)	1	(1.1)

1 See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table.

Underlying causes of death were compared for decedents who were Latino, African American, or white (Table 5.4). Latino decedents had the highest proportion of deaths attributed to HIV as the underlying cause, compared to African Americans and whites. The proportion of deaths where HIV was the underlying cause declined across time periods among Latinos, African Americans and whites. The proportion of deaths due to non-AIDS cancers increased across all time periods for African Americans. The proportion of deaths due to heart disease increased in Latinos and whites. The proportion of deaths due to accidental factors decreased among African Americans (13.5% to 8.6% between first and third time periods) while it increased among Latinos (3.1% to 7.1% between first and third time periods).

Table 5.4 Underlying causes of death among persons diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco

	Year of Death								
	2006-2009			2010-2013			2014-2017		
Underlying Causes of Death[1]	Latino N (%)	African American N (%)	White N (%)	Latino N (%)	African American N (%)	White N (%)	Latino N (%)	African American N (%)	White N (%)
Total	**131**	**244**	**698**	**124**	**190**	**561**	**126**	**187**	**573**
HIV	89 (67.9)	121 (49.6)	343 (49.1)	66 (53.2)	79 (41.6)	213 (38.0)	58 (46.0)	74 (39.6)	198 (34.6)
Non-AIDS cancer	5 (3.8)	21 (8.6)	89 (12.8)	14 (11.3)	24 (12.6)	91 (16.2)	13 (10.3)	35 (18.7)	84 (14.7)
Heart disease	6 (4.6)	17 (7.0)	57 (8.2)	8 (6.5)	17 (8.9)	54 (9.6)	11 (8.7)	13 (7.0)	71 (12.4)
Accident	4 (3.1)	33 (13.5)	78 (11.2)	11 (8.9)	25 (13.2)	64 (11.4)	9 (7.1)	16 (8.6)	58 (10.1)
Suicide	8 (6.1)	2 (0.8)	36 (5.2)	4 (3.2)	2 (1.1)	29 (5.2)	4 (3.2)	1 (0.5)	23 (4.0)
Liver disease	3 (2.3)	7 (2.9)	16 (2.3)	3 (2.4)	2 (1.1)	13 (2.3)	6 (4.8)	4 (2.1)	13 (2.3)
Chronic obstructive pulmonary disease	1 (0.8)	7 (2.9)	17 (2.4)	3 (2.4)	5 (2.6)	9 (1.6)	1 (0.8)	5 (2.7)	16 (2.8)
Assault	0 (0.0)	1 (0.4)	7 (1.0)	1 (0.8)	2 (1.1)	5 (0.8)	2 (1.6)	5 (2.7)	4 (0.7)
Cerebrovascular disease	2 (1.5)	3 (1.2)	2 (0.3)	1 (0.8)	2 (1.1)	6 (1.1)	1 (0.8)	2 (1.1)	9 (1.6)
Mental disorders due to substance use	3 (2.3)	9 (3.7)	9 (1.3)	1 (0.8)	1 (0.5)	7 (1.2)	2 (1.6)	2 (1.1)	6 (1.0)

1 See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table. Asian, Pacific Islander, Native American, and multi-racial decedents were not displayed due to small cell sizes.

Table 5.5 shows both underlying and contributory causes of death among persons diagnosed with HIV. The proportion of deaths in which HIV was either the underlying or contributory cause declined from 69.8% in the period 2006-2009 to 63.0% during the following four years, and then to 59.0% in the years 2014-2017. When all contributory causes were taken into account, heart disease was the second most common cause of death among HIV diagnosed persons in San Francisco. Non-AIDS cancers remained a frequent cause of death among persons diagnosed with HIV; lung, liver, and anal cancers were the most common and were likely due to tobacco use, chronic hepatitis B and C infections, and infection with the human papilloma virus. Deaths due to accidents (including drug overdoses) increased in the second time period.

Table 5.5 Multiple causes of death among persons diagnosed with HIV, 2006-2017, San Francisco

	Year of Death					
	2006-2009 N=1,148		2010-2013 N=952		2014-2017 N=953	
Multiple Causes of Death[1]	Number	(%)	Number	(%)	Number	(%)
HIV	801	(69.8)	600	(63.0)	562	(59.0)
Heart disease	266	(23.2)	262	(27.5)	285	(29.9)
Coronary heart disease	76	(6.6)	85	(8.9)	84	(8.8)
Cardiomyopathy	18	(1.6)	22	(2.3)	29	(3.0)
Non-AIDS cancer	169	(14.7)	182	(19.1)	193	(20.3)
Lung cancer	50	(4.4)	37	(3.9)	41	(4.3)
Anal cancer	8	(0.7)	12	(1.3)	16	(1.7)
Liver cancer	24	(2.1)	29	(3.0)	15	(1.6)
Colon cancer	10	(0.9)	5	(0.5)	9	(0.9)
Pancreatic cancer	5	(0.4)	10	(1.1)	7	(0.7)
Rectal cancer	6	(0.5)	5	(0.5)	7	(0.7)
Leukemia	3	(0.3)	9	(0.9)	5	(0.5)
Hodgkin lymphoma	9	(0.8)	6	(0.6)	2	(0.2)
Liver disease	146	(12.7)	120	(12.6)	109	(11.4)
Liver cirrhosis	65	(5.7)	71	(7.5)	62	(6.5)
Alcoholic liver disease	12	(1.0)	6	(0.6)	17	(1.8)
Renal disease	114	(9.9)	94	(9.9)	109	(11.4)
Viral hepatitis	132	(11.5)	122	(12.8)	103	(10.8)
Accident	134	(11.7)	116	(12.2)	102	(10.7)
Drug overdose	101	(8.8)	98	(10.3)	77	(8.1)
Septicemia	110	(9.6)	94	(9.9)	94	(9.9)
Mental disorders due to substance use	109	(9.5)	92	(9.7)	89	(9.3)
Chronic obstructive pulmonary disease	78	(6.8)	62	(6.5)	67	(7.0)
Cerebrovascular disease	38	(3.3)	28	(2.9)	51	(5.4)
Diabetes	41	(3.6)	56	(5.9)	42	(4.4)
Suicide	50	(4.4)	38	(4.0)	32	(3.4)
Pneumonia	14	(1.2)	10	(1.1)	19	(2.0)
Diseases of arteries	12	(1.0)	9	(0.9)	14	(1.5)
Hyperlipidemia	7	(0.6)	8	(0.8)	14	(1.5)

1 Includes underlying and contributory causes of death. Individuals may have more than one cause of death. See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table.

We examined multiple causes of death by time period and sex, and in Table 5.6 we list the most frequently causes of death that occurred in the last time period. Among both women and men, HIV was the most frequent underlying or contributory cause of death in all time periods. The proportions of deaths, attributed primarily to HIV, declined over the three time periods for males but not females (Table 5.6). Heart disease was the second most frequent underlying or contributory cause of death in both women and men, and became increasingly common for men over the three time periods. In the most recent time period, heart disease was listed as a cause of death in 30.4% of deaths among men and 25.0% of deaths among women. Deaths from non-AIDS cancers accounted for a greater proportion of deaths in men than in women during the first two time periods but accounted for similar proportions of deaths in both sexes by the third time period. In the most recent time period, HIV, drug overdose, renal disease, viral hepatitis, septicemia, and chronic obstructive pulmonary disease accounted for a higher proportion of deaths in women than in men.

Table 5.6 Multiple causes of death among persons diagnosed with HIV by sex, 2006-2017, San Francisco

	Year of Death									
	2006-2009				2010-2013				2014-2017			
	Male		Female		Male		Female		Male		Female	
Multiple Causes of Death[1]	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Total	**1,029**		**119**		**865**		**87**		**861**		**92**	
HIV	718	(69.8)	83	(69.7)	547	(63.2)	53	(60.9)	501	(58.2)	61	(66.3)
Heart disease	237	(23.0)	29	(24.4)	231	(26.7)	31	(35.6)	262	(30.4)	23	(25.0)
Non-AIDS cancer	161	(15.6)	8	(6.7)	175	(20.2)	7	(8.0)	174	(20.2)	19	(20.7)
Liver disease	125	(12.1)	21	(17.6)	109	(12.6)	11	(12.6)	101	(11.7)	8	(8.7)
Renal disease	100	(9.7)	14	(11.8)	82	(9.5)	12	(13.8)	91	(10.6)	18	(19.6)
Viral hepatitis	117	(11.4)	15	(12.6)	104	(12.0)	18	(20.7)	91	(10.6)	12	(13.0)
Accident	114	(11.1)	20	(16.8)	98	(11.3)	18	(20.7)	93	(10.8)	9	(9.8)
Drug overdose	85	(8.3)	16	(13.4)	83	(9.6)	15	(17.2)	68	(7.9)	9	(9.8)
Septicemia	97	(9.4)	13	(10.9)	85	(9.8)	9	(10.3)	83	(9.6)	11	(12.0)
Mental disorders due to substance use	89	(8.6)	20	(16.8)	80	(9.2)	12	(13.8)	82	(9.5)	7	(7.6)
Chronic obstructive pulmonary disease	63	(6.1)	15	(12.6)	50	(5.8)	12	(13.8)	57	(6.6)	10	(10.9)

1 Includes underlying and contributory causes of death. Individuals may have more than one cause of death. See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table.

When multiple causes of death were compared for Latino, African American, and white decedents, HIV contributed to more than half of deaths in each racial/ethnic group for all time periods assessed. Heart disease was the second most frequent underlying or contributory cause of death followed by non-AIDS cancers. African American decedents were also more impacted by renal disease and chronic obstructive pulmonary disease than were Latino and white decedents.

Table 5.7 Multiple causes of death among persons diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco

	Year of Death								
	2006-2009			2010-2013			2014-2017		
	Latino	African American	White	Latino	African American	White	Latino	African American	White
Multiple Causes of Death[1]	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total	**131**	**244**	**698**	**124**	**190**	**561**	**126**	**187**	**573**
HIV	100 (76.3)	172 (70.5)	476 (68.2)	92 (74.2)	129 (67.9)	333 (59.4)	82 (65.1)	118 (63.1)	322 (56.2)
Heart disease	26 (19.8)	75 (30.7)	145 (20.8)	28 (22.6)	64 (33.7)	152 (27.1)	32 (25.4)	59 (31.6)	175 (30.5)
Non-AIDS cancer	10 (7.6)	29 (11.9)	116 (16.6)	17 (13.7)	35 (18.4)	118 (21.0)	21 (16.7)	44 (23.5)	117 (20.4)
Liver disease	23 (17.6)	32 (13.1)	84 (12.0)	24 (19.4)	25 (13.2)	64 (11.4)	21 (16.7)	16 (8.6)	62 (10.8)
Renal disease	11 (8.4)	48 (19.7)	48 (6.9)	11 (8.9)	33 (17.4)	43 (7.7)	13 (10.3)	38 (20.3)	50 (8.7)
Viral hepatitis	16 (12.2)	24 (9.8)	83 (11.9)	17 (13.7)	41 (21.6)	54 (9.6)	17 (13.5)	21 (11.2)	53 (9.2)
Accident	5 (3.8)	37 (15.2)	85 (12.2)	11 (8.9)	26 (13.7)	66 (11.8)	12 (9.5)	17 (9.1)	65 (11.3)
Drug overdose	4 (3.1)	28 (11.5)	65 (9.3)	11 (8.9)	23 (12.1)	52 (9.3)	6 (4.8)	14 (7.5)	50 (8.7)
Septicemia	25 (19.1)	23 (9.4)	54 (7.7)	20 (16.1)	18 (9.5)	45 (8.0)	17 (13.5)	19 (10.2)	50 (8.7)
Mental disorders due to substance use	9 (6.9)	34 (13.9)	63 (9.0)	6 (4.8)	23 (12.1)	58 (10.3)	17 (13.5)	12 (6.4)	51 (8.9)
Chronic obstructive pulmonary disease	2 (1.5)	25 (10.2)	48 (6.9)	4 (3.2)	20 (10.5)	37 (6.6)	5 (4.0)	17 (9.1)	42 (7.3)

1 Includes underlying and contributory causes of death. Individuals may have more than one cause of death. See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table. Asian, Pacific Islander, Native American, and multi-racial decedents were not displayed due to small cell sizes.

Data on 4,158 San Francisco residents diagnosed with HIV or AIDS at age 13 years or older and who died from January 1, 2002 through December 31, 2016 by cause of death are included in Table 5.9. Housing status was dichotomized as ever homeless (homeless at the time of HIV diagnosis, AIDS diagnosis, at follow up, or at death) or not.

Among persons who were ever homeless, a higher proportion of deaths was due to viral hepatitis, accidents, mental disorders due to substance abuse, drug overdose, and assault. A lower proportion of deaths among homeless people was due to AIDS, non-AIDS cancer, ischemic heart disease, and diabetes.

Table 5.8 Multiple causes of death among persons diagnosed with HIV by housing status, 2002-2016, San Francisco

Multiple Causes of Death[1]	Ever Homeless N	Ever Homeless (%)	Housed N	Housed (%)
Total	**559**		**3,599**	
HIV (n=2928)	376	(67.3)	2552	(70.9)
AIDS opportunistic infections (n=1243)	160	(28.6)	1083	(30.1)
Heart disease (n=1033)	122	(21.8)	911	(25.3)
Non-AIDS cancer (n=655)	41	(7.3)	614	(17.1)
Liver disease (n=569)	90	(16.1)	479	(13.3)
Viral hepatitis (n=564)	96	(17.2)	468	(13.0)
Pneumonia (n=500)	74	(13.2)	426	(11.8)
Renal (n=440)	65	(11.6)	375	(10.4)
Septicemia (n=427)	64	(11.5)	363	(10.1)
Accident (n=417)	80	(14.3)	337	(9.4)
Drug overdose (n=321)	63	(11.3)	258	(7.2)
Mental disorders due to substance abuse (n=383)	99	(17.7)	284	(7.9)
AIDS cancer (n=328)	32	(5.7)	296	(8.2)
Ischemic heart disease (n=311)	26	(4.7)	285	(7.9)
Chronic obstructive lung disease (n=262)	36	(6.4)	226	(6.3)
Diabetes (n=165)	11	(2.0)	154	(4.3)
Suicide (n=143)	14	(2.5)	129	(3.6)
Cerebrovascular (n=141)	14	(2.5)	127	(3.5)
Cardiomyopathy (n=91)	11	(2.0)	80	(2.2)
Alcoholic liver disease (n=47)	8	(1.4)	39	(1.1)
Assault (n=32)	9	(1.6)	23	(0.6)
Pancreatitis (n=25)	4	(0.7)	21	(0.6)

1 Includes underlying and contributory causes of death. Individuals may have more than one cause of death. See Technical Notes "Death Ascertainment." Deceased HIV cases that lack cause of death information are not represented in this table.

Enhanced HIV Mortality Surveillance

Despite increased life expectancy due to wide use of antiretroviral therapies (ART), persons living with HIV (PLWH) continue to die prematurely. Enhanced HIV Mortality Surveillance is a HIV surveillance activity designed to more fully and systematically understand the causes of and contributory factors associated with death among PLWH diagnosed in San Francisco.

A random sample of 50 decedents who were reported to the San Francisco Department of Public Health and died and received care in San Francisco from July 1, 2016 through June 30, 2017 was selected. Data were abstracted from medical records at all San Francisco facilities where persons received care in the three years prior to death and surveillance staff had access to charts. Information regarding substance use, mental illness, housing status, co-morbidities, use of ART, and receipt of care was collected.

In terms of gender, race/ethnicity, and transmission risk, sampled decedents were demographically similar to all decedents (2016 to 2017), but there were differences between sampled decedents and PLWH (Table 5.9). Compared to all PLWH, a greater proportion of decedents were women, white or African American, and persons who injected drugs. Sampled decedents were older than PLWH.

Table 5.9 Demographic and risk characteristics among decedents diagnosed with HIV and among persons living with HIV, 2016-2017, San Francisco

	Enhanced mortality surveillance sample N=50		All decedents 2016-2017[1] N=480	PLWH[2] N=15,952
	Number	%	%[3]	%[3]
Age (years)[4]				
<40	3	6%	5%	15%
40-49	7	14%	16%	23%
50-59	16	32%	33%	37%
60-69	16	32%	29%	21%
70+	8	16%	16%	5%
Gender				
Men	45	90%	86%	92%
Women	5	10%	10%	6%
Trans Women	0	0%	4%	2%
Race/Ethnicity				
White	33	66%	63%	59%
African American	9	18%	19%	12%
Latino	4	8%	13%	19%
Other/Unknown	4	8%	5%	9%
Transmission Category				
MSM	25	50%	53%	74%
PWID	9	18%	15%	6%
MSM PWID	12	24%	27%	15%
Heterosexual	3	6%	4%	4%
Other/Unidentified	1	2%	1%	2%

1 Died January 1, 2016 through December 31, 2017.
2 San Francisco residents at diagnosis and alive as of December 31, 2017.
3 May not equal 100% because of rounding.
4 Age at death for decedents and age as of December 31, 2017 for living cases.

Risk factors and co-morbidities which contribute to premature death were frequent among sampled decedents (Tables 5.10). Large proportions of sampled decedents were found to have used various substances: 84% had used tobacco, 58% used non-injected illicit drugs (including crack, meth, and opiates), and 42% had a history of excessive alcohol use.

A history of mental illness was found in 100% of sampled decedents. Forty-four percent of decedents were diagnosed with depression, 14% with psychoses (including schizophrenia), 14% with bi-polar disorder, and 64% with unspecified mental illness.

The most common co-morbidities included hypertension (46%), non-AIDS cancers (34%), chronic viral hepatitis B and/or C (32%) (22% hepatitis C and 10% hepatitis B, respectively), and chronic renal disease (32%).

Table 5.10 Substance use, mental illness and co-morbidities among decedents (N=50), Enhanced HIV Mortality Surveillance, 2016-2017, San Francisco

Substance Use[1]

	In 12 months prior to death		Ever[2]	
	Number	%	Number	%
Tobacco (any form)	23	46%	42	84%
Illicit drugs not injected	19	38%	29	58%
Illicit drugs injected	6	12%	18	36%
Excessive alcohol[3]	12	24%	21	42%
Non-medical marijuana	10	20%	19	38%
Opioid replacement	8	16%	10	20%

Mental illness (chronic and episodic)[1]

	Number	%
Any mental illness	50	100%
Depression	22	44%
Psychosis/ Schizophrenia	7	14%
Bipolar disorder	7	14%
Post-traumatic stress disorder	3	6%
Suicide attempt or ideation	3	6%
Mental illness (type unspecified)	32	64%

Co-morbidity (chronic and episodic)[1]

	Number	%
Hypertension	23	46%
Non-AIDS-defining cancer	17	34%
Chronic hepatitis B/C	16	32%
Renal disease	16	32%
Hyperlipidemia	14	28%
Chronic obstructive lung disease	14	28%
Cardiovascular disease	14	28%
AIDS-opportunistic infection	13	26%
Liver failure	11	22%
Diabetes mellitus	10	20%
AIDS-defining cancer	6	12%

1 Categories are not mutually exclusive and individuals may be counted more than once.
2 Includes behavior in past 12 months as well as behaviors that occurred during or prior to the 12 months before death.
3 Excessive alcohol use was defined as any alcohol use that was recorded in the medical record as heavy or requiring medical treatment (e.g. alcoholism, binge drinking).

Forty-six percent of sampled decedents had intermittent primary medical care (Table 5.11). Forty percent had history of non-adherence to ART, 28% had been non-adherent in the 12 months prior to death, and 22% were not using ART at time of death. The high proportion of decedents who were inconsistently engaged in primary care and/or non-adherent to ART, suggests missed opportunities for medical providers and case managers to re-engage patients in care.

Table 5.11 Health care utilization and ART use among decedents (N=50), Enhanced HIV Mortality Surveillance, 2016-2017, San Francisco

Health Care Utilization and ART Use[1]

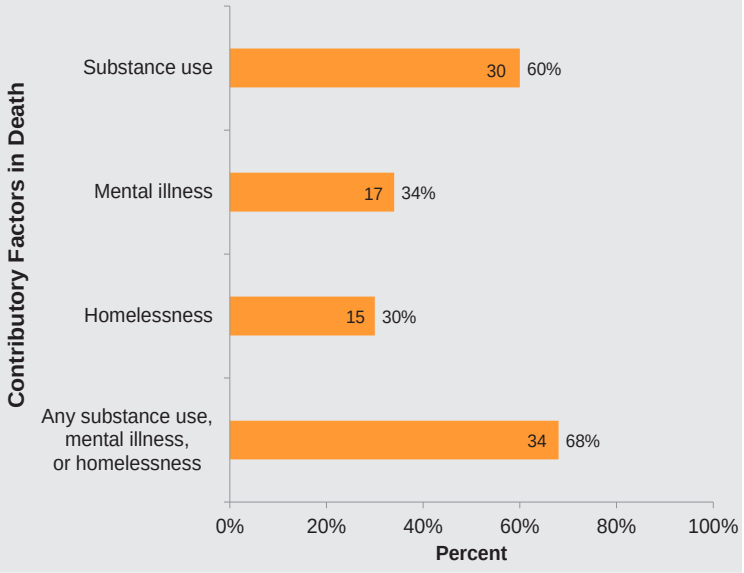
	Number	%
Intermittent or inconsistent primary care[2] (ever)	23	46%
Inconsistent use/non-adherent to ART (ever)	20	40%
Inconsistent use/non-adherent to ART (12 months prior to death)	14	28%
Not on ART at time of death	11	22%

1 Categories are not mutually exclusive and individuals may be counted more than once.
2 Intermittent primary medical care was defined as multiple missed appointments or lack of follow through with recommended referrals for procedures or to other health care providers.

The data collected from decedents' medical charts was reviewed by two HIV physician experts to determine whether substance use, mental illness, and/or homelessness were contributory factors in the decedents' deaths. Figure 5.3 shows the frequencies of these factors that were indicated by either reviewer. Of the 50 sampled decedents, 34 (68%) were determined to have died at least in part because of substance use, mental illness, and/or homelessness. Substance use was observed in a large proportion of decedents as a contributory factor in death (60%).

Enhanced mortality surveillance offers a way to identify factors for targeted public health and clinical attention. A substantial proportion of decedents had important co-morbid conditions that may have contributed to premature mortality. High rates of substance use and mental illness point to the importance of access to substance use treatment and behavioral health services for PLWH.

Figure 5.3 Estimate of sampled decedents (N=50) for which substance use, mental illness, and homelessness were contributory factors in death, Enhanced HIV Mortality Surveillance, 2016-2017, San Francisco



6 Health Insurance Status at Time of HIV Diagnosis

Insurance status at time of initial HIV diagnosis differed by racial/ethnic group (Figure 6.1). Among whites diagnosed each year, 37% or greater had private insurance in 2012 to 2017. Similar to whites, Asian/Pacific Islanders had higher annual proportions on private insurance at diagnosis. In contrast, 43% or greater of African Americans diagnosed each year were publicly insured during this time period. No type of insurance was predominant for Latinos during this time period. Latinos and Asian/Pacific Islanders had higher proportions each year with no insurance coverage at diagnosis than whites and African Americans.

Figure 6.1 Trends in health insurance status at time of HIV diagnosis by race/ethnicity, 2012-2017, San Francisco

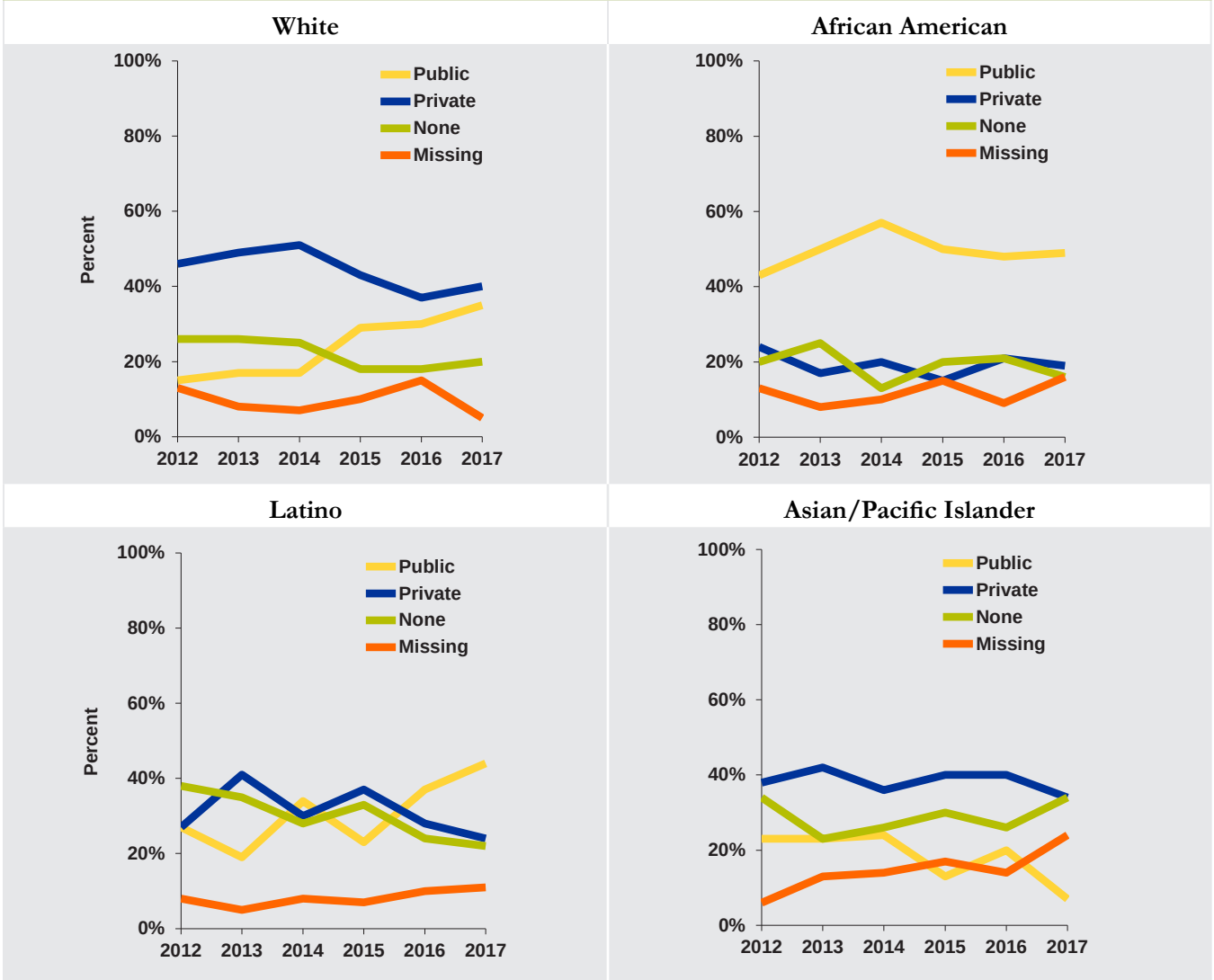
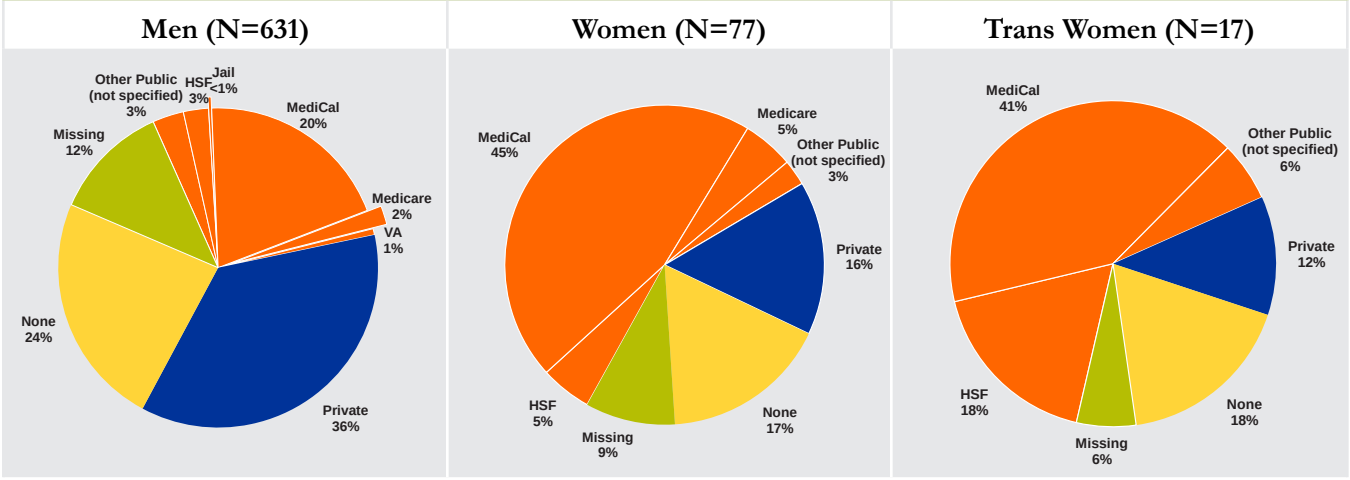


Figure 6.2 shows the distribution of insurance types by gender for persons newly diagnosed with HIV between 2015 and 2017. Compared to men, women and trans women diagnosed during this time period had higher proportions with public insurance (including MediCal, Medicare, Healthy San Francisco, Veteran Administration, county jail, and other unspecified public insurance). At diagnosis, 45% of women and 41% of trans women reported using MediCal, state-sponsored insurance for persons meeting financial criteria. In addition, Healthy San Francisco, the county-sponsored health access program for residents was used by 3% of men, 5% of women, and 18% of trans women at time of diagnosis. Twenty-four percent of men, 17% of women, and 18% of trans women had no health insurance coverage at time of diagnosis.

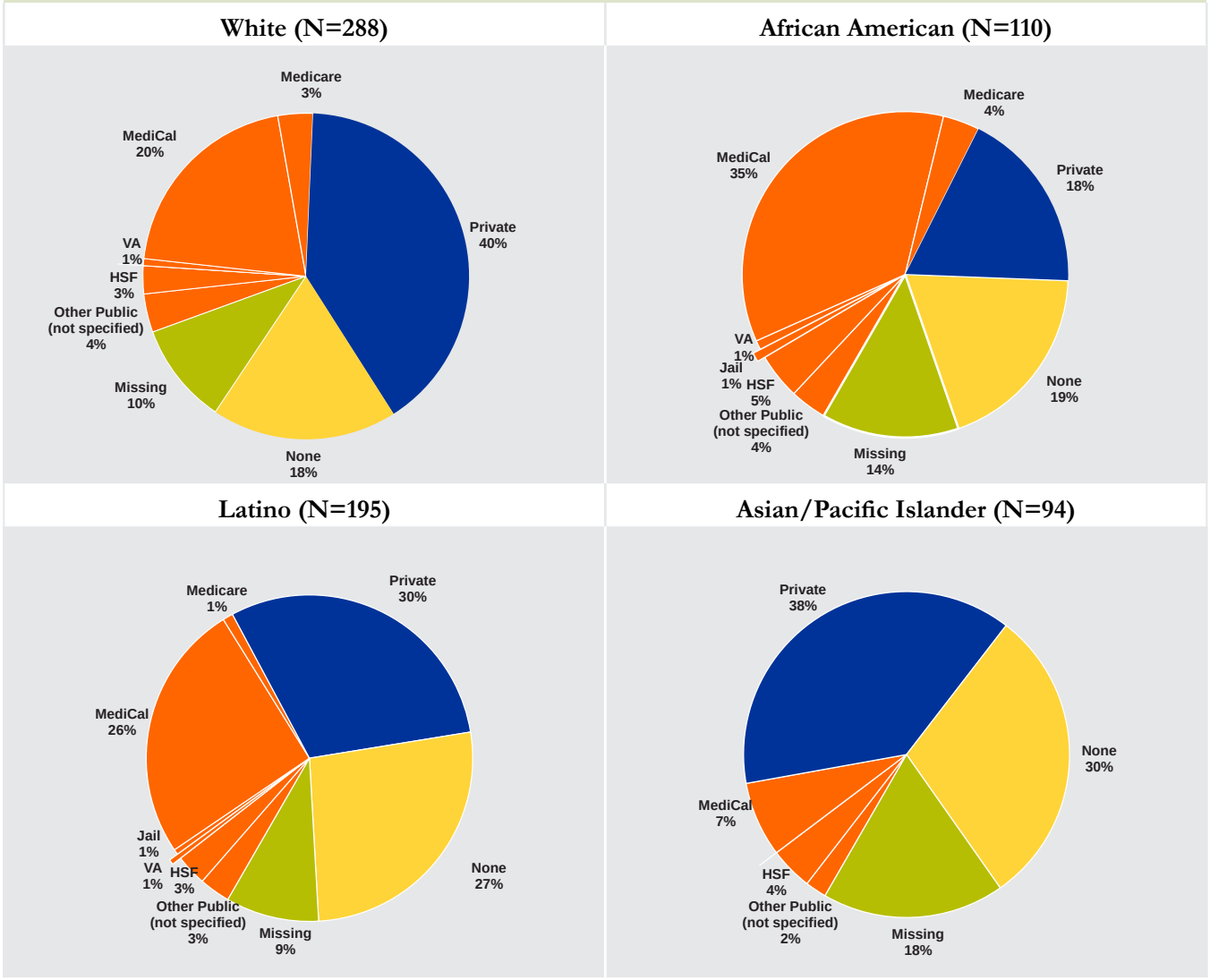
Figure 6.2 Health insurance status at time of HIV diagnosis by gender[1], 2015-2017, San Francisco



1 Data on trans men are not presented due to small number and potential small population size. See Technical Notes "Gender Status."
HSF: Healthy San Francisco.

Figure 6.3 shows the distribution of insurance types by racial/ethnic group for persons newly diagnosed with HIV between 2015 and 2017. Seventy-two percent of whites, 67% of African Americans, 64% of Latinos, and 52% of Asian/Pacific Islanders were insured at diagnosis. In the past three years, African Americans diagnosed with HIV reported having publicly-funded insurance types more frequently than other racial/ethnic groups. Across racial ethnic groups there were similar proportions using Healthy San Francisco for health care coverage at time of diagnosis (3%-5%).

Figure 6.3 Health insurance status at time of HIV diagnosis by race/ethnicity, 2015-2017, San Francisco



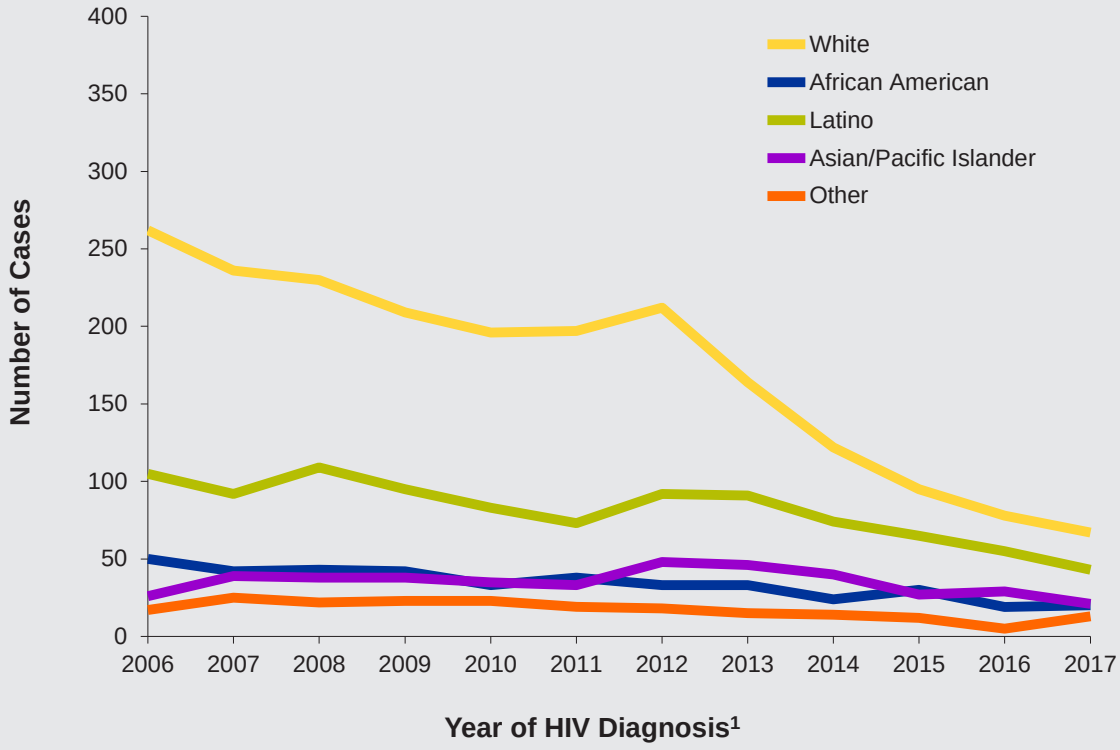
HSF: Healthy San Francisco.

7 HIV among Men who Have Sex with Men

HIV surveillance data

Among MSM newly diagnosed with HIV from 2006 through 2017, whites account for the largest number of diagnoses in San Francisco (Figure 7.1). The number of MSM newly diagnosed with HIV from 2006 to 2017 declined in whites, Latinos, and African Americans. The decline was most pronounced among white MSM with annual numbers converging closer to annual numbers of Latino MSM. The number of Asian/Pacific Islander MSM diagnosed increased from 26 in 2006 to a high of 48 in 2012 and then decreased to 21 in 2017. Among MSM, whites made up 41%, African Americans 12%, Latinos 26% and Asian/Pacific Islanders 13% of new diagnoses in 2017.

Figure 7.1 Number of MSM newly diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco



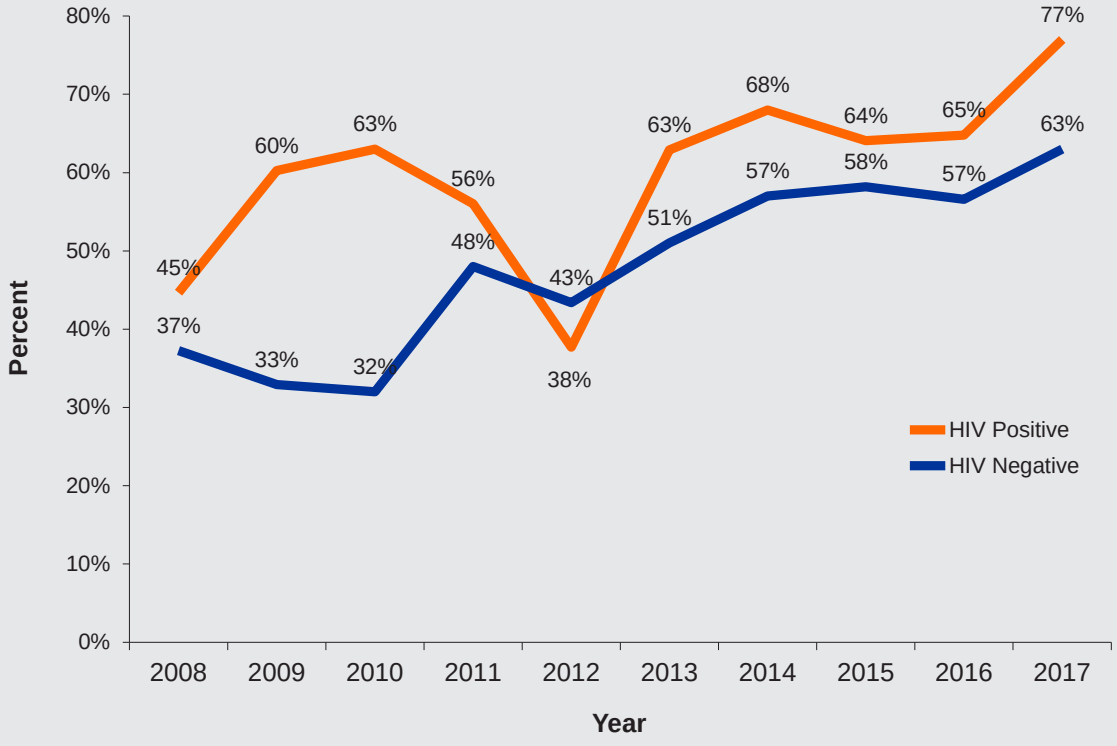
1 Includes MSM and MSM-PWID with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

HIV sexual behavior data

The STOP AIDS Project collects information on sexual behaviors and self-reported HIV status of MSM who participate in their outreach prevention activities in San Francisco. These data are collected anonymously to track trends in HIV-related risk behavior. Such data may not be representative of all MSM in San Francisco. In this section, trends in condomless anal intercourse in the past six months are presented for MSM who are 18 years and older and reside in San Francisco.

Figure 7.2 shows trends in any reported condomless anal intercourse (either insertive or receptive) by self-reported HIV serostatus. The percent of HIV negative MSM who reported any condomless anal intercourse declined slightly from 37% in 2008 to 32% in 2010, but rose to a high of 63% in 2017. The proportion of HIV positive MSM reporting any condomless anal intercourse has generally remained above 60%, with a high of 77% in 2017.

Figure 7.2 Percent of MSM reporting condomless anal intercourse in the last six months by self-reported HIV status, the STOP AIDS Project, 2008-2017, San Francisco



Sexually transmitted diseases among MSM

Sexually transmitted diseases (STD) serve as a marker of condomless sex and some have been shown to increase HIV transmission. Figure 7.3 shows trends in male rectal gonorrhea and male gonococcal proctitis among MSM in San Francisco from 2006 through 2017 by HIV serostatus. Data on male rectal gonorrhea originate from case reporting by laboratories and health providers throughout the city. Data on male gonococcal proctitis originate from the municipal STD clinic only and represent men with symptomatic infection. Among men, rectal gonorrhea is a biological marker for condomless receptive anal sex.

The last six years have seen an increase in reported cases of male rectal gonorrhea irrespective of HIV serostatus. The number of reported cases of male rectal gonorrhea has been higher among HIV negative men than among HIV infected men beginning in 2008. The relatively stable numbers of cases of male gonococcal proctitis suggest that some of the increase in reported male rectal gonorrhea may be due to increased screening or reporting.

Data may underestimate true levels of infections due to several factors, including lack of rectal screening by many health providers, underreporting, and a large proportion of asymptomatic cases.

Figure 7.3 Male rectal gonorrhea and male gonococcal proctitis among MSM by HIV serostatus, 2006-2017, San Francisco

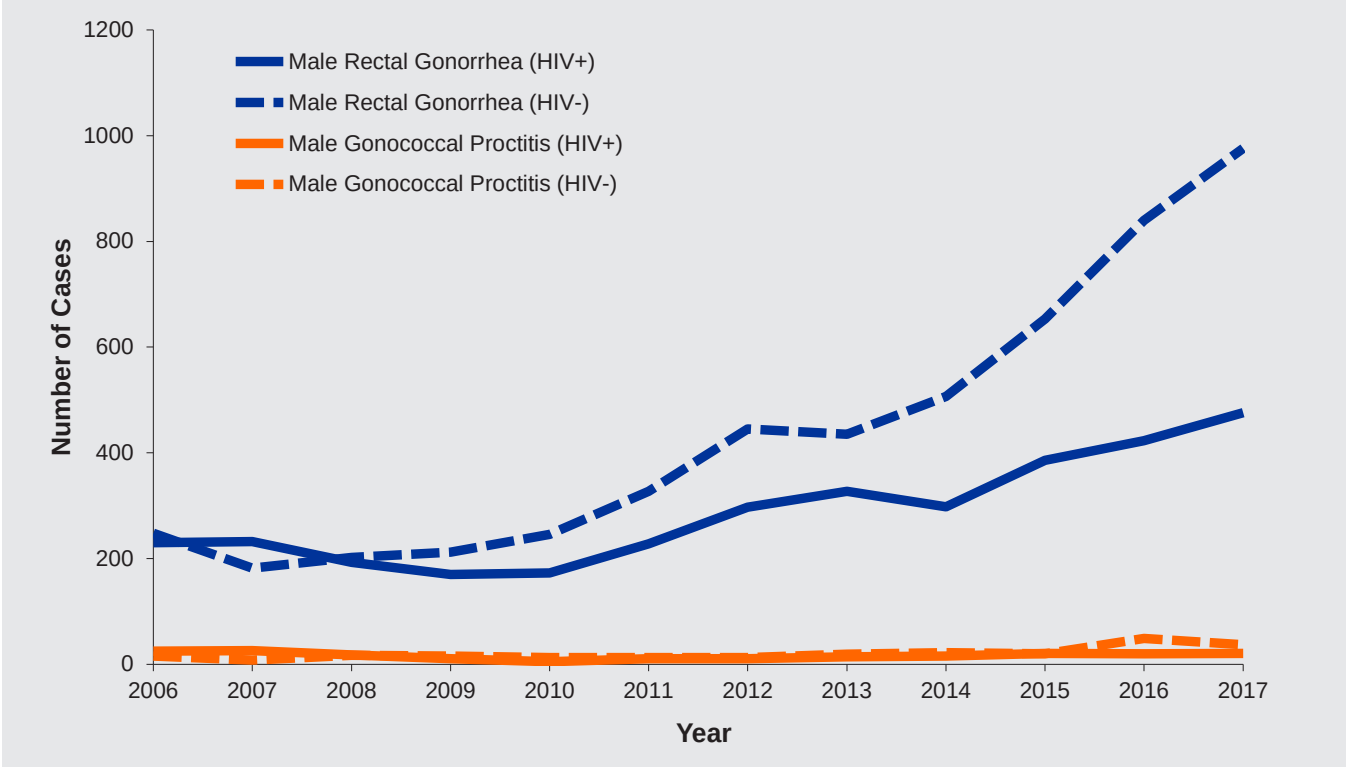
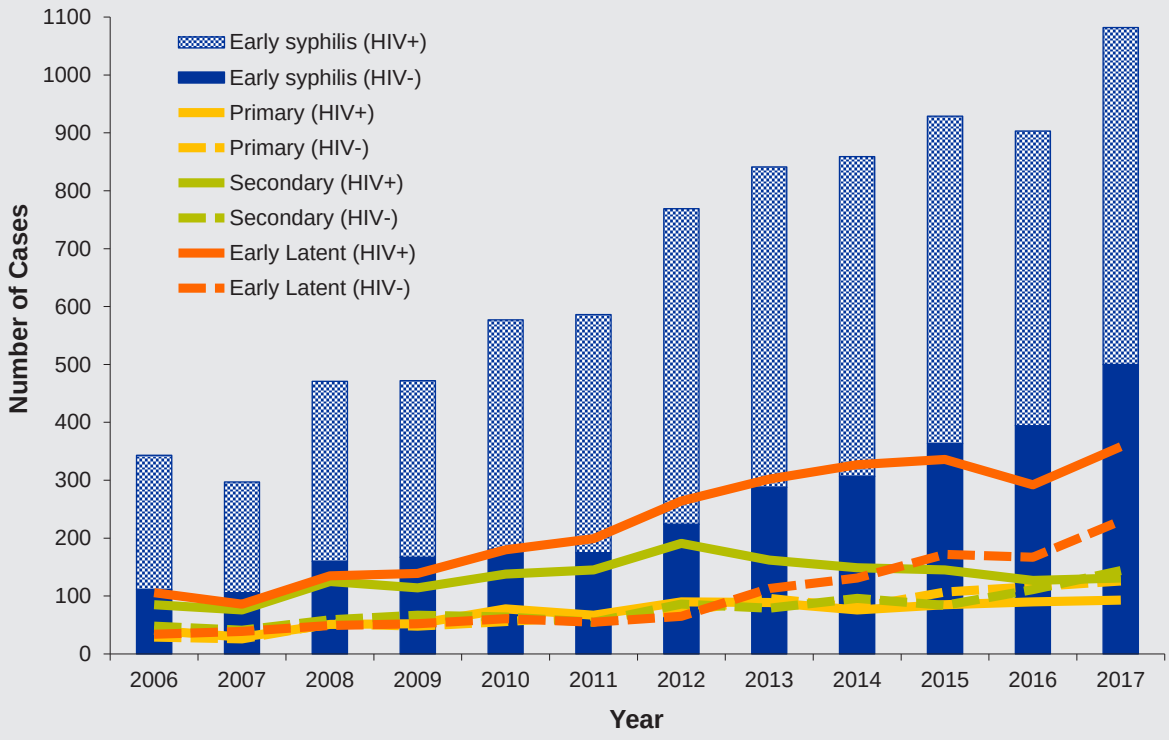


Figure 7.4 shows trends in early syphilis cases (primary, secondary, and early latent) among MSM in San Francisco from 2006 through 2017 by HIV serostatus. Data originate from case reporting by laboratories and health care providers throughout the city and from the municipal STD clinic, the site where most of the patients were diagnosed. Like gonorrhea, syphilis is a biological marker for condomless sex. The increase from 2006 to 2017 in early latent is dramatic, especially among HIV positive MSM who account for a greater proportion of early syphilis cases than HIV negative MSM.

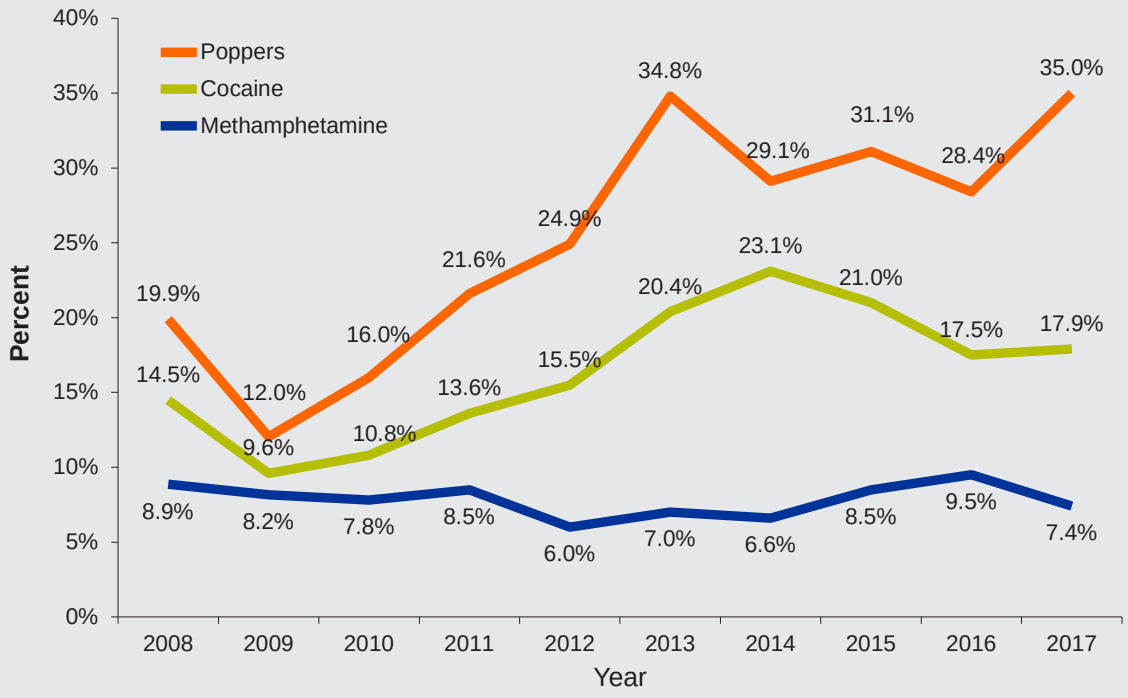
Figure 7.4 Early syphilis among MSM by HIV serostatus, 2006-2017, San Francisco



Substance use

The STOP AIDS Project records substance use among San Francisco MSM. Figure 7.5 shows the percent of MSM who used methamphetamines, "poppers," or cocaine in the past six months for the years 2008 to 2017. The most recent years show a decrease in cocaine use from 23.1% in 2014 to 17.9% in 2017. Poppers use increased from a low of 12.0% in 2009 to 35.0% in 2017. Methamphetamine use has remained relatively stable since 2008.

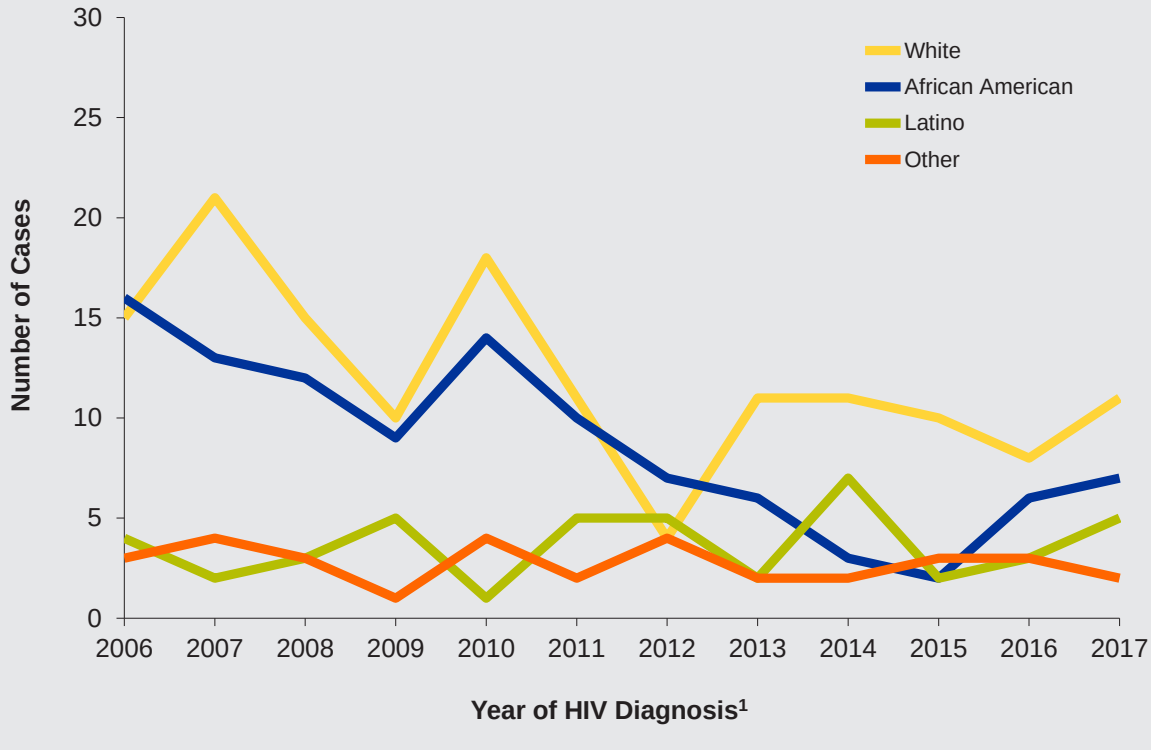
Figure 7.5 Substance use among MSM, the STOP AIDS Project, 2008-2017, San Francisco



8 HIV among People who Inject Drugs

From 2006 to 2017, whites accounted for 44% of non-MSM PWID cases, African Americans 32%, and Latinos 13% (Figure 8.1). The total number of non-MSM PWID diagnoses each year decreased to 17 in 2015 and increased in 2016-2017.

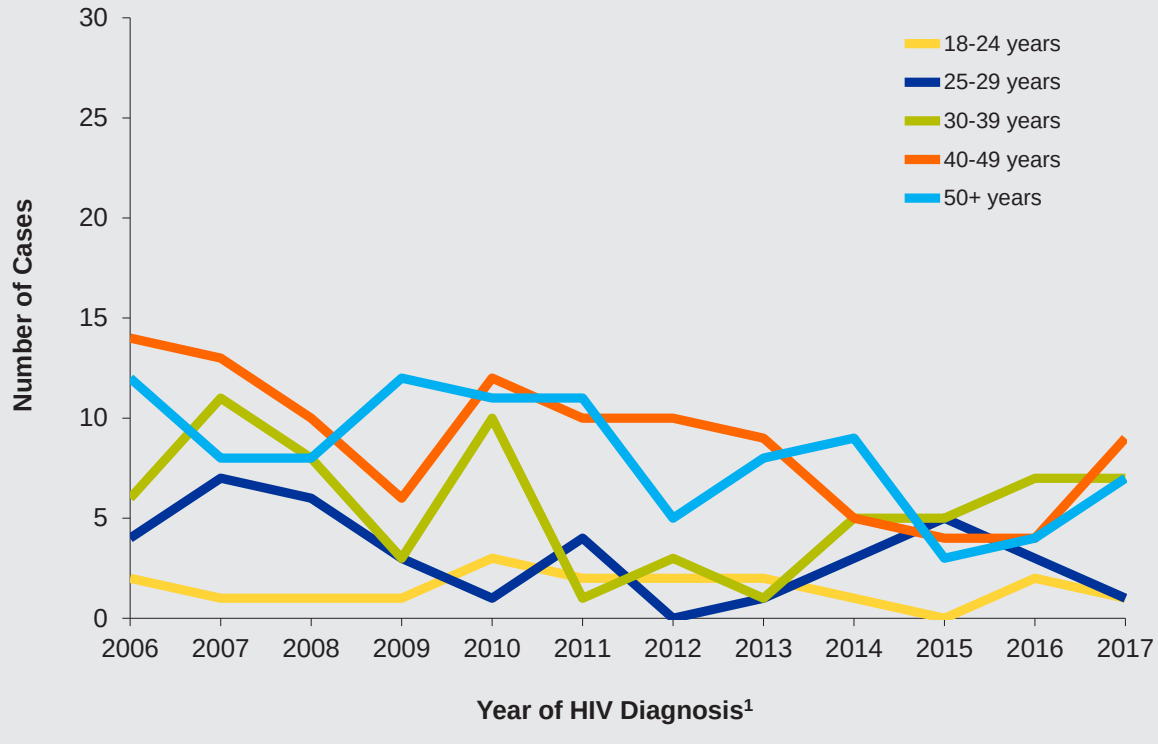
Figure 8.1 Number of non-MSM PWID newly diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

Thirty-two percent of non-MSM PWID newly diagnosed with HIV between 2006 and 2017 were aged 40 to 49 years and 30% were aged 50 years and older (Figure 8.2). Since 2014, the annual numbers of persons aged 30-39 years diagnosed with HIV have been trending upwards to levels prior to 2011. The numbers of new HIV diagnoses among non-MSM PWID aged 18-24 years remained low.

Figure 8.2 Number of non-MSM PWID newly diagnosed with HIV by age group at HIV diagnosis, 2006-2017, San Francisco



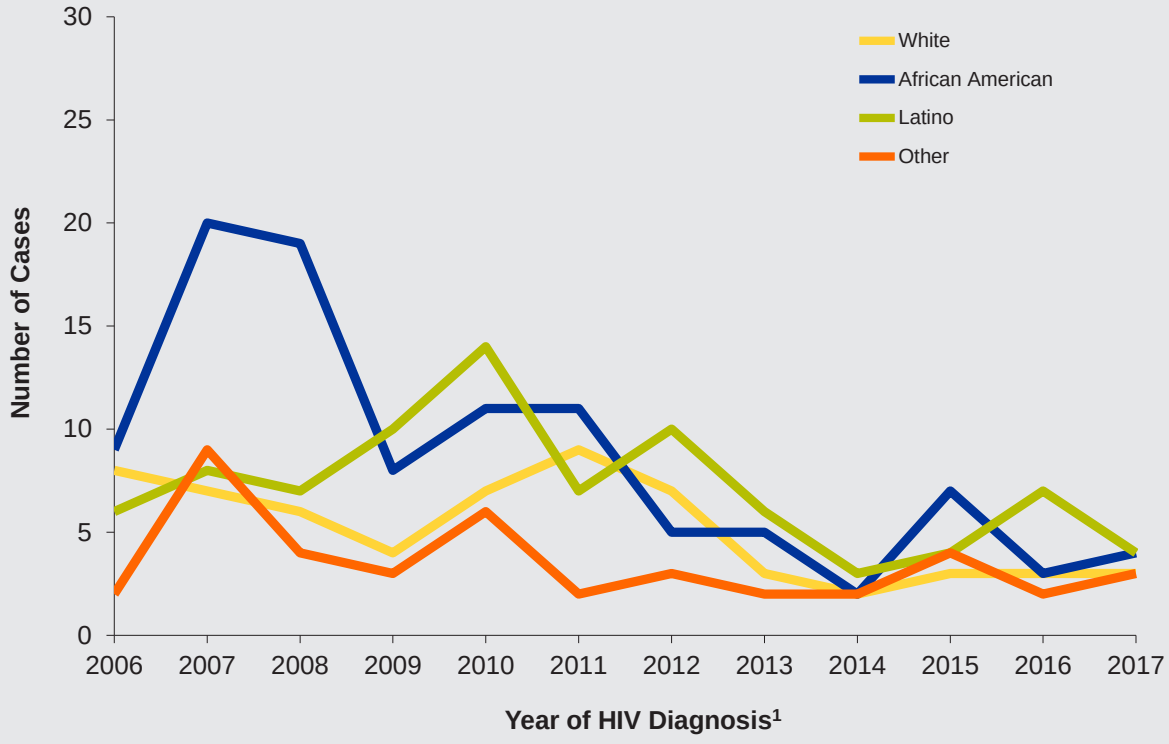
1 Includes persons with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

9 HIV among Heterosexuals

HIV surveillance data

Racial/ethnic trends among heterosexuals newly diagnosed with HIV are difficult to characterize due to the relatively small number of persons infected through heterosexual contact (Figure 9.1). From 2006 through 2017 the decline in annual number of persons who acquired HIV through heterosexual contact was most pronounced in African Americans (20 diagnoses in 2007 to 4 diagnoses in 2017). In persons who acquired HIV through heterosexual contact, African Americans accounted for 35%, followed by Latinos at 29%, and whites at 21%.

Figure 9.1 Number of heterosexuals newly diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

Sexually transmitted diseases among heterosexuals

Figure 9.2 shows the annual number of primary, secondary, and early latent cases of early syphilis among heterosexual men in San Francisco from 2007 through 2017. Data originate from case reporting from laboratories and health providers throughout the city, although the majority are patients seen at the municipal STD clinic. The number of early syphilis cases among heterosexual men has generally increased over time reaching a peak in 2015 at 58 cases and then declining slightly in 2016 and 2017.

Figure 9.2 Early syphilis among heterosexual men, 2007-2017, San Francisco

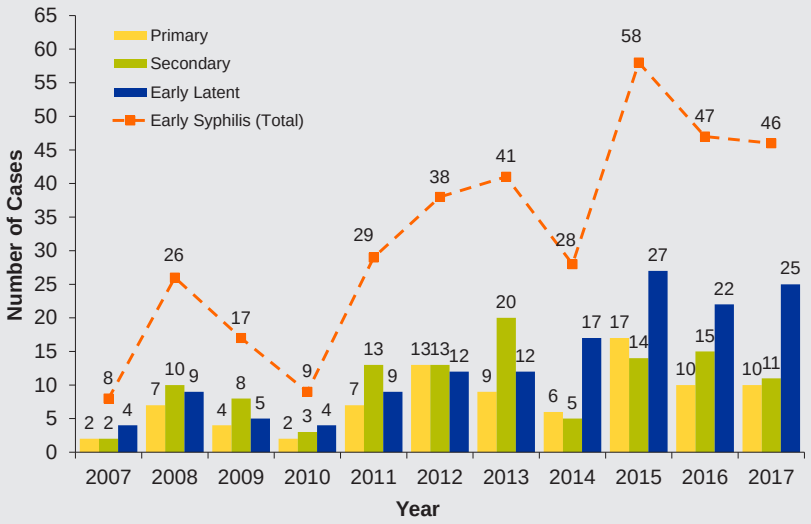
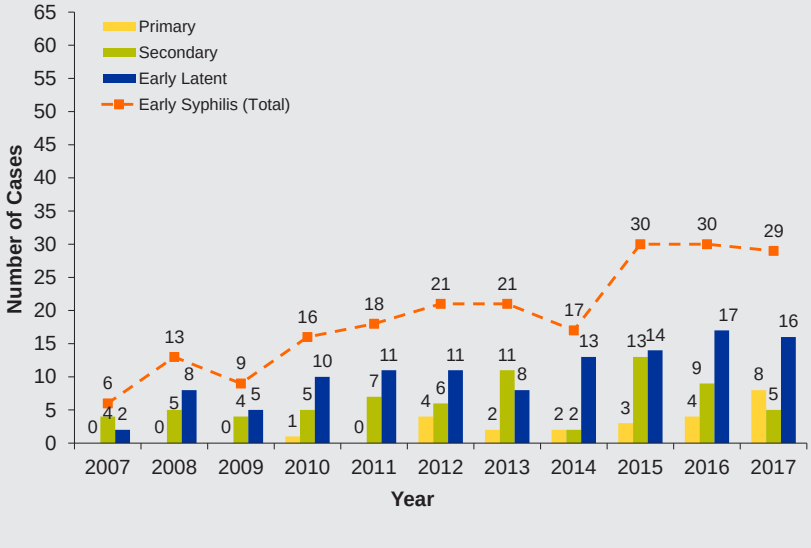


Figure 9.3 shows the annual number of primary, secondary, and early latent cases of syphilis among women in San Francisco from 2007 through 2017. Data originate from case reporting from laboratories and health providers throughout the city, although the majority are patients seen at the municipal STD clinic. Among women, syphilis cases have been low and stable, although higher numbers of early syphilis cases were observed in 2015-2017.

Figure 9.3 Early syphilis among women, 2007-2017, San Francisco

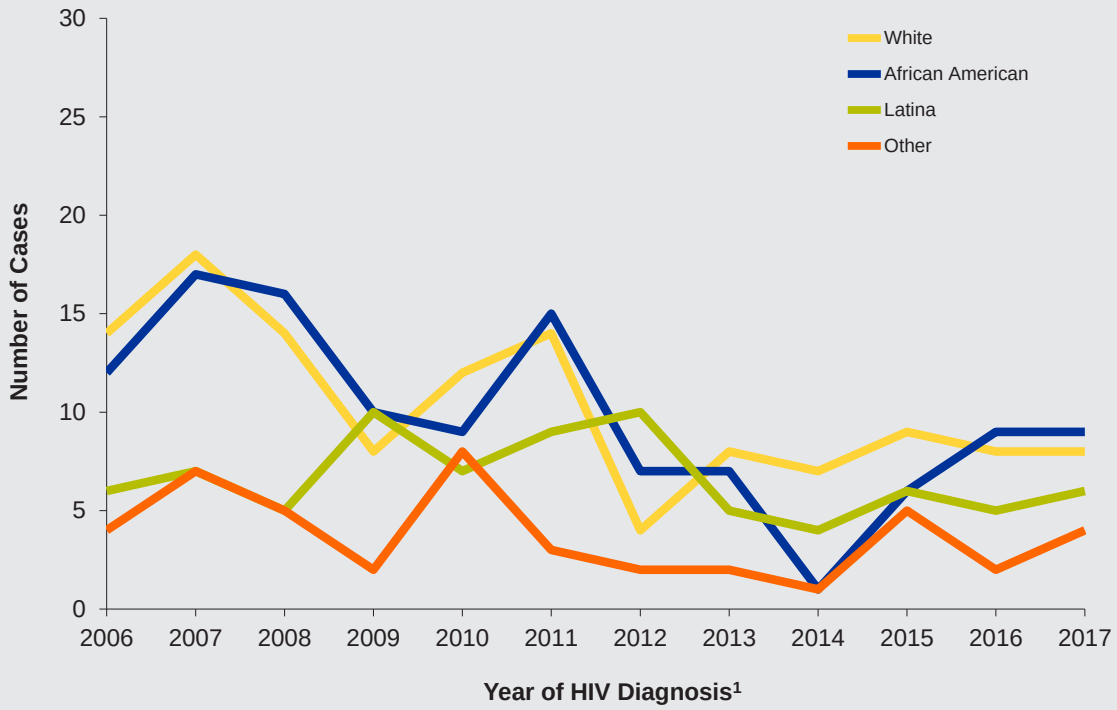


10 HIV among Women

HIV surveillance data

Among women newly diagnosed with HIV from 2006 to 2017, whites accounted for 34% of diagnoses, African Americans accounted for 32%, and Latinas accounted for 22% (Figure 10.1). The trends in annual diagnoses among women during this time period are similar for whites and African Americans.

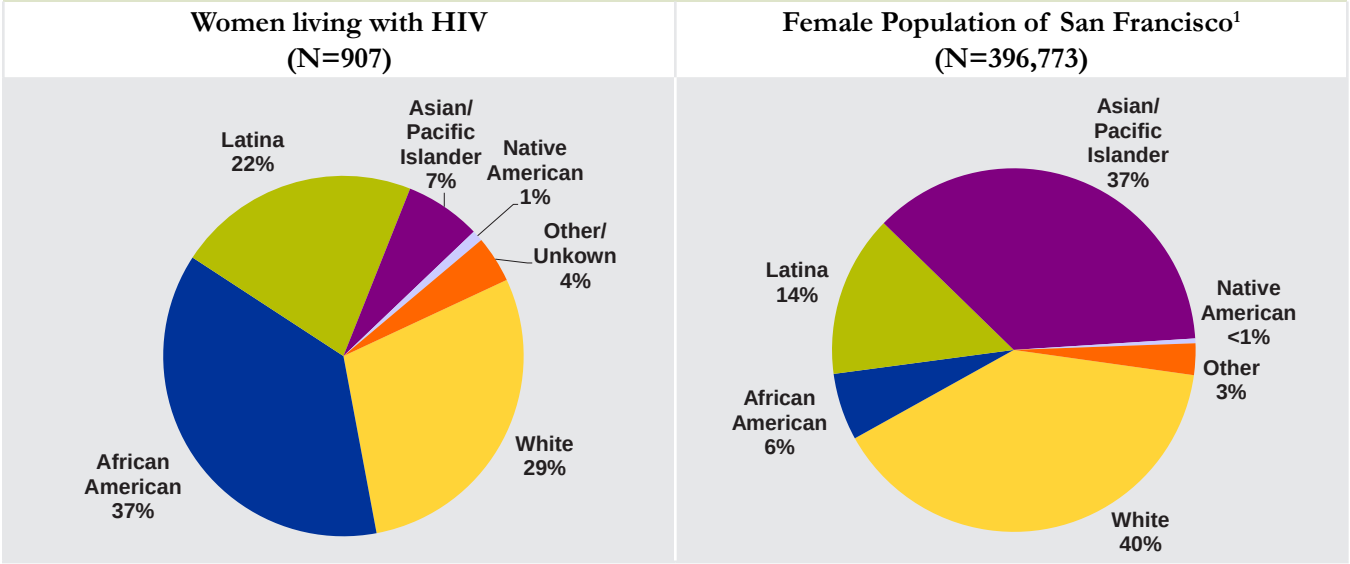
Figure 10.1 Number of women newly diagnosed with HIV by race/ethnicity, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

Among women, African Americans are disproportionately affected by HIV. This is evident when comparing women living with HIV in San Francisco to the city's female population (Figure 10.2). Although African American women represent 6% of the total female population, as of December 31, 2017 they accounted for 37% of women living with HIV in San Francisco.

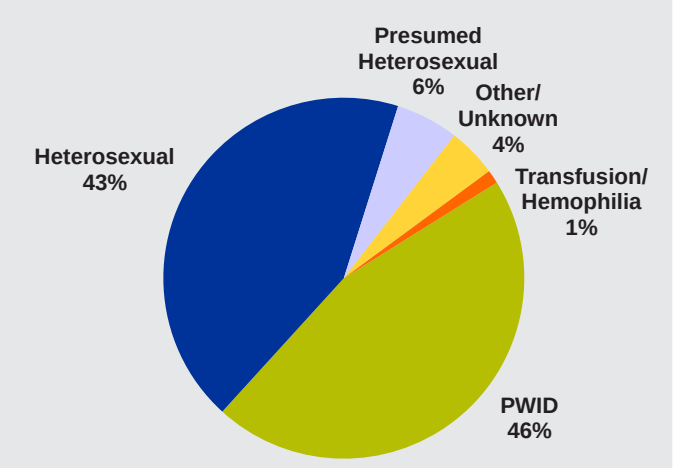
Figure 10.2 Women living with HIV diagnosed through December 2017 and female population by race/ethnicity, San Francisco



1 United States 2010 Census data.

The current transmission category definition for heterosexual contact does not adequately describe transmission for a large number of women who were infected heterosexually. The CDC HIV Incidence Case Surveillance Branch's definition for "female presumed heterosexual contact" reclassifies the transmission category for cases whose sex at birth was female who would otherwise be reported with no identified risk (see Technical Notes "Female Presumed Heterosexual Contact"). Among all women living with HIV diagnosed with HIV in San Francisco through the end of 2017, 46% acquired HIV through injecting drugs and 49% through heterosexual contact (Figure 10.3).

Figure 10.3 Women living with HIV diagnosed through December 2017 by transmission category, San Francisco



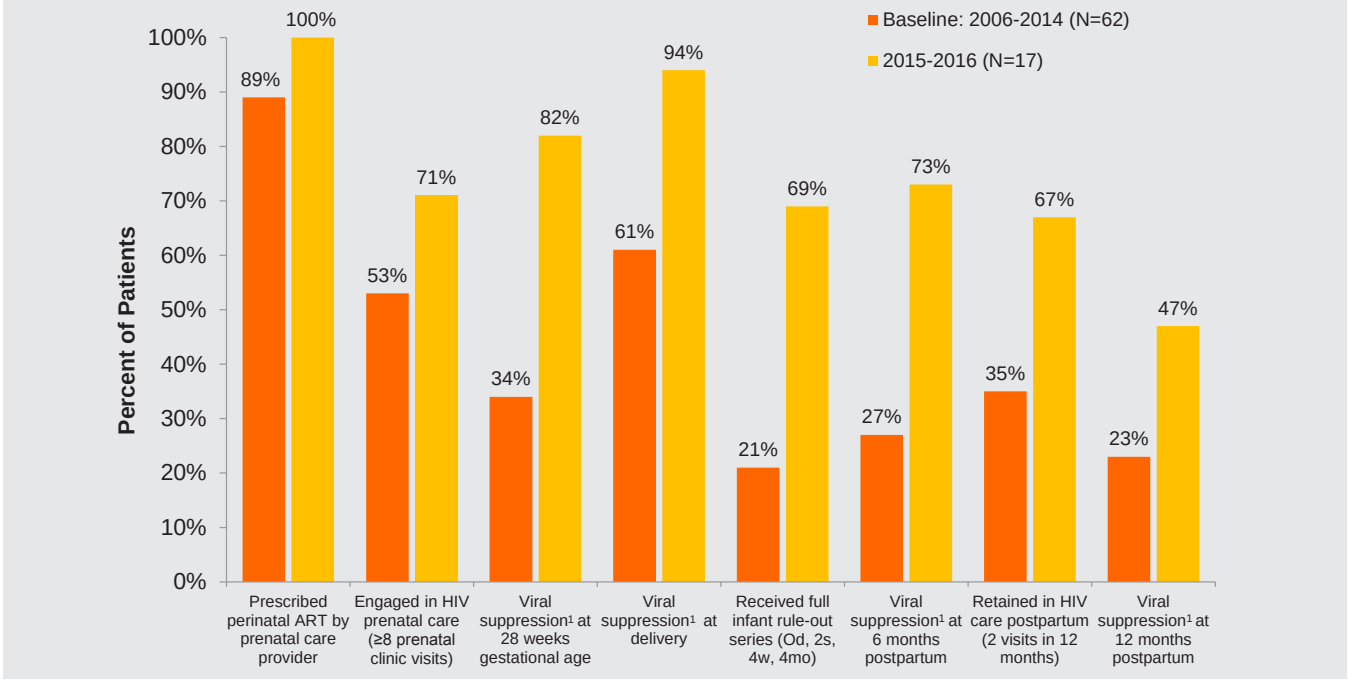
Perinatal HIV Prevention in San Francisco

Getting to and maintaining zero perinatal HIV transmissions requires extraordinary care coordination with community organizations and a team of providers to assure maternal and child health. One program that serves HIV-affected people in and around pregnancy is HIVE (the former Bay Area Perinatal AIDS Center) based at Zuckerberg San Francisco General Hospital and Trauma Center.

The HIVE treatment cascade displays data from 79 patients living with HIV who gave birth between 2006 and 2016 (Figure 10.4) including 62 patients during the baseline time period 2006-2014 and 17 patients in the years 2015-2106. HIVE providers prescribed antiretroviral therapy to all 17 patients in the 2015-2016 period. Over 70% of these were engaged in HIV prenatal care (defined as attendance at eight or more appointments). A notable proportion (82%) were virally suppressed (defined as viral load <40 copies/mL) at 28 weeks gestational age. All except one patient were virally suppressed (94%) at the time of delivery.

While improvements were seen over time, the HIVE treatment cascade continues to show opportunities to optimize maternal health and prevent perinatal HIV transmission particularly postpartum. As reported across the U.S. and globally, women are less likely to be engaged in their own care postpartum. Viral suppression dropped to 73% and 47% at 6 and 12 months postpartum in 2015-2016, respectively. Between 2006 and 2016, a period of zero perinatal HIV transmissions among residents of San Francisco, nine HIVE patients died postpartum. Medical chart reviews of patients who died revealed a myriad of psychosocial and structural factors including a history of trauma, housing instability, substance use, custody loss, and challenges with medication adherence.

Figure 10.4 HIV care and treatment among women living with HIV and gave births in 2006-2016, the HIVE program, San Francisco



1 Defined as viral load test <40 copies/mL.

11 HIV among Children, Adolescents and Young Adults

Adolescents (current age 13-17 years) or young adults (current age 18-24 years) living with HIV in San Francisco make up fewer than 1% of persons living with HIV in the city. As of December 31, 2017 there were fewer than ten adolescents and 101 young adults living with HIV. Among young adults living with HIV, three-quarters were MSM (either with or without a history of injecting drugs; Table 11.1). Thirty-three percent of young adults living with HIV were Latino, 26% were white, 23% were African American, and 11% were Asian/Pacific Islander. Adolescent data are not displayed due to small numbers.

Table 11.1 Young adults living with HIV by transmission category, gender[1], and race/ethnicity, December 2017, San Francisco

	18 - 24 Years Old	
	Number	(%)
Total	**101**	**(100)**
Transmission Category		
MSM	69	(68)
PWID	3	(3)
MSM-PWID	7	(7)
Heterosexual	8	(8)
Perinatal	11	(11)
Other/Unidentified	3	(3)
Gender[1]		
Men	79	(78)
Women	20	(20)
Race/Ethnicity		
White	26	(26)
African American	23	(23)
Latino	33	(33)
Asian/Pacific Islander	11	(11)
Multi-race	8	(8)

1 Data on trans women and trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

Table 11.2 compares adolescents or young adults at time of HIV diagnosis in San Francisco with those in the same age groups at diagnosis nationally for the years 2014-2017. Compared to the U.S., San Francisco had lower proportions of adolescents and young adults diagnosed with HIV.

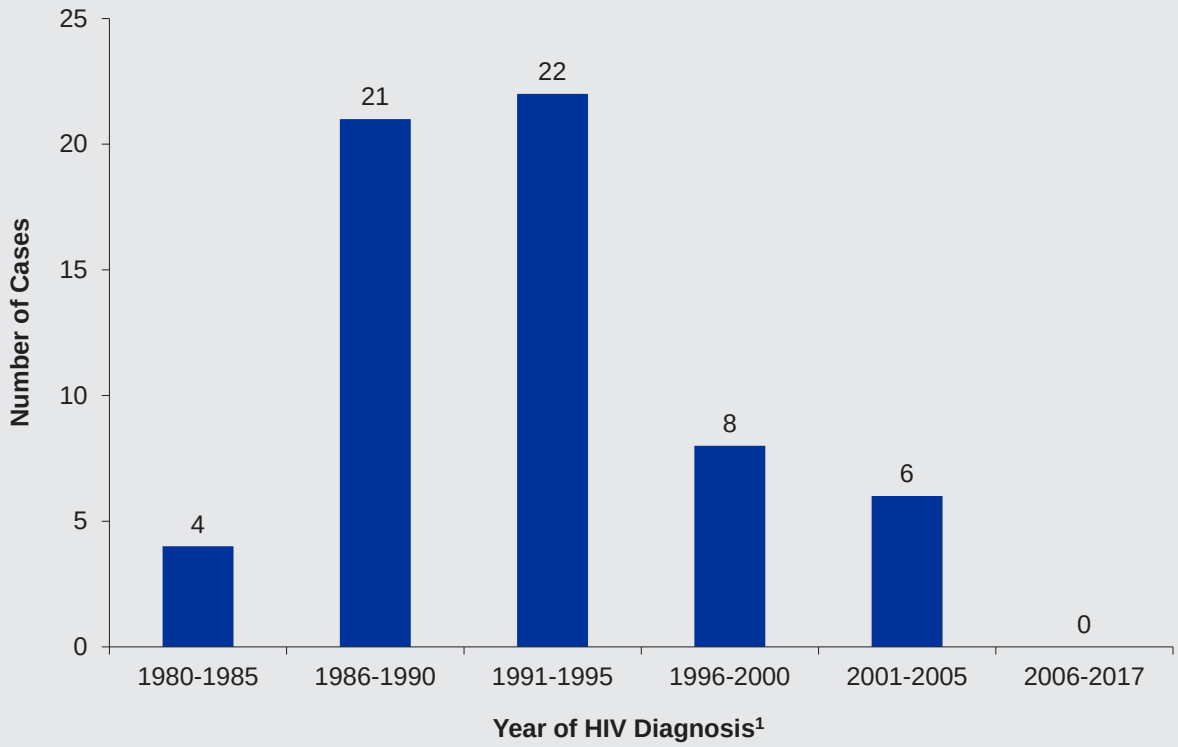
Table 11.2 Number of adolescents and young adults newly diagnosed with HIV, 2014-2017, San Francisco and the United States

	Year of HIV Diagnosis							
	2014		2015		2016		2017	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
San Francisco (All ages)	315		272		233		221	
Age 13-19 years at HIV diagnosis	1	(<1)	5	(2)	4	(2)	8	(4)
Age 20-24 years at HIV diagnosis	37	(12)	35	(13)	27	(12)	18	(8)
U.S.[1] (All ages)	40,927		40,442		40,324			
Age 13-19 years at HIV diagnosis	1,766	(4)	1,754	(4)	1,688	(4)	N/A	
Age 20-24 years at HIV diagnosis	7,349	(18)	7,310	(18)	6,848	(17)	N/A	

1 U.S. data are based on reported case counts from the 50 states and 6 dependent areas with confidential name-based HIV reporting in CDC HIV Surveillance Report, 2016 (volume 28).

As of December 31, 2017, there was a cumulative total of 61 pediatric HIV cases (children less than 13 years old) who resided in San Francisco at time of diagnosis. The number of pediatric HIV cases peaked between 1986 and 1995, and has declined over the following years (Figure 11.1). No pediatric HIV cases have been diagnosed among residents of San Francisco since 2005. Of the 61 reported pediatric HIV diagnoses, 26 (43%) have died as of December 2017 and 35 (57%) have survived beyond childhood (current age ≥13 years).

Figure 11.1 Number of children diagnosed with HIV by time period of HIV diagnosis, 1980-2017, San Francisco



1 See Technical Notes "Date of Initial HIV Diagnosis."

12 HIV among Persons Aged 50 Years and Older

Effective combination antiretroviral therapy use in the community has succeeded in extending the lives of persons with HIV and resulted in growing numbers of persons living with HIV (PLWH) who are 50 years and older. Sixty-five percent (N=10,340) of PLWH were aged 50 years and older as of December 31, 2017. Of PLWH over the age of 50 years, approximately 90% were between the age of 50-64 years old. Table 12.1 compares the characteristics between persons under 50 years and those persons 50 years and older. Those aged 50 years and older had a higher proportion of whites while those under age 50 had higher proportions of Latinos and Asian/Pacific Islanders.

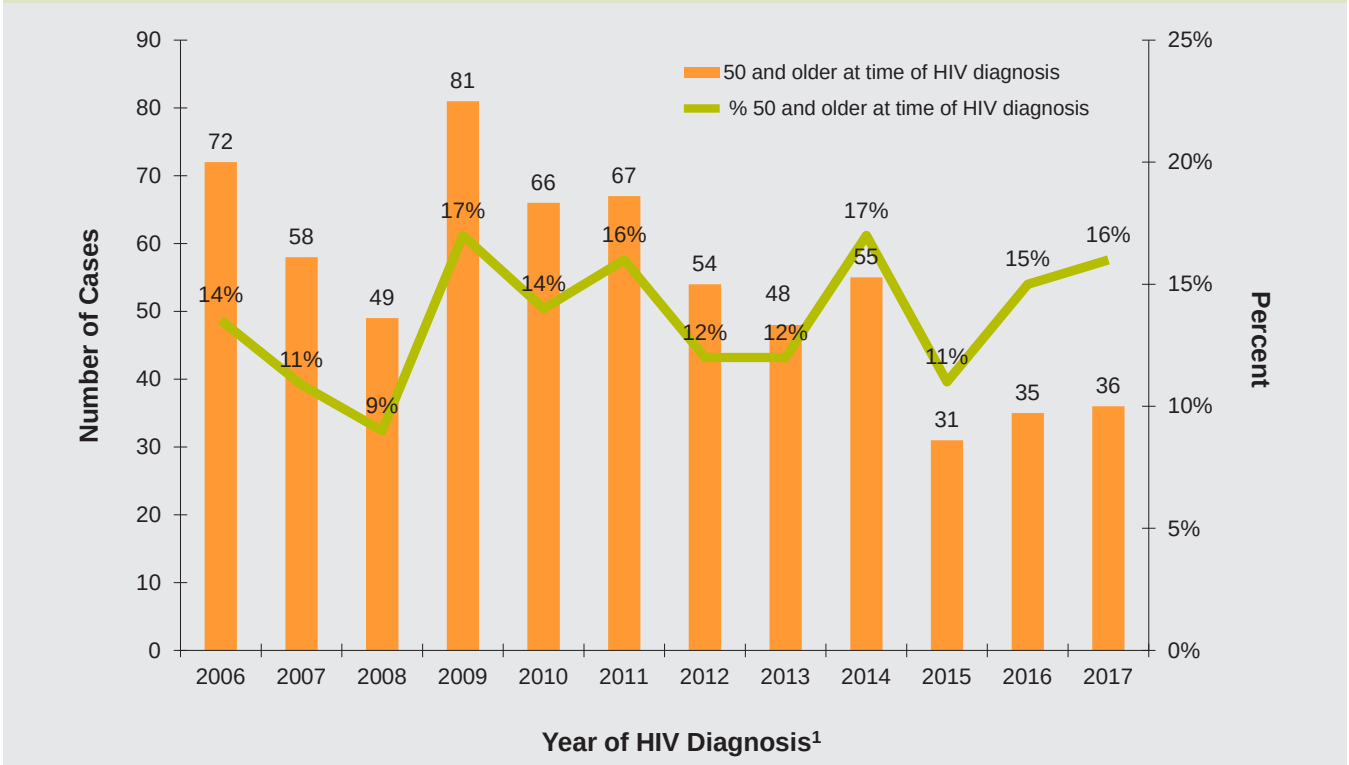
Table 12.1 Characteristics of persons living with HIV by age group, December 2017, San Francisco

	Age ≥ 50 years as of 12/31/2017 (N=10,340)		Age < 50 years as of 12/31/2017 (N=5,612)	
	Number	(%)	Number	(%)
Gender[1]				
Men	9,626	(93)	5,030	(90)
Women	545	(5)	362	(6)
Trans Women	166	(2)	218	(4)
Race/Ethnicity				
White	6,811	(66)	2,558	(46)
African American	1,253	(12)	652	(12)
Latino	1,550	(15)	1,550	(28)
Asian/Pacific Islander	409	(4)	564	(10)
Native American	38	(<1)	29	(1)
Other/Unknown	279	(3)	259	(5)
Transmission Category				
MSM	7,789	(75)	4,063	(72)
PWID	636	(6)	248	(4)
MSM-PWID	1,459	(14)	907	(16)
Heterosexual	323	(3)	246	(4)
Other/Unidentified	133	(1)	148	(3)

1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

Figure 12.1 illustrates the trends in the number and proportion of persons aged 50 years and older at time of diagnosis from 2006 through 2017. While the overall number of new diagnoses decreased, the number of persons aged 50 years and older at time of diagnosis has oscillated during this time and accounted for as much as 17% in 2009 and 2014, and as few as 9% in 2008.

Figure 12.1 Number and percent of persons newly diagnosed with HIV at age 50 years and older, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

Between 2006 and 2017, persons who were newly diagnosed with HIV and aged 50 years and older had a different demographic profile than those under the age of 50 (Table 12.2) including a higher proportion of women, whites, African Americans, heterosexuals, and PWID. Of those diagnosed at the age of 50 and older, 49% were 50-54 years old, 26% were 55-59 years old, 16% were 60-64 years old, and 9% were 65 years or older.

Table 12.2 Characteristics of persons newly diagnosed with HIV in 2006-2017 by age at diagnosis, San Francisco

	Age ≥ 50 years at diagnosis (N=652)		Age < 50 years at diagnosis (N=4,186)	
	Number	(%)	Number	(%)
Gender[1]				
Men	550	(84)	3,763	(90)
Women	93	(14)	274	(7)
Trans Women	8	(1)	147	(4)
Race/Ethnicity				
White	373	(57)	1,939	(46)
African American	133	(20)	527	(13)
Latino	87	(13)	1,056	(25)
Asian/Pacific Islander	33	(5)	441	(11)
Other/Unknown	26	(4)	223	(5)
Transmission Category				
MSM	370	(57)	3,033	(72)
PWID	98	(15)	229	(5)
MSM-PWID	72	(11)	603	(14)
Heterosexual	74	(11)	220	(5)
Other/Unidentified	38	(6)	101	(2)

1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

13 HIV among Trans Women

Gender status relies on review of information in medical records. Information on trans women and trans men has been collected since 1996. In this section, information on trans women is presented (numbers of trans men are not presented due to small numbers).

From 2006 through 2017, there were 155 trans women newly diagnosed with HIV in San Francisco (Table 13.1). Trans women comprised 3% of all persons diagnosed with HIV in this time period. Compared to all persons diagnosed with HIV during the period of 2006-2017, trans women were more likely to be non-white, PWID, and younger; 43% of newly diagnosed trans women were 18-29 years old.

As of December 31, 2017, there were 384 trans women living with HIV in San Francisco (Table 13.2). African Americans and Latinas were the largest racial/ethnic groups, each accounting for 33% and 34% respectively. Forty-four percent of trans women persons living with HIV were PWID. Similar to trans women newly diagnosed with HIV in 2006-2017, a higher proportion of non-whites, PWID, and younger ages occurred among trans women living with HIV when compared to all persons living with HIV in San Francisco.

Table 13.1 Characteristics of trans women compared to all persons newly diagnosed with HIV in 2006-2017, San Francisco

	Trans Women HIV Cases[1] 2006-2017		HIV Cases 2006-2017	
	Number	(%)	Number	(%)
Total	**155**		**4,838**	
Race/Ethnicity				
White	31	(20)	2,312	(48)
African American	43	(28)	660	(14)
Latina	51	(33)	1143	(24)
Asian/Pacific Islander	19	(12)	474	(10)
Other/Unknown	11	(7)	249	(5)
People who Inject Drugs				
Yes	56	(36)	1,002	(21)
No	99	(64)	3,836	(79)
Age at HIV Diagnosis (Years)				
13 - 17	0	(0)	18	(<1)
18 - 24	34	(22)	580	(12)
25 - 29	32	(21)	812	(17)
30 - 39	50	(32)	1,523	(31)
40 - 49	31	(20)	1,253	(26)
50+	8	(5)	652	(13)

1 See Technical Notes "Gender Status."

Table 13.2 Characteristics of trans women living with HIV compared to all persons living with HIV, December 2017, San Francisco

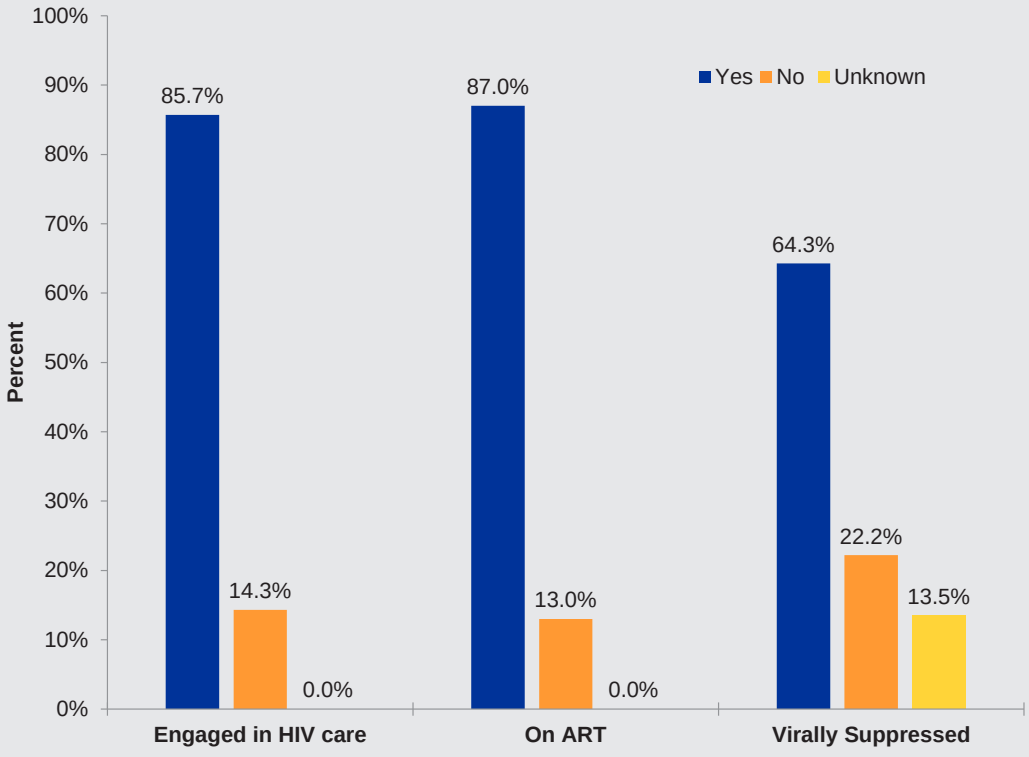
	Trans Women PLWH[1]		All PLWH	
	Number	(%)	Number	(%)
Total	**384**	**(100)**	**15,952**	**(100)**
Race/Ethnicity				
White	70	(18)	9,369	(59)
African American	125	(33)	1,905	(12)
Latina	130	(34)	3,100	(19)
Asian/Pacific Islander	39	(10)	973	(6)
Other/Unknown	20	(5)	605	(4)
People who Inject Drugs				
Yes	170	(44)	3,250	(20)
No	214	(56)	12,702	(80)
Age in Years (at end of 2015)				
13 - 17	0	(0)	5	(<1)
18 - 24	2	(1)	101	(1)
25 - 29	22	(6)	390	(2)
30 - 39	79	(21)	1,745	(11)
40 - 49	115	(30)	3,371	(21)
50+	166	(43)	10,340	(65)

1 See Technical Notes "Gender Status."

The Transwomen Empowered to Advance Community Health 3 (TEACH 3) study in San Francisco recruited self-identified adult trans women. Eligible participants were 18 years of age or older, lived in San Francisco, and self-identified as a gender different from that typically associated with a male sex assigned at birth (e.g. man). Indicators of HIV care, including engagement in HIV care, current use of antiretroviral therapy (ART) and viral suppression, were assessed through self-report.

TEACH 3 participants were interviewed between June 2016 and March 2017. Among participants interviewed, 123 tested positive for HIV. Of these, 85.7% reported engagement in HIV care, 87% reported current ART use and 64.3% reported they were virally suppressed.

Figure 13.1 Self-reported HIV care indicators among trans women living with HIV in San Francisco, June 2016 - March 2017

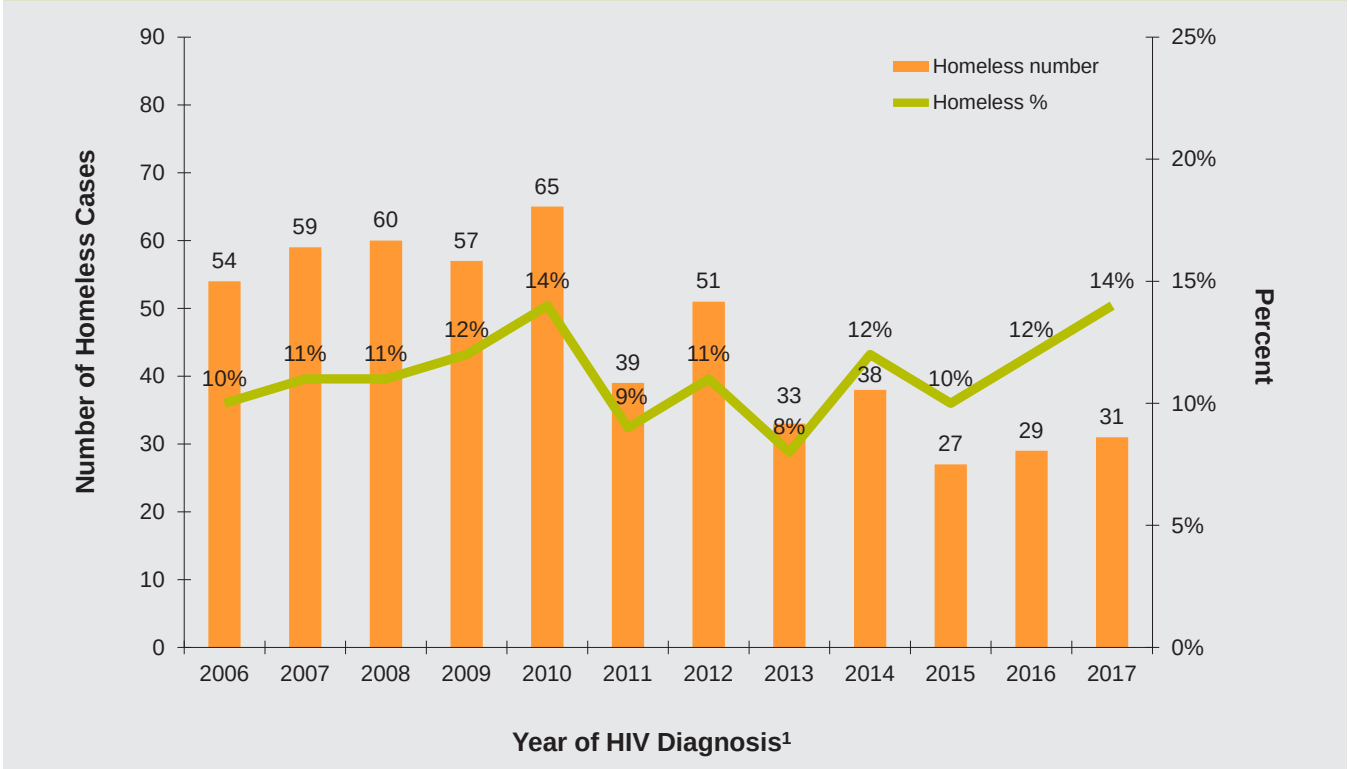


14 HIV among Homeless Persons

A person is defined as homeless if the medical record states that the patient is homeless or not housed at time of HIV diagnosis, or the patient's address at diagnosis is a known homeless shelter or a free postal address not connected to a residence ("general delivery"). Persons with missing information on residence at diagnosis are not classified as homeless. In addition, a person is not considered homeless if they live in a single room occupancy or transitional housing, live with partners, family or other non-family members, or are institutionalized (such as hospice, inpatient drug/alcohol recovery facility, facility for physically/mentally disabled, residential treatment program, correctional facility). Because our definition for homelessness excludes those with marginalized or unstable housing, our findings may differ from other programs.

Among homeless persons newly diagnosed with HIV from 2006 through 2017, the number of cases peaked at 65 in 2010, and in 2017 the number was 31 (Figure 14.1). The proportion of homeless cases declined in 2011 after a period of increase. From 2011 to 2017 the proportion of homeless cases has fluctuated but showed an overall increasing trend; 14% of new diagnoses in 2017 were homeless.

Figure 14.1 Number and percent of homeless persons newly diagnosed with HIV by year of diagnosis, 2006-2017, San Francisco



1 Includes persons with HIV by year of their initial HIV diagnosis. See Technical Notes "Date of Initial HIV Diagnosis."

Compared to all persons diagnosed with HIV in 2006 to 2017, persons who were homeless at time of HIV diagnosis were more likely to be women or trans women, African American, PWID, and MSM-PWID (Table 14.1). The age distribution for homeless diagnosed persons showed slightly higher proportions in the 18-24 years group and the 50 years and older group compared to all HIV diagnosed persons.

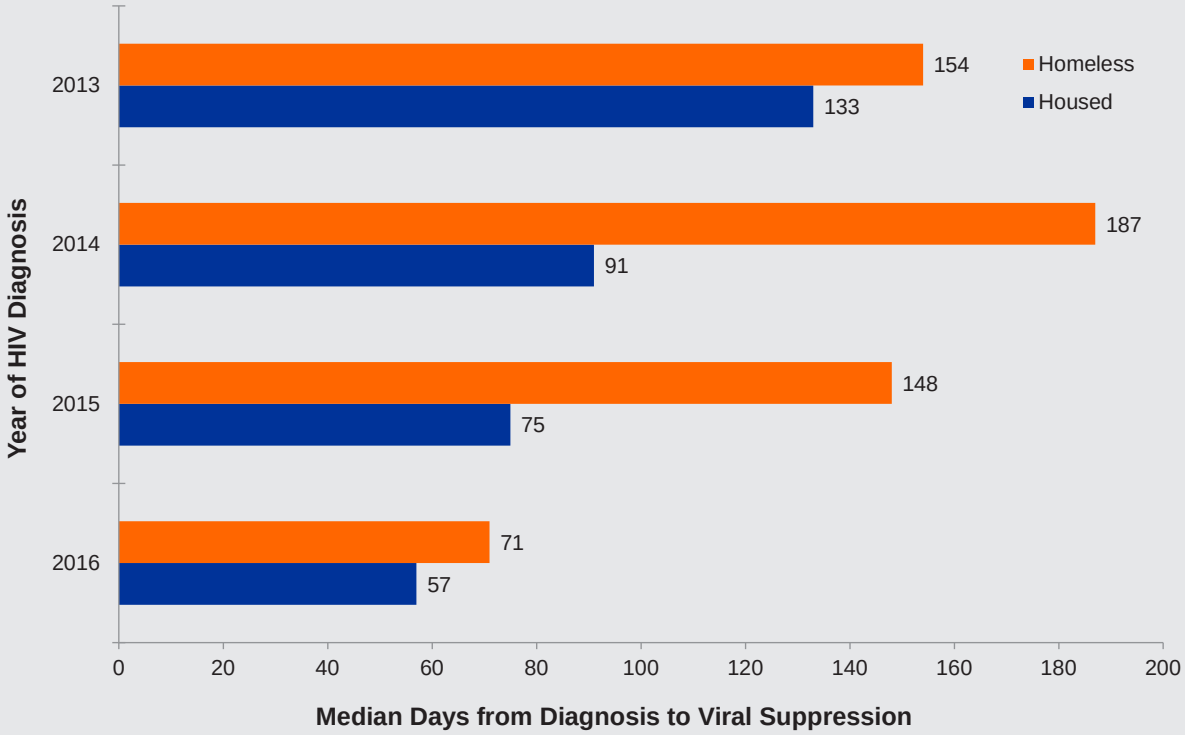
Table 14.1 Characteristics of homeless persons compared to all persons newly diagnosed with HIV in 2006-2017, San Francisco

	Homeless HIV Cases 2006-2017		HIV Cases 2006-2017	
	Number	(%)	Number	(%)
Total	**543**		**4,838**	
Gender[1]				
Men	412	(76)	4,313	(89)
Women	78	(14)	367	(8)
Trans Women	53	(10)	155	(3)
Race/Ethnicity				
White	232	(43)	2,312	(48)
African American	143	(26)	660	(14)
Latino	109	(20)	1,143	(24)
Asian/Pacific Islander	16	(3)	474	(10)
Other/Unknown	43	(8)	249	(5)
Transmission Category				
MSM	177	(33)	3,403	(70)
PWID	134	(25)	327	(7)
MSM-PWID	179	(33)	675	(14)
Heterosexual	40	(7)	294	(6)
Other/Unidentified	13	(2)	139	(3)
Age at Diagnosis (Years)				
0 - 17	1	(<1)	18	(<1)
18 - 24	85	(16)	580	(12)
25 - 29	100	(18)	812	(17)
30 - 39	141	(26)	1,523	(31)
40 - 49	130	(24)	1,253	(26)
50+	86	(16)	652	(13)

1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status".

Despite significant improvement in HIV-related care indicators in San Francisco, homeless persons living with HIV have poor retention and engagement in HIV care compared to persons who have adequate housing. Figure 14.2 shows temporal trends from HIV diagnosis to viral suppression by housing status for persons diagnosed with HIV in 2013 through 2016. Viral suppression was defined as HIV RNA<200 copies/mL. Median days from HIV diagnosis to viral suppression were greater for homeless than housed persons each year but decreased significantly over time from 154 days in 2013 to 71 days in 2016.

Figure 14.2 Time from HIV diagnosis to viral suppression by housing status, 2013-2016, San Francisco

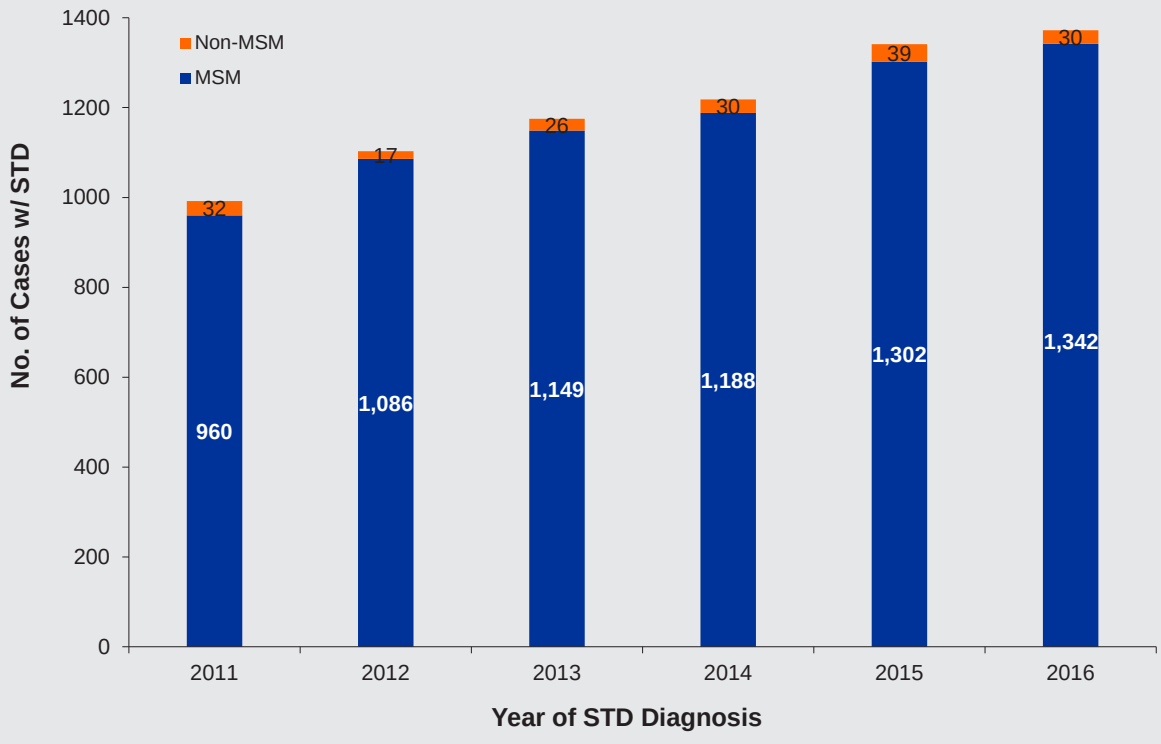


15 Persons Co-infected with HIV and Sexually Transmitted Diseases

Diagnoses of new sexually transmitted diseases (STD) such as early syphilis, gonorrhea, and chlamydia among persons living with HIV (PLWH) serve as a marker of condomless sex which, depending upon HIV treatment status and partner HIV serostatus, may result in HIV transmission. The diagnosis of STD among PLWH was determined through a computerized match of the San Francisco Department of Public Health HIV and STD cases registries.

The data from the STD registry included persons reported with gonorrhea, chlamydia, non-gonococcal urethritis, or infectious syphilis. From 2011 to 2016, the number of STD cases among PLWH rose from 992 in 2011 to 1,372 in 2016 and the vast majority of cases (>95%) were among MSM (Figure 15.1). Overall, the increase coincided with the upward trend shown in early syphilis (Figure 7.4 on page 60) and in male gonorrhea (Figure 7.3 on page 59) reported from 2006 through 2017 among MSM diagnosed with HIV. All STD occurred after the HIV diagnosis, indicating condomless sex among persons with known HIV infection.

Figure 15.1 Number of STD diagnoses among persons living with HIV by year of STD diagnosis, 2011-2016, San Francisco



The majority of PLWH diagnosed with an STD from 2011 through 2016 were men, white, and aged 40-49 years at time of STD diagnosis (Table 15.1). There were small increases in the proportions of Latinos and declines in the proportions of whites who were diagnosed with an STD. The proportion of PLWH diagnosed with an STD at age 50 or older increased from 22% in 2011 to 33% in 2016, while the proportion of those aged 40-49 declined during the same period of time.

Table 15.1 Demographic characteristics of persons living with HIV who were diagnosed with STD, 2011-2016, San Francisco

	Year of STD diagnosis											
	2011		2012		2013		2014		2015		2016	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Gender[1]												
Men	960	(97)	1,083	(98)	1,147	(98)	1,181	(97)	1,286	(96)	1,312	(96)
Women	11	(1)	8	(1)	6	(1)	12	(1)	19	(1)	14	(1)
Trans Women	20	(2)	12	(1)	22	(2)	25	(2)	36	(3)	46	(3)
Race/Ethnicity												
White	598	(60)	671	(61)	690	(59)	702	(58)	738	(55)	728	(53)
African American	89	(9)	86	(8)	104	(9)	103	(8)	118	(9)	119	(9)
Latino	215	(22)	257	(23)	269	(23)	284	(23)	331	(25)	366	(27)
Asian/Pacific Islander	60	(6)	68	(6)	80	(7)	85	(7)	94	(7)	107	(8)
Other/Unknown	30	(3)	21	(2)	32	(3)	44	(4)	60	(4)	52	(4)
Age at STD Diagnosis (years)												
13 - 29	110	(11)	132	(12)	141	(12)	155	(13)	157	(12)	166	(12)
30 - 39	245	(25)	265	(24)	291	(25)	287	(24)	300	(22)	312	(23)
40 - 49	415	(42)	461	(42)	471	(40)	460	(38)	486	(36)	440	(32)
50 - 59	172	(17)	197	(18)	230	(20)	247	(20)	326	(24)	361	(26)
60 +	50	(5)	48	(4)	42	(4)	69	(6)	72	(5)	93	(7)
Total	992		1,103		1,175		1,218		1,341		1,372	

1 Data on trans men are not released separately due to small numbers. See Technical Notes "Gender Status."

16 Molecular HIV Surveillance

Transmitted drug resistance and HIV-1 subtypes

Transmitted drug resistance (TDR) occurs when a drug-resistant HIV strain is transmitted from a treatment experienced person to a treatment naïve person. TDR can compromise the effectiveness of antiretroviral therapy (ART) and complicate HIV treatment. In San Francisco, a city with widespread use of ART, TDR can be of public health concern. The San Francisco Department of Public Health collects HIV nucleotide sequences through routine HIV laboratory reporting. HIV nucleotide sequences are generated by HIV genotypic testing, a test recommended by the U.S. Department of Health and Human Services to detect mutations associated with antiretroviral drugs at entry into health care and again later as needed to guide ART[1]. HIV nucleotide sequences can also be used to assess HIV genetic diversity. Monitoring HIV genetic diversity can enhance understanding of HIV transmission in the community and inform prevention efforts. We used HIV nucleotide sequence data to assess HIV-1 TDR and common HIV-1 subtypes among persons newly diagnosed with HIV between 2014 and 2016 and reported through December 2017.

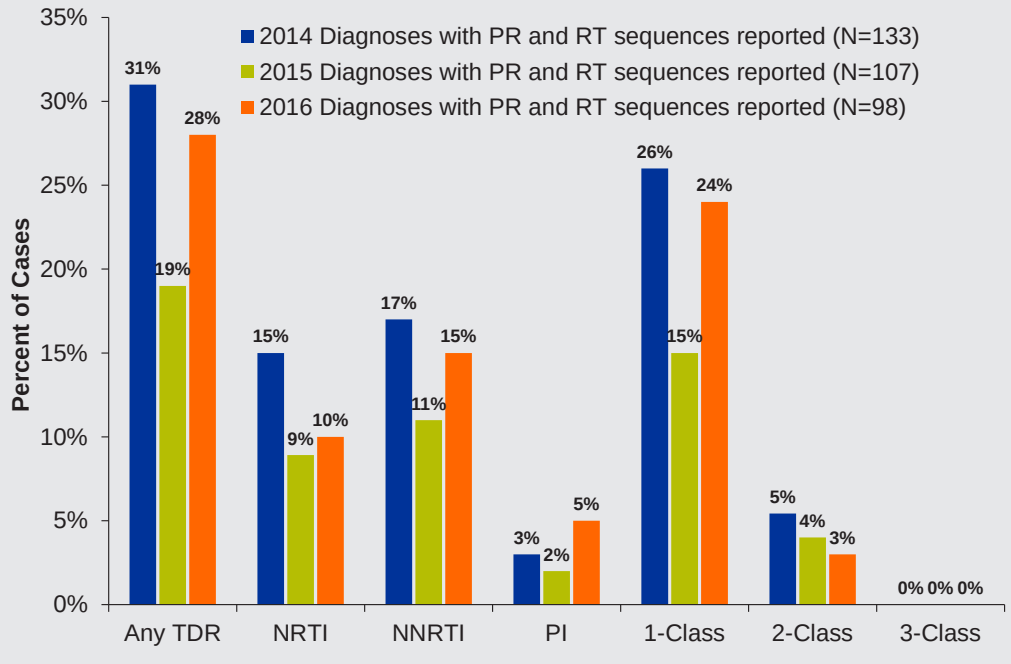
Of 330 new HIV diagnoses in 2014, 296 in 2015, and 264 in 2016, 188 (57%), 171 (58%), and 139 (53%), respectively, had any sequences reported. The completeness of HIV genotypic sequences was dependent upon the proportion of persons who were linked to care and received genotypic testing soon after HIV diagnosis, and the completeness of laboratory reporting. There were 133 (40%) persons diagnosed in 2014, 107 (36%) in 2015, and 98 (37%) in 2016 who had reported HIV protease (PR) and reverse transcriptase (RT) genes and met the inclusion criteria to assess TDR associated with nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), and protease inhibitors (PIs) (see Technical Notes "Transmitted Drug Resistance and HIV-1 Subtype"). Integrase sequences (IN) that met the inclusion criteria to assess TDR for integrase strand transfer inhibitors (INSTIs) were reported less frequently but the proportion increased in 2016: 25 (8%), 24 (8%), and 46 (17%) had a reported IN sequence among new diagnoses in 2014, 2015 and 2016, respectively.

Figure 16.1 shows the proportion of TDR among new HIV diagnoses with reported PR and RT sequences by NRTI, NNRTI, and PI drug classes. The proportion of TDR to any drug class fluctuated from 2014 to 2016. The proportion was highest in 2014 (N=41, 31%), declined in 2015 (N=20, 19%), and increased in 2016 (N=27, 28%). Overall, TDR occurred most frequently for NNRTIs, followed by TDR for NRTIs, and TDR for PIs. The proportion of TDR for multiple drug classes was low: 5% (N=6) in 2014, 4% (N=4) in 2015, 3% (N=3) in 2016 had TDR for two drug classes, and none had TDR for three drug classes during those years. TDR for INSTIs was not found among the limited number of new diagnoses with IN sequences reported (data not shown).

Figure 16.2 shows the distribution of HIV-1 subtypes among new HIV diagnoses in 2014-2016 that had HIV sequences reported. Of 498 persons with sequences information, 449 (90%) were classified as subtype B. CRF01_AE was the most common non-B subtype, occurring in 21 (4%) of new diagnoses with sequence reported.

1 Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services. Available at http://aidsinfo.nih.gov/contentfiles/lvguidelines/AdultandAdolescentGL.pdf Section accessed [06/06/2018]

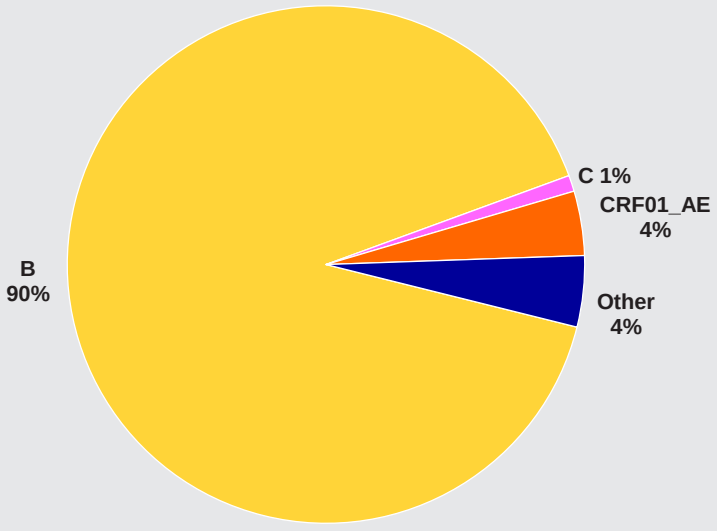
Figure 16.1 Transmitted HIV-1 drug resistance[1] among new HIV diagnoses with eligible protease and reverse transcriptase sequence by drug class, 2014-2016, San Francisco



1 Limited to persons with sequences collected within 3 months of HIV diagnosis and with no evidence of prior antiretroviral treatment. See Technical Notes "Transmitted Drug Resistance and HIV-1 subtypes." Drug classes include nucleoside reverse transcriptase inhibitors (NRTI), non-nucleoside reserves transcriptase inhibitors (NNRTI), and protease inhibitors (PI).

Figure 16.2 HIV-1 subtypes[1] among new HIV diagnoses with HIV nucleotide sequences, 2014-2016, San Francisco

(N=498)



1 See Technical Notes "Transmitted Drug Resistance and HIV-1 Subtypes."

17 First and Subsequent Cancers in Persons with HIV

People without HIV who have a first cancer diagnosis are at greater risk of developing a second cancer than those who have not been diagnosed with cancer. This higher risk may be due to the effect of treatment of the first cancer, an underlying risk for cancer such as genetics or immune deficiency, or exposure to factors that increase the risk of cancer such as tobacco or alcohol use or infection with cancer-causing viruses such as hepatitis B and C. People with HIV are at higher risk than people without HIV for certain cancers, such as the AIDS-defining cancers (Kaposi sarcoma [KS], non-Hodgkin lymphoma [NHL], and cervical cancer) as well as certain non-AIDS-defining cancers. In this section we display information on the frequency of selected cancers that occurred as a first cancer and as a second or subsequent cancer among people diagnosed with HIV in San Francisco. Second or subsequent cancer refers to new cancers that are different from the first cancer. These are not cancers that recurred or spread to a new site. Information on cancers that occurred among San Francisco adult residents who were diagnosed with HIV from January 1, 1990 through December 31, 2010 was obtained from the California cancer registry. Cancers that occurred from January 1, 1985 through December 31, 2013 were included in order to capture cancers that may have occurred prior to or after the HIV diagnosis.

There were 22,623 San Francisco adults diagnosed with HIV from 1990 through 2010 and among these individuals 4,144 first cancers were identified. Of these 4,144 first cancers, 3,772 (91%) were in persons who had only one cancer while 372 were in persons with both a first and second new cancer (Table 17.1). A greater proportion of persons diagnosed with cancer were male, older, white, and men who had sex with men. Second cancers were more frequent among older persons and MSM compared to persons with only a single primary cancer diagnosis.

Table 17.1 Characteristics of San Francisco residents diagnosed with HIV in 1990-2010 by number of primary cancers diagnosed in 1985-2013

	No cancer N=18,479		One primary cancer N=3,772		Two or more primary cancers N=372		Total N=22,623	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Sex at Birth								
Male	17,268	(93.5)	3,656	(96.9)	361	(97.0)	21,285	(94.1)
Female	1,211	(6.6)	116	(3.1)	11	(3.0)	1,338	(5.9)
Age at HIV Diagnosis (years)								
15 - 24	1,070	(5.8)	102	(2.7)	6	(1.6)	1,178	(5.2)
25 - 34	6,379	(34.5)	1111	(29.5)	91	(24.5)	7,581	(33.5)
35 - 44	7,254	(39.3)	1561	(41.4)	155	(41.7)	8,970	(39.7)
45 - 54	2,971	(16.1)	725	(19.2)	90	(24.2)	3,787	(16.7)
55 - 64	663	(3.6)	217	(5.8)	19	(5.1)	898	(4.0)
65 - 74	126	(0.7)	44	(1.2)	10	(2.7)	180	(0.8)
75+	16	(0.1)	12	(0.3)	1	(0.3)	29	(0.1)
Race/Ethnicity								
White	11,240	(60.8)	2,674	(70.9)	265	(71.2)	14,179	(62.7)
African American	2,867	(15.5)	429	(11.4)	40	(10.8)	3,336	(14.8)
Other/Unknown	4,372	(23.7)	669	(17.7)	67	(18.0)	5,108	(22.6)
Transmission Category								
MSM	12,610	(68.2)	2,931	(77.7)	309	(83.1)	15,850	(70.1)
PWID	1,856	(10.0)	223	(5.9)	19	(5.1)	2,098	(9.3)
MSM-PWID	3,133	(17.0)	534	(14.2)	35	(9.4)	3,702	(16.4)
Heterosexual	548	(3.0)	50	(1.3)	4	(1.1)	602	(2.7)
Other/Unidentified	332	(1.8)	34	(0.9)	5	(1.3)	371	(1.6)

The most frequent cancers were the AIDS-defining cancers; KS and NHL (Table 17.2). Of the non-AIDS-defining cancers, anal, liver, Hodgkin lymphoma, prostate, lung, and melanoma were most frequent. These were also the most frequent first cancers and, with the addition of colon cancer, were also the most frequent second and third cancers. While KS and NHL are likely due to HIV-related immune deficiency, many of the other cancers may be due to infection with cancer causing viruses (anal and liver cancers), sun exposure (melanoma), and tobacco use (lung). These non-AIDS-defining cancers may be preventable with changes in life style and vaccination against cancer causing viruses.

Table 17.2 Primary cancer types by sequence of occurrence among San Francisco residents diagnosed with HIV in 1990-2010

	Sequence of Occurrence								
	First N = 4,144		Second N = 372		Third N = 26		Fourth or later N = 3		All N=4,545
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number
Primary Cancer Type[1]									
Breast	21	(1)	4	(1)	0	(0)	0	(0)	25
Digestive system									
Anal	173	(4)	24	(6)	4	(15)	1	(33)	202
Colon	32	(1)	10	(3)	2	(8)	2	(67)	46
Esophageal	9	(<1)	3	(1)	1	(4)	0	(0)	13
Liver	72	(2)	10	(3)	3	(12)	0	(0)	85
Pancreas	13	(<1)	3	(1)	0	(0)	0	(0)	16
Rectal	39	(1)	7	(2)	0	(0)	0	(0)	46
Stomach	15	(<1)	3	(1)	0	(0)	0	(0)	18
Endocrine									
Thyroid	15	(<1)	7	(2)	0	(0)	0	(0)	22
Kaposi sarcoma	2,084	(50)	49	(13)	2	(8)	0	(0)	2,135
Leukemia	31	(1)	6	(2)	0	(0)	0	(0)	37
Lymphoma									
Hodgkin Lymphoma	100	(2)	6	(2)	0	(0)	0	(0)	106
Non-Hodgkin Lymphoma	848	(20)	156	(42)	1	(4)	0	(0)	1,005
Male Genital System									
Penis	10	(<1)	4	(1)	1	(4)	0	(0)	15
Prostate	129	(3)	11	(3)	0	(0)	0	(0)	140
Testis	41	(1)	1	(<1)	0	(0)	0	(0)	42
Myeloma	19	(<1)	2	(1)	0	(0)	0	(0)	21
Oral Cavity and Pharynx									
Tongue	21	(1)	5	(1)	1	(4)	0	(0)	27
Tonsil	15	(<1)	1	(<1)	1	(4)	0	(0)	17
Respiratory System									
Larynx	19	(<1)	1	(<1)	0	(0)	0	(0)	20
Lung	128	(3)	16	(4)	3	(12)	0	(0)	147
Skin									
Melanoma	91	(2)	13	(3)	2	(8)	0	(0)	106
Urinary System									
Bladder	31	(1)	5	(1)	1	(4)	0	(0)	37
Kidney	31	(1)	4	(1)	0	(0)	0	(0)	35

1 Excludes cancer types with a total frequency of ten or fewer.

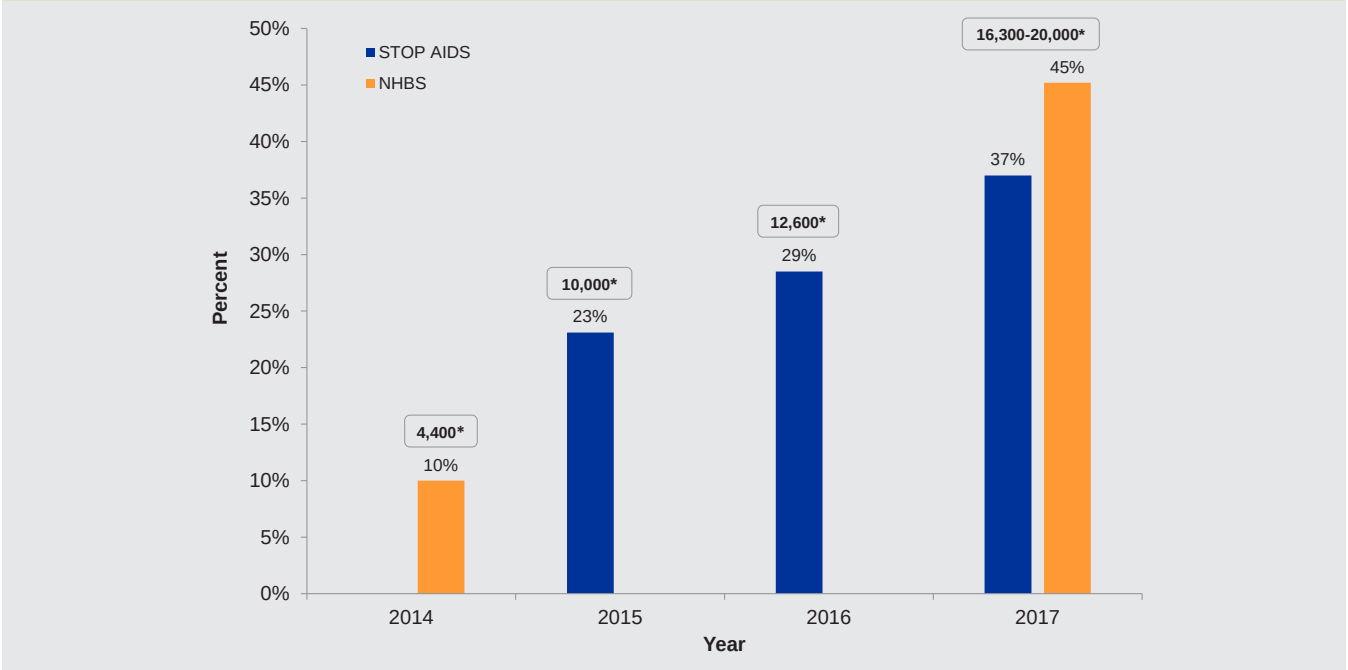
18 Pre-Exposure Prophylaxis

Pre-exposure prophylaxis (PrEP) is a rapidly emerging HIV prevention strategy for people at high risk of HIV acquisition. In 2012, after a series of clinical trials demonstrated the safety and efficacy of PrEP, the United States Food and Drug Administration approved emtricitabine/tenofovir as a once-daily pill to prevent sexually acquired HIV infection in at-risk adults. Since then, San Francisco has aggressively promoted PrEP as a key HIV prevention strategy.

Measuring PrEP use is difficult as there is no name-based PrEP surveillance system or pharmacy reporting. Additionally, people can go on and off PrEP so determining the number of current users is also challenging. The San Francisco Department of Public Health (SFDPH) in collaboration with the Getting to Zero San Francisco initiative has been working to measure PrEP uptake among populations at risk for HIV. Data are gathered from community-based and clinic-based sources to track trends and disparities in PrEP use among persons at risk for HIV in San Francisco. Several estimates from different surveys and clinical settings are presented below.

Figure 18.1 presents data on PrEP use among men who have sex with men (MSM) from two community-based surveys, the population-based National HIV Behavioral Surveillance (NHBS) survey and the STOP AIDS Project survey. The proportion of HIV negative MSM or those with unknown serostatus reporting current PrEP use increased from 10% in 2014 to 45% in 2017 from NHBS and from 23% in 2015 to 37% in 2017 from the STOP AIDS Project. These proportions were applied to the estimated number of MSM without HIV living in San Francisco to calculate an estimate of the number of PrEP users. The estimated overall number of MSM using PrEP increased from approximately 4,400 in 2014 to between 16,300 and 20,000 in 2017.

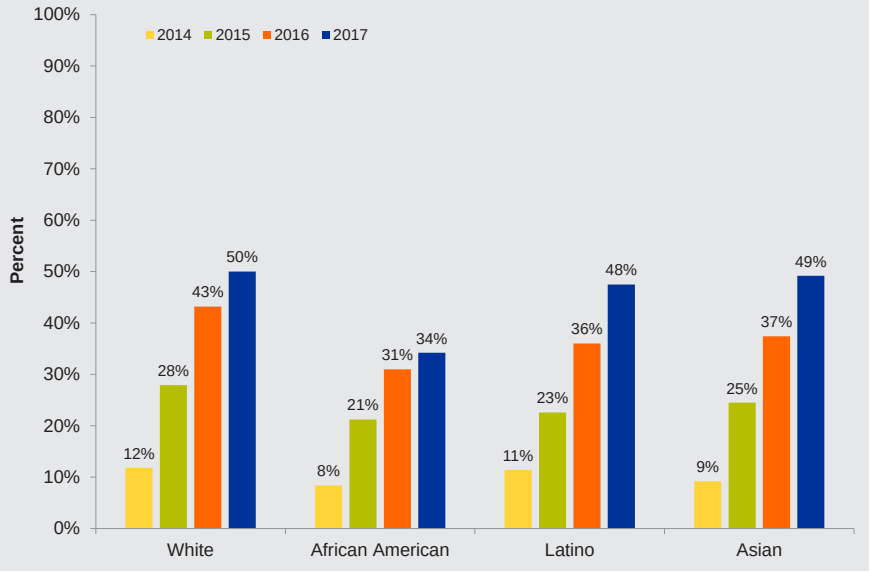
Figure 18.1 Proportion of MSM reporting PrEP by source and estimated total MSM PrEP users, 2014-2017, San Francisco



* Based on published estimated sample size of 44,154 HIV negative MSM in San Francisco in 2014 Hughes et al, J Urban Health 2017.

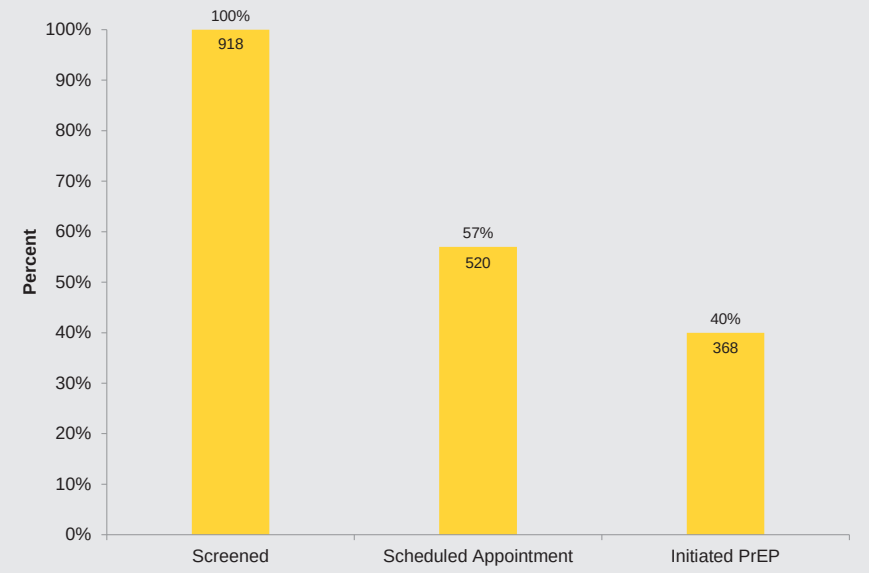
Figure 18.2 shows current PrEP use among a subset of MSM eligible for PrEP at the San Francisco City Clinic by race/ethnicity over time. PrEP use among eligible MSM increased over time among all races. However, for each year, African-American MSM had lower proportions of PrEP use compared to MSM of all other races.

Figure 18.2 Proportion of PrEP eligible MSM currently on PrEP by race/ethnicity, San Francisco City Clinic patients, 2014-2017



SFDPH also collects information of the number of clients who were screened, offered an appointment to discuss PrEP and initiated PrEP at community based organizations (CBOs) funded by the Health Department. Data from five CBOs are presented in Figure 18.3; several of these CBOs were selected for funding based on access to under-served populations. Between August 2016 and March 2018, 918 clients were screened for PrEP eligibility, 57% (N=520) were offered an appointment to discuss PrEP and 40% (N=368) initiated PrEP.

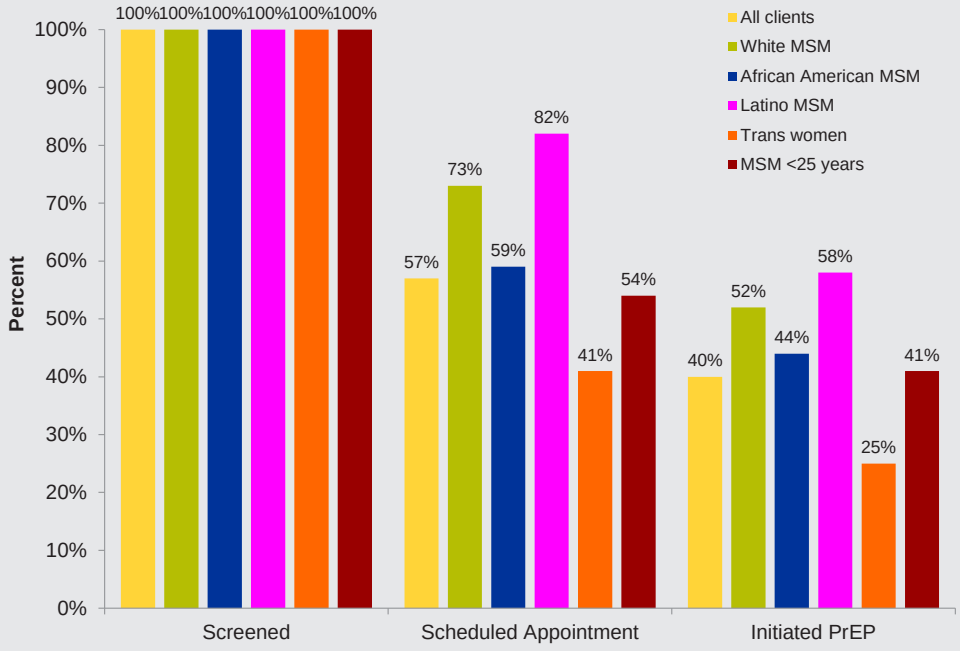
Figure 18.3 PrEP screening, appointments and PrEP initiation among clients being served by selected community based organizations[1], San Francisco, August 2016 - March 2018



1 Community Based Organizations included API Wellness, Lyric, San Francisco AIDS Foundation, Instituto de la Raza, and Alliance Health Project.

Figure 18.4 shows the PrEP cascade, from screening to initiation, for the 918 clients screened for PrEP. Of those screened, Latino MSM were most likely to schedule an appointment (82%) followed by white MSM (73%). Trans women (41%) and young MSM under the age of 25 (54%) were less likely to schedule an appointment. PrEP initiation was also highest among Latino MSM (58%) and white MSM (52%) and lowest among trans women (25%) and young MSM (41%).

Figure 18.4 PrEP Cascade among clients being served by selected community based organizations[1], San Francisco, August 2016 - March 2018

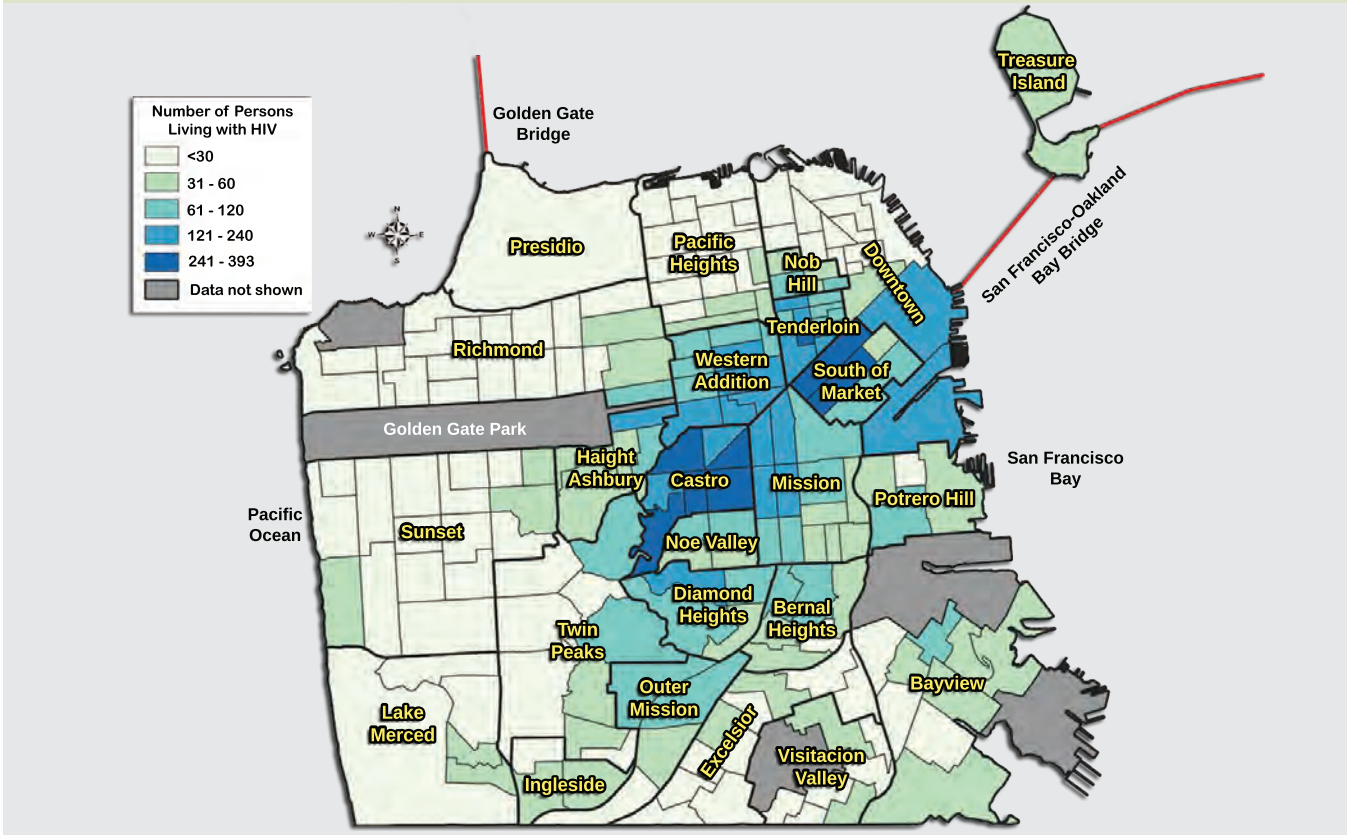


1 Community Based Organizations included API Wellness, Lyric, San Francisco AIDS Foundation, Instituto de la Raza, and Alliance Health Project.

19 Geographic Distribution of Persons with HIV

Approximately 38% of persons living with HIV who resided in San Francisco at time of diagnosis have since moved out of the city (Figure 3.9). Map 19.1 uses the current address for all persons who have accessed HIV care in San Francisco. There were 12,997 current San Francisco residents living with HIV as of December 31, 2017, regardless of their residence at HIV diagnosis. Current address is updated through chart review, laboratory reports, and communications with other jurisdictions. The Castro, Tenderloin, and South of Market neighborhoods had census tracts with the highest numbers of persons living with HIV (PLWH) (shown in the darker shades of blue). The South of Market census tract along Market Street had the largest number of PLWH (N=393) followed by three census tracts in the Castro. The Tenderloin also contains smaller census tracts with a high number of PLWH, a reminder of the higher density of persons in these areas.

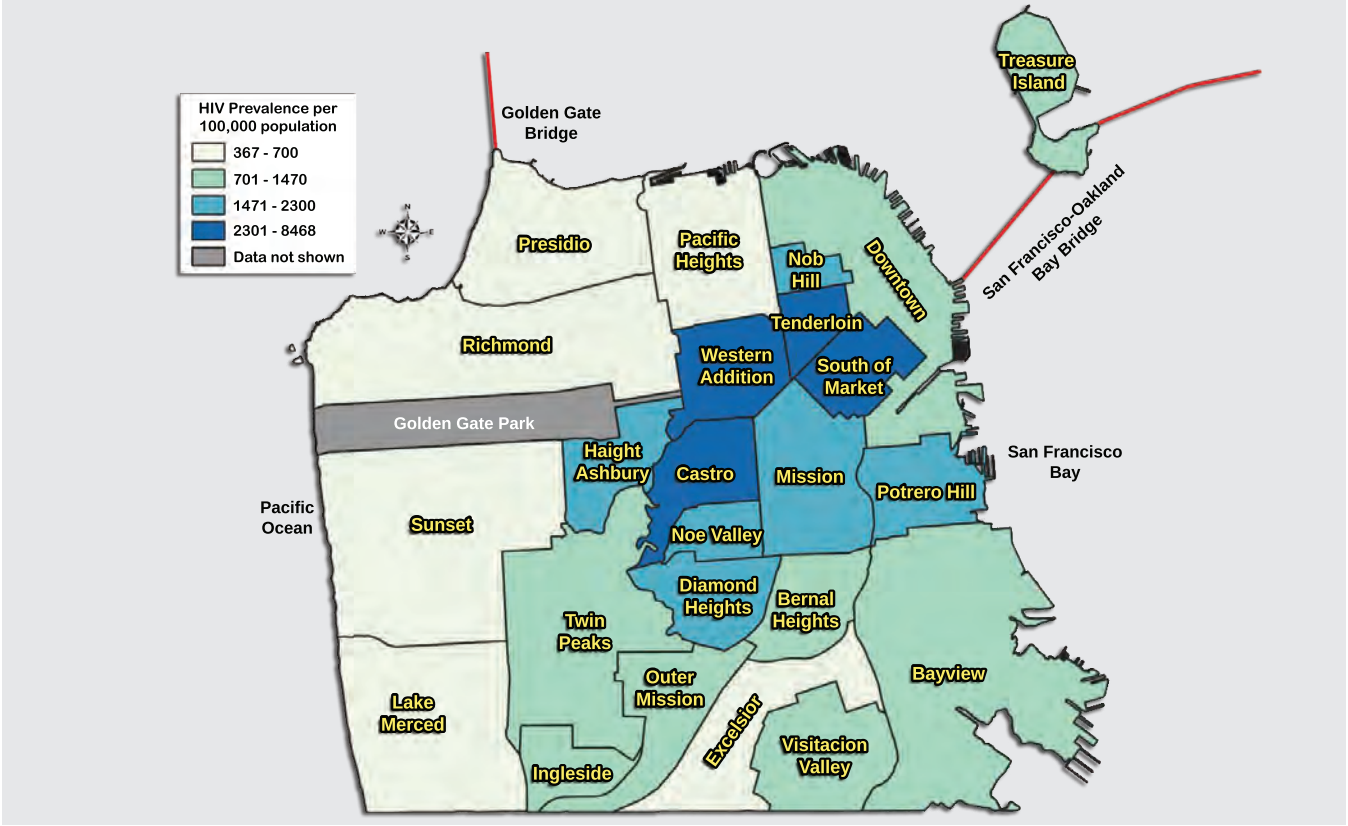
Map 19.1 Geographic distribution of persons living with HIV who resided in San Francisco as of December 2017



* Living homeless cases (N=488) and those with unknown or invalid addresses (N=382) are not displayed. Census tracts with population totals less than 500 are not shown.

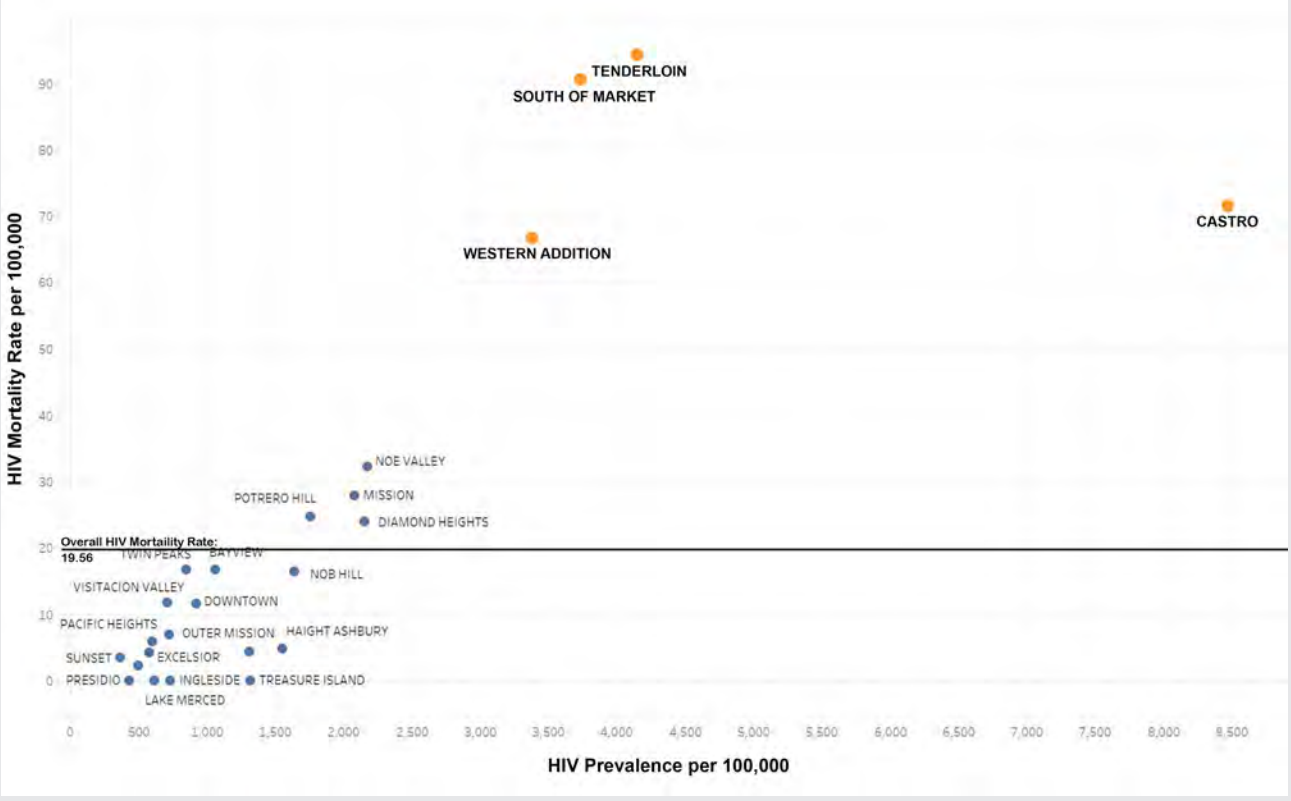
Map 19.2 shows HIV prevalence per 100,000 population by neighborhood. The Castro had the highest prevalence rate of 8,468 per 100,000, followed by the Tenderloin (4,160 per 100,000), South of Market (3,730 per 100,000) and Western Addition (3,384 per 100,000).

Map 19.2 HIV prevalence per 100,000 population by neighborhood, 2017, San Francisco



In addition to HIV prevalence rates displayed in Map 19.2, we examined the relationship between HIV mortality rates and HIV prevalence across the city. Map 19.3 shows that the neighborhoods with the highest prevalence rates also had the highest HIV mortality rates (Castro, Tenderloin, South of Market, and Western Addition). Although HIV prevalence in the Tenderloin (4,160 per 100,000) and South of Market (3,730 per 100,000) was less than half of the Castro (8,468 per 100,000), the Tenderloin had the highest mortality rate (94 per 100,000) followed by the South of Market (91 per 100,000).

Map 19.3 HIV prevalence and HIV mortality per 100,000 population by neighborhood[1], 2017, San Francisco

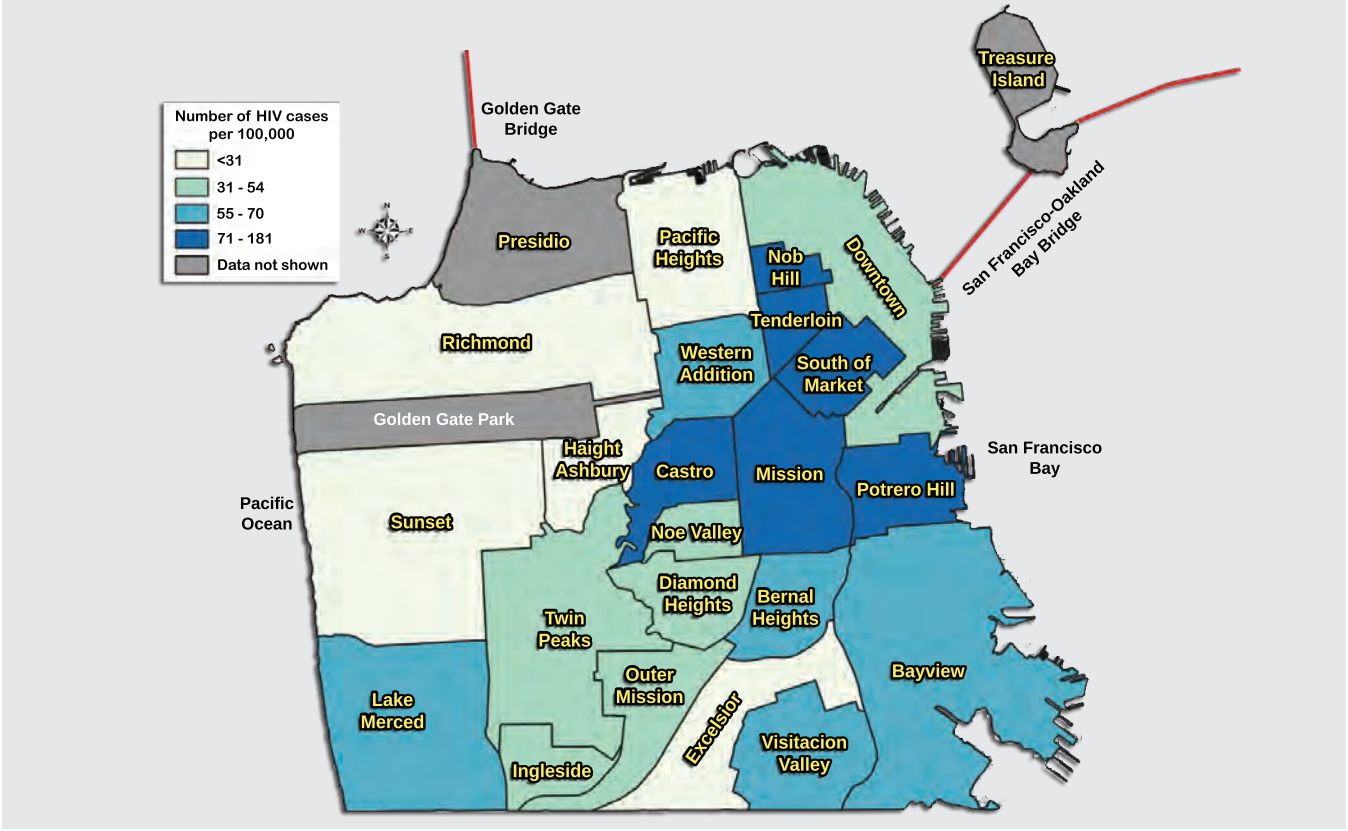


1 HIV prevalence rates are calculated based on current address for PLWH, HIV mortality rates are based on residence at death listed on death certificate for decedents.

Map 19.4 shows the two-year diagnosis rates[1] from 2016 to 2017. The Castro had the highest newly diagnosed rates in 2016-2017 (181 per 100,000) followed by the Tenderloin (171 per 100,000), and South of Market neighborhoods (136 per 100,000).

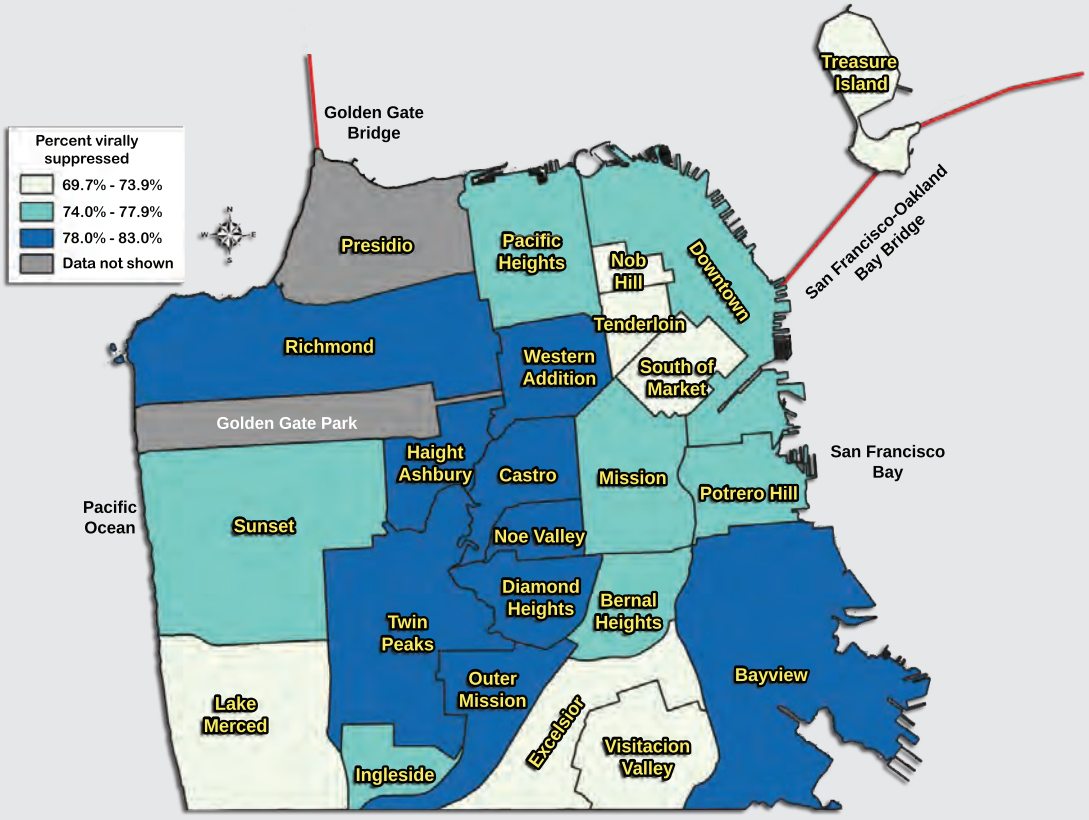
1 Two-year diagnosis rate numerators represent two years of diagnosed cases.

Map 19.4 Geographic distribution of rates of HIV diagnosis per 100,000 population per two years for persons newly diagnosed in 2016-2017, San Francisco



Map 19.5 displays the geographic distribution of PLWH in San Francisco who were virally suppressed. PLWH with a current San Francisco residence as of December 31, 2016 and diagnosed with HIV prior to 2016 were included in this map. Overall, 74% were virally suppressed in 2016. All but seven neighborhoods were above this overall mark. These seven neighborhoods include Tenderloin (70%), Excelsior (72%), Nob Hill (73%), and South of Market, Treasure Island, Visitacion Valley, and Lake Merced (74% each). In addition, 37% of homeless PLWH were virally suppressed in 2016 (not displayed).

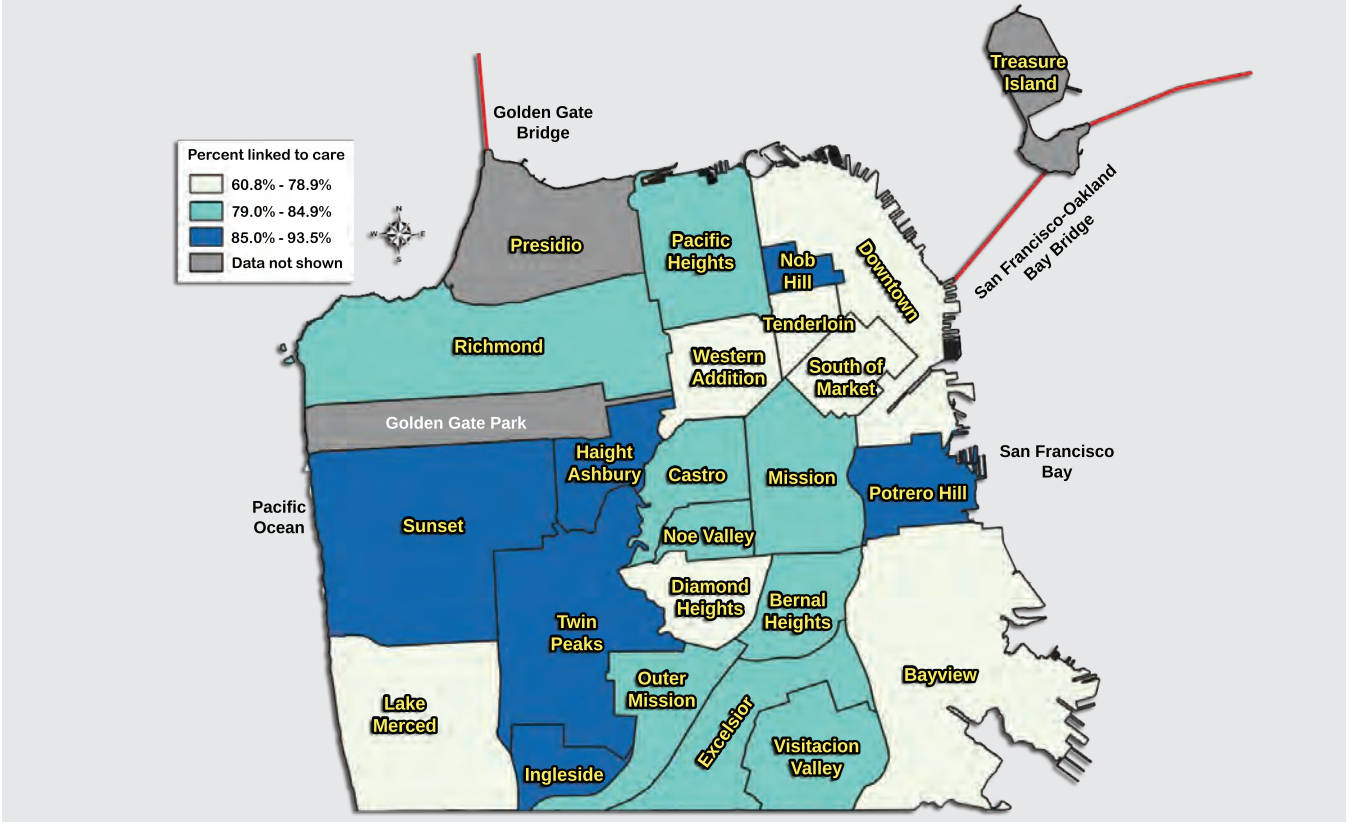
Map 19.5 Geographic distribution of proportion of persons living with HIV as of December 2016 and diagnosed through 2015 who were virally suppressed in 2016, San Francisco



* Thirty-seven percent of homeless PLWH had viral suppression in 2016 while 48% of those with unknown or invalid addresses were virally suppressed.

From 2013 to 2016, 79% of the 1,290 newly diagnosed San Francisco residents were linked into care within one month of their diagnosis. Diamond Heights had the lowest linkage to care rate (61%) followed by Lake Merced (67%), Western Addition, and South of Market (71% each). In addition, 76% of persons who where homeless at diagnosis were linked into care within one month (not displayed).

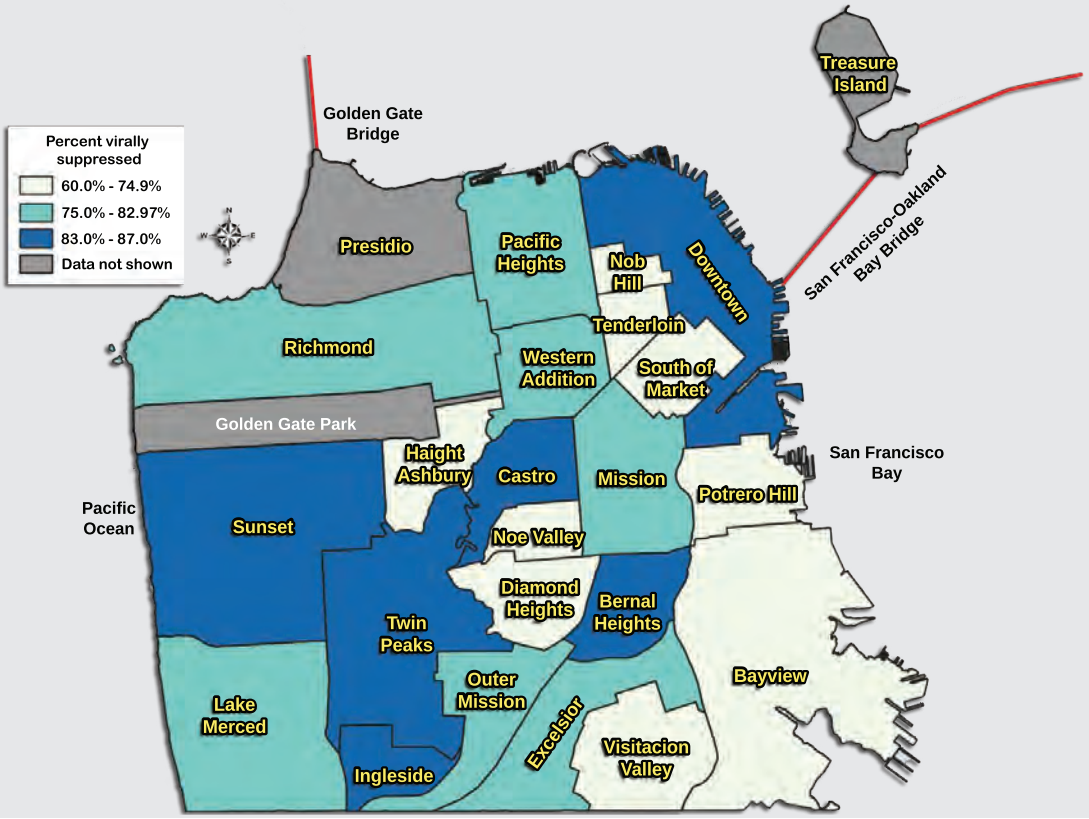
Map 19.6 Geographic distribution of proportion of persons newly diagnosed with HIV in 2013-2016 who were linked to care within one month of diagnosis, San Francisco



* Persons who were homeless at HIV diagnosis and those with invalid or unknown addresses are not displayed on this map (76% and 65% were linked to care within one month of HIV diagnosis, respectively.) Neighborhoods with fewer than 15 cases are not displayed.

Among newly diagnosed San Francisco residents from 2013 to 2016, 75% reached viral suppression within 12 months after HIV diagnosis. Nine neighborhoods had viral suppression rates below this overall estimate. Map 19.7 shows the neighborhoods with the lowest proportion of viral suppression among newly diagnosed San Francisco residents are Visitacion Valley (60%), Potrero Hill (62%), Diamond Heights (65%), and South of Market (67%). Despite showing high linkage into care after diagnosis, Potrero Hill did not translate into successful viral suppression for the newly diagnosed.

Map 19.7 Geographic distribution of proportion of persons newly diagnosed with HIV in 2013-2016 who achieved viral suppression within 12 months of diagnosis, San Francisco



* Persons homeless at HIV diagnosis and those with unknown or invalid addresses are not displayed (74% and 59% achieved viral suppression within 12 months, respectively). Neighborhoods with fewer than 15 cases are not displayed.

Technical Notes
(in alphabetic order by topic)

CD4-Based Model

CD4-Based Model uses HIV surveillance data and the first CD4 value after diagnosis to estimate HIV incidence (diagnosed and undiagnosed persons newly acquired HIV infection), HIV prevalence (diagnosed and undiagnosed persons living with HIV infection), and percentage of undiagnosed infections.

The date of HIV infection is estimated for each person with a CD4 test by using a CD4 depletion model[1]. To account for persons without a CD4 test result, the number of persons with CD4 test results are weighted based on the year of HIV diagnosis, sex, race/ethnicity, transmission category, age at diagnosis, disease classification, and vital status at the end of the specified year. Then, based on the estimated time from HIV infection to diagnosis, the diagnosis delay distribution can be estimated by using standard survival analysis for right truncated data and used to estimate annual HIV incidence, which includes persons with diagnosed and undiagnosed infection.

HIV prevalence, which represents counts of persons with diagnosed or undiagnosed HIV infection who were alive at the end of a given year, is estimated by subtracting reported cumulative deaths from cumulative infections. The number of persons with undiagnosed HIV infection is estimated by subtracting the number of persons living with diagnosed infection from total prevalence. The percentage of diagnosed (or undiagnosed) infections is determined by dividing the number of persons living with diagnosed (or undiagnosed) infections by the total prevalence for each year.

The CD4 model relies on a series of assumptions: (1) the CD4 depletion mode is accurate; (2) persons received no treatment before the first CD4 test; (3) all data adjustment (e.g., multiple imputation for missing values of transmission category, weighting to account for cases without a CD4 test) are unbiased; and (4) a person's infection, diagnosis, and death occur in a "closed" population (no migration) or balanced population (approximately the same number of infected people moved into or out of the area under consideration).

Date of Initial HIV Diagnosis

The date of HIV diagnosis for newly diagnosed cases is determined based on the earliest date of any of the following: positive HIV antibody test, positive HIV antigen/antibody combination test, detectable viral load test, or physician-documented diagnosis in absence of sufficient laboratory evidence. The date of initial HIV diagnosis for assessing trends in new HIV diagnoses in this report takes into account patient self-report of a positive HIV test as noted in the medical record that was prior to the confirmed HIV diagnosis made by laboratory or clinical evidence. However, CD4 or undetectable viral load tests prior to the confirmed HIV diagnosis are not used to determine date of initial HIV diagnosis. Data for the most recent year should be interpreted with caution as the number of cases diagnosed may be underestimated due to reporting delays.

1 Song R, Hall HI, Green TA, Szwarcwald CL, Pantazis N. Using CD4 Data to Estimate HIV Incidence, Prevalence, and Percent of Undiagnosed Infections in the United States. J Acquir Immune DeficSyndr. 2017 Jan 1; 74(1):3-9.

Death Ascertainment

Death information among persons reported with HIV is obtained through the following mechanisms: (1) monthly matches with local vital statistics registry, (2) Social Security Death Master File (3) National Death Index (NDI), (4) medical record review, (5) notification from other health department, and (6) matches with other disease registry databases.

Cause of death information on death certificates is summarized and coded using the International Classification of Diseases, 10th revision (ICD-10) for deaths that occurred since 1999. A single cause of death is identified from all reported conditions that began the chain of events that resulted in death; this is known as the underlying cause of death. All conditions (including the underlying cause of death) listed on the death certificate are known as the multiple causes of death (http://www.cdc.gov/nchs/icd/icd10.htm). We obtained the ICD codes from annual matches to the NDI from 1999 to 2017. Decedents for the most recent year 2017 were identified through NDI Early Release Program which is 90% complete (https://www.cdc.gov/nchs/ndi/ndi_early_release.htm). Deaths classified as B20-B24 and all AIDS-related opportunistic infections and cancers listed on the death certificate were included in the HIV-related classification. Deaths classified as R99 (ill-defined and unknown cause of mortality) were included in the non-HIV-related classification.

Cause of death information for racial subgroups such as Asian, Pacific Islander, Native American, and multi-racial decedents were not displayed due to many small cells.

Estimate of ART Use

Information on ART use is obtained from medical chart review. Using surveillance data to estimate use of ART will most likely result in an underestimate of ART use. The underestimate occurs because use of ART is collected at the time a person with HIV infection is reported (which is often close to the time that they are diagnosed), a time when some people have not yet begun treatment. The SFDPH collects follow-up information from selected health care facilities. For persons who receive care at these sites, treatment data are likely to be more complete because it allows us to capture the use of ART after diagnosis and the date the case report was completed. Follow-up information is not available for persons who have moved away from San Francisco or who receive ongoing care outside of the city. Surveillance data provide information that indicates when a person was prescribed ART but does not provide information on adherence. Persons whose medical records indicate that they were prescribed ART are assumed to have received it.

The lower level estimate of ART use (Table 3.7 on page 27) was calculated among all cases living with HIV. The upper level estimate (Table 3.7 on page 27, Figure 3.4 on page 28) was calculated among cases who had follow-up information within the last two years, whose chart review was completed between January 2016 and May 2018, and who were not known to have moved out of San Francisco.

Female Presumed Heterosexual Contact

In 2010 the CDC HIV Incidence and Case Surveillance Branch accepted a definition for female presumed heterosexual contact to reclassify the transmission category for adult female cases who would otherwise be reported with no identified risk. The definition for female presumed heterosexual contact was first proposed by the Council of State and Territorial Epidemiologists[2]. Like other transmission categories, the definition uses patient history variables collected on the HIV adult case report form. The female presumed heterosexual contact definition includes the following components: (1) the patient's sex at birth is female, (2) the patient had sex with male(s), (3) the patient had no indication of injection drug use, and (4) there is no other known information that would suggest a likely alternative source of HIV infection.

Gender Status

As part of routine HIV case surveillance, sex at birth is collected. People who are classified as female at birth and have no other gender identity noted are classified as women. People who are classified as male at birth and have no other gender identity noted are classified as men. In September 1996, SFDPH began collecting transgender status when this information is contained in the medical record. Transgender individuals are listed as either trans women or trans men. Due to the small number of cases among trans men and small population size, data on trans men are sometimes suppressed in this report to protect confidentiality. We believe that our report likely underestimates the number of trans women and trans men affected by HIV because data collected for HIV reporting are derived from the medical record. Consequently, information that may be discussed with the health care provider but not recorded in the medical record is generally not available for the purposes of HIV case reporting.

Grouping of Data Categories

Data in certain racial/ethnic or risk categories are grouped together when the number of persons with HIV in that particular group is small and/or does not present significant trends. For example, "Other" in the Race/Ethnicity breakdown in some tables or figures represents Asian/Pacific Islander, Native American, and people of multiple race. Whenever possible, this report presents the expanded racial/ethnic categories rather than aggregating into the group "Other." The label "Other" in the Transmission Category breakdown may include transfusion recipients, hemophiliacs, heterosexuals, persons acquiring HIV perinatally, or persons of unidentified risk.

2 Council of State and Territorial Epidemiologists Positions statements 2007: Heterosexual HIV transmission classification. Available from http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/07-ID-09.pdf

HIV Case Rates and HIV Mortality Rates

Annual race-specific rates are calculated as the number of cases diagnosed for a particular racial/ethnic group during each year divided by the San Francisco population for that race/ethnicity, multiplied by 100,000. Age-adjusted mortality rates are calculated for persons 18 and over. For each race/ethnicity and sex group, the number of HIV cases who died each year was divided by projected San Francisco population estimates across seven age groups (18-29, 30-39, 40-49,50-59,60-69,70-79, 80+) to generate crude rates applied to the standard population, defined using the California population estimates from the Department of Finance. These rates are calculated separately for males and females. The annual populations are not available for transgender persons. Population denominators by year are obtained from the State of California, Department of Finance, Demographic Research Unit, in two sources: the California Intercensal Population Estimates[3] and California Population Projections[4] (http://www.dof.ca.gov/Forecasting/Demographics/Projections/).

HIV Disease Stage 3 (AIDS) Survival

Survival was calculated as the time between the date of HIV stage 3 (AIDS) diagnosis and the date of death. This analysis included persons who met the case definition for HIV infection stage 3 (AIDS). The follow-up information for cases was obtained through retrospective and prospective reviews of laboratory records and medical charts. Dates of death were obtained through review of local death certificates, reports from the State Office of AIDS, and matches with the National Death Index (NDI) and Social Security death files. The most recent NDI and Social Security death file matches included deaths that occurred through December 31, 2017. Survival reflects deaths that are HIV as well as non-HIV related. Persons not known to have died were censored on the date of their last known follow-up or on December 31, 2017, whichever was more recent.

HIV Surveillance Methods

San Francisco HIV cases are reported primarily through active surveillance activities in which public health personnel review laboratory and pathology reports and medical records to identify cases and complete the case report forms. HIV cases are also identified through passive reporting, review of death certificates, validation studies using secondary data sources such as hospital billing records or other disease registries, and reports from other health departments. The surveillance system is evaluated regularly for completeness, timeliness, and accuracy.

The completeness of case reporting of HIV diagnoses in 2016 was evaluated and found to be 99% (using CDC developed reporting delay model). In terms of timeliness, an estimate of 96% of 2016 diagnoses were reported within six months of HIV diagnosis.

Completeness of HIV laboratory reporting for specimens collected in 2014 to 2016 was evaluated through

3 State of California, Department of Finance, Race/Hispanics Population with Age and Gender Detail, 2000–2010. Sacramento, California, September 2012.
4 State of California, Department of Finance, Report P-3: State and County Population Projections by Race/Ethnicity, Detailed Age, and Gender, 2010-2060. Sacramento, California, December 2014.

four sensitivity studies of high volume laboratories. HIV laboratory reporting from the SFDPH Public Health Laboratory was >99% complete (15,475 laboratory records assessed for January 2014 to June 2016). Two studies evaluated the reporting of CD4 laboratory results from San Francisco General Hospital and the completeness of reporting was 94% and 100%, with 10,878 (January 2015 to July 2016) and 2,352 records (August to November 2016) assessed respectively. HIV and CD4 laboratory reporting from a large, private commercial laboratory was 96% complete (7,586 records with specimen collection dates August to November 2015).

The HIV data in this report include persons who were residents of San Francisco at the time they were diagnosed with HIV (all stages of infection) including San Francisco residents who were diagnosed in other jurisdictions. San Francisco started name-based case reporting for HIV cases in April 2006, as mandated by California law. Only cases reported confidentially by name are included in this report.

Linkage Integration Navigation Comprehensive Services

Linkage Integration Navigation Comprehensive Services (LINCS) is a program maintained by SFDPH that helps PLWH re-engage with care. Since 2011, health care navigators on the LINCS team have worked at San Francisco City Clinic and other SFDPH sites to address patient needs, including finding insurance, attending care appointments and adhering to medication. Patients may come to LINCS through direct referral by a provider or, more recently, through not-in-care lists generated from HIV surveillance or medical record databases. LINCS programmatic data were used to define patient's race/ethnicity and housing status. Trans women were defined as either being transgender in HIV surveillance or in LINCS programmatic data. Transmission category was determined from HIV surveillance data.

LINCS outcomes can vary from year to year due to staffing capacity and referral sources. The Data to Care (DTC) program began in 2016 and included persons in eHARS with a most recent address of San Francisco who had never had an HIV lab recorded in eHARS after HIV diagnosis, or had no evidence of a care visit in 12 months or longer (defined as a HIV viral load, CD4 test or genotype test in eHARS). In addition, there were a number of individuals referred to the LINCS program who were not eligible for navigation services for reasons such as having moved out of the jurisdiction, already being in HIV care, not being locatable, or being deceased or incarcerated.

Out-of-Jurisdiction Cases

Routine HIV case surveillance assigns case ownership by residence at diagnosis. HIV cases residing in San Francisco at time of diagnosis are considered San Francisco cases. HIV cases receiving care in San Francisco but who resided elsewhere at time of diagnosis are considered out-of-jurisdiction (OOJ) cases. In 2009, California Department of Public Health upgraded the surveillance database and updated procedures, and case reporting for OOJ cases was conducted and reported in the same manner as San Francisco cases.

Stage of Disease at HIV Diagnosis

In 2014, the United States surveillance case definition[5] for HIV infection among adults and adolescents aged ≥13 years and children age<13 years was revised to expand the HIV infection classification staging system to five stages of HIV infection as described below. With the new case definition, stages 1-3 are classified on the basis of the first CD4 T-lymphocyte count and age on date of CD4 T-lymphocyte test, unless there is a stage-3-defining opportunistic illness. The CD4 T-lymphocyte percentage of total lymphocytes is only used when the corresponding CD4 T-lymphocyte count is unknown.

- HIV infection stage 0: This stage is early HIV infection and is established by a sequence of discordant HIV test results indicative of early HIV infection. The criteria for stage 0 infection can be established by a testing history of 1) a confirmed HIV positive test that occurs 180 days or less after a negative or indeterminate test for HIV infection, 2) a negative or indeterminate HIV antibody test is on or less than 180 days before a positive HIV virologic test and on or less than 60 days after a positive HIV antibody test, or 3) a negative or indeterminate HIV antibody test is on or less than 60 days after a positive HIV virologic test. This sequence of discordant results may be based on testing history (previous laboratory documented or patient's self-report of negative/indeterminate results), or by a HIV testing algorithm. If the criteria for stage 0 are met, the stage is 0 (supersedes other stages) regardless of criteria for other stages (CD4 T-lymphocyte test results and opportunistic illness diagnoses).

- HIV infection stage 1-3: HIV infection stage 1-3 is based on age-specific CD4 T-lymphocyte count or CD4 T-lymphocyte percentage of total lymphocytes.

	Age on date of CD4 T-lymphocyte test					
	<1 year		1-5 years		≥6 years	
Stage	Cells/ µL	%	Cells/ µL	%	Cells/ µL	%
1	≥1,500	≥34	≥1,000	≥30	≥500	≥26
2	750-1,499	26-33	500-999	22-29	200-499	14-25
3	<750	<26	<500	<22	<200	<14

Data on persons with HIV infection, stage 3 (AIDS) include persons whose infection has ever been classified as stage 3 (AIDS).

- HIV infection, stage unknown: No information available on CD4 count or percentage and no reported information on AIDS-defining conditions (every effort is made to collect CD4 counts or percentages at time of diagnosis).

5 Selik RE, Mokotoff ED, Branson B, Owen SM, Whitmore S, Hall HI. Revised Surveillance Case Definitions for HIV Infection -- United States, 2014. MMWR 2014;63(No. RR-3):1-10.

Transmitted Drug Resistance and HIV-1 Subtypes

The Stanford HIV Web Service, Sierra (Version 1.1)[6], is used to identify mutations in HIV protease, reverse transcriptase, and integrase sequences reported. Sequence data evaluated by Sierra do not contain any personally identifiable information and are not stored on the Sierra system. HIV-1 subtypes are assigned by COMET[7] (Context-based Modeling for Expeditious Typing) v2.2 and evaluated only among sequences with the length of 500 characters or more. The CDC mutation list for surveillance[8] is applied to determine mutations conferring resistance to non-nucleoside reverse transcriptase inhibitors (NNRTIs), nucleoside reverse transcriptase inhibitors (NRTIs), protease inhibitors (PIs) and integrase strand-transfer inhibitors (INSTIs).

To assess transmitted drug resistance, we include HIV nucleotide sequences obtained from HIV genotypic testing performed within three months of HIV diagnosis and from persons with no evidence of prior antiretroviral treatment. For persons with multiple sequences, the earliest and longest sequence is used. HIV nucleotide sequences are excluded from the analysis if they are 1) possible HXB2, the wild-type reference strain, contaminant, 2) do not have all amino acid positions specified in the CDC mutation list, or 3) have not been classified as the following HIV subtypes: A, B, C, D, F, G, CRF01_AE and CRF02_AG as listed in the CDC mutation list.

6 Information on Sierra is available at https://hivdb.stanford.edu/DR/webservices/

7 Information on COMET is available at https://comet.lih.lu/

8 Wheeler W. et al. Prevalence of transmitted drug resistance-associated mutations and HIV-1 subtypes in new HIV-1 diagnoses, U.S., 2006. AIDS 2010, 24: 1203-1212.

D Data Tables

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
HIV infection stage 3 cases	3	26	99	274	557	860	1236	1632	1763	2160
HIV infection stage 3 deaths	0	8	32	111	273	534	807	878	1040	1279
Persons living with HIV ever classified as stage 3	3	21	88	251	535	861	1290	2044	2767	3648

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
HIV infection stage 3 cases	2046	2285	2327	2068	1780	1555	1076	801	693	577
HIV infection stage 3 deaths	1364	1512	1640	1603	1601	1485	995	424	402	353
Persons living with HIV ever classified as stage 3	4330	5103	5790	6255	6434	6504	6585	6962	7253	7477

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
HIV infection stage 3 cases	557	512	492	554	481	480	451	445	435	324
HIV infection stage 3 deaths	350	324	323	303	308	312	289	271	229	211
Persons living with HIV ever classified as stage 3	7684	7872	8041	8292	8465	8633	8795	8969	9175	9288

Year	2010	2011	2012	2013	2014	2015	2016	2017
HIV infection stage 3 cases	301	251	243	190	140	123	97	126
HIV infection stage 3 deaths	194	189	183	192	189	203	187	195
Persons living with HIV ever classified as stage 3	9395	9457	9517	9515	9466	9386	9296	9227

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White	290	267	255	227	223	218	227	180	137	112	91	85
African American	77	81	80	63	61	64	46	48	30	40	33	37
Latino	116	106	120	113	108	85	111	100	89	73	67	55
Asian/Pacific Islander	30	49	43	40	40	35	53	48	42	30	35	29
Other	19	30	25	28	30	22	21	18	17	17	7	15

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White	151	134	132	118	114	111	119	90	67	53	42	39
African American	242	230	229	191	195	188	138	164	119	127	98	116
Latino	175	148	171	149	148	108	149	139	118	93	84	68
Asian/Pacific Islander	22	35	29	29	28	25	41	32	31	21	25	19

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
White	9	11	9	5	8	9	2	5	4	5	5	5
African American	47	68	65	42	39	66	31	32	5	28	42	43
Latina	11	13	9	18	12	15	17	8	7	10	8	9
Asian/Pacific Islander	2	3	2	1	3	1	1	0	1	1	2	0

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
MSM	363	327	361	313	290	294	347	292	227	199	161	131
PWID	19	20	18	14	23	12	14	11	14	6	9	16
MSM-PWID	86	82	63	72	63	53	47	45	38	23	19	29
Other	14	30	22	20	33	11	18	12	14	11	13	14

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
PWID	18	20	15	11	14	16	6	10	9	11	10	9
Heterosexual	14	25	20	17	18	21	16	10	3	12	9	9
Other	4	4	5	2	4	4	1	2	1	3	5	9

Figure 5.2 Age-adjusted mortality rates among persons aged 18 and older with HIV per 100,000 by sex and race/ethnicity, 2006-2017, San Francisco 43

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White men	117	122	95	95	98	79	92	90	86	86	85	94
African American men	196	257	194	179	163	193	163	150	178	165	169	148
Latino men	75	98	76	66	64	70	69	85	78	64	50	65
White women	13	9	9	5	2	3	6	7	3	6	5	6
African American women	67	68	75	50	57	55	48	75	64	58	71	43
Latina women	22	6	2	2	4	4	3	12	8	7	15	10

Figure 6.1 Trends in health insurance status at time of HIV diagnosis by race/ethnicity, 2012-2017, San Francisco. 54

White	2012	2013	2014	2015	2016	2017
Public	15%	17%	17%	29%	30%	35%
Private	46%	49%	51%	43%	37%	40%
None	26%	26%	25%	18%	18%	20%
Missing	13%	8%	7%	10%	15%	5%

African American	2012	2013	2014	2015	2016	2017
Public	43%	50%	57%	50%	48%	49%
Private	24%	17%	20%	15%	21%	19%
None	20%	25%	13%	20%	21%	16%
Missing	13%	8%	10%	15%	9%	16%

Latino	2012	2013	2014	2015	2016	2017
Public	27%	19%	34%	23%	37%	44%
Private	27%	41%	30%	37%	28%	24%
None	38%	35%	28%	33%	24%	22%
Missing	8%	5%	8%	7%	10%	11%

Asian/Pacific Islander	2012	2013	2014	2015	2016	2017
Public	23%	23%	24%	13%	20%	7%
Private	38%	42%	36%	40%	40%	34%
None	34%	23%	26%	30%	26%	34%
Missing	6%	13%	14%	17%	14%	24%

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White	262	236	230	209	196	197	212	164	122	95	78	67
African American	50	42	43	42	33	38	33	33	24	30	19	20
Latino	105	92	109	95	83	73	92	91	74	65	55	43
Asian/Pacific Islander	26	39	38	38	35	33	48	46	40	27	29	21
Other	17	25	22	23	23	19	18	15	14	12	5	13

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Male Rectal Gonorrhea												
HIV+	230	232	193	170	173	228	297	327	298	386	423	476
HIV-	248	182	202	212	246	327	445	435	507	653	840	976
Male Gonococcal Proctitis												
HIV+	25	26	18	11	5	11	11	14	16	21	20	21
HIV-	16	8	17	16	13	13	13	19	22	20	49	37

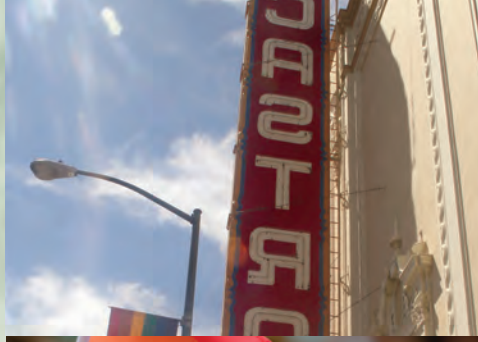
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Early syphilis (HIV+)	232	191	311	305	396	411	545	553	552	566	509	582
Early syphilis (HIV-)	111	106	160	167	181	175	224	288	307	363	394	500
Primary (HIV+)	41	29	51	52	78	67	90	89	76	85	90	93
Primary (HIV-)	29	26	52	48	56	65	73	96	80	107	116	126
Secondary (HIV+)	85	76	125	114	138	145	191	162	149	145	127	131
Secondary (HIV-)	48	41	59	67	64	55	86	79	96	84	111	144
Early Latent (HIV+)	106	86	135	139	180	199	264	302	327	336	292	358
Early Latent (HIV-)	34	39	49	52	61	55	65	113	131	172	167	230

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White	15	21	15	10	18	11	4	11	11	10	8	11
African American	16	13	12	9	14	10	7	6	3	2	6	7
Latino	4	2	3	5	1	5	5	2	7	2	3	5
Other	3	4	3	1	4	2	4	2	2	3	3	2

Age in years	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
18-24	2	1	1	1	3	2	2	2	1	0	2	1
25-29	4	7	6	3	1	4	0	1	3	5	3	1
30-39	6	11	8	3	10	1	3	1	5	5	7	7
40-49	14	13	10	6	12	10	10	9	5	4	4	9
50+	12	8	8	12	11	11	5	8	9	3	4	7

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White	8	7	6	4	7	9	7	3	2	3	3	3
African American	9	20	19	8	11	11	5	5	2	7	3	4
Latino	6	8	7	10	14	7	10	6	3	4	7	4
Other	2	9	4	3	6	2	3	2	2	4	2	3

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
White	14	18	14	8	12	14	4	8	7	9	8	8
African American	12	17	16	10	9	15	7	7	1	6	9	9
Latina	6	7	5	10	7	9	10	5	4	6	5	6
Other	4	7	5	2	8	3	2	2	1	5	2	4



San Francisco
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