



Estimated Hepatitis C Prevalence and Key Population Sizes in San Francisco: A Foundation for Elimination

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Background

Despite the implementation of hepatitis C virus (HCV) surveillance systems and the inclusion of HCV measures in national health surveys, efforts to estimate the population burden of HCV at the local level are lacking. Historically, efforts to document HCV burden in San Francisco have included core HCV surveillance (mandated reporting of positive HCV test results), and enhanced surveillance, in which approximately 25% of newly confirmed cases are contacted for detailed interviews.

The recent introduction of direct-acting antivirals (DAAs) to treat and cure HCV provides an opportunity for elimination. Initiated in 2016, End Hep C SF is a comprehensive initiative to eliminate HCV in San Francisco. To properly measure progress, a baseline estimate of HCV prevalence, and of the number of people in various subpopulations infected with HCV, is required to target and measure the impact of interventions.

Methods

We estimated HCV burden in San Francisco through triangulation of data found in case registries, medical records, cohort studies, and published literature from 2010 through 2017.

The 2015 American Community Survey (ACS) informed the overall and general population size estimates. We stratified the population by sex, age and/or key population at high risk for HCV in San Francisco, including people who inject drugs (PWID); men who have sex with men (MSM), a population with a high prevalence of HIV in San Francisco; and transgender women.

We then estimated the population size and HCV prevalence in each group (See Figures 1 and 2 for examples of calculations of population size and HCV seroprevalence for PWID).

When multiple sources of data were available, we calculated a weighted average using inverse variance weighting. Credible ranges (CRs) were derived from 95% confidence intervals of population size and prevalence estimates.

Figure 1. People Who Inject Drugs population size estimates, data inputs [1], and weighted average

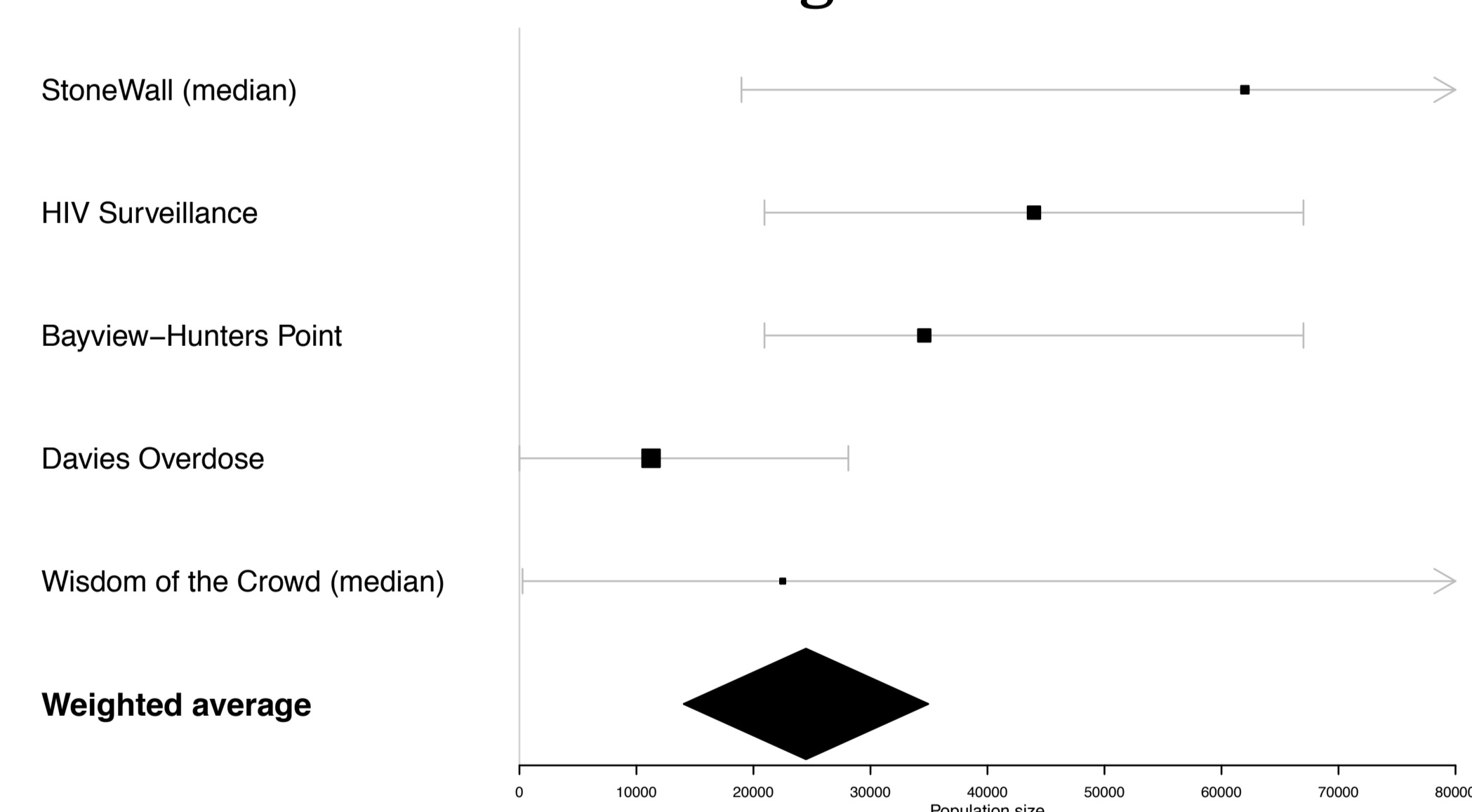
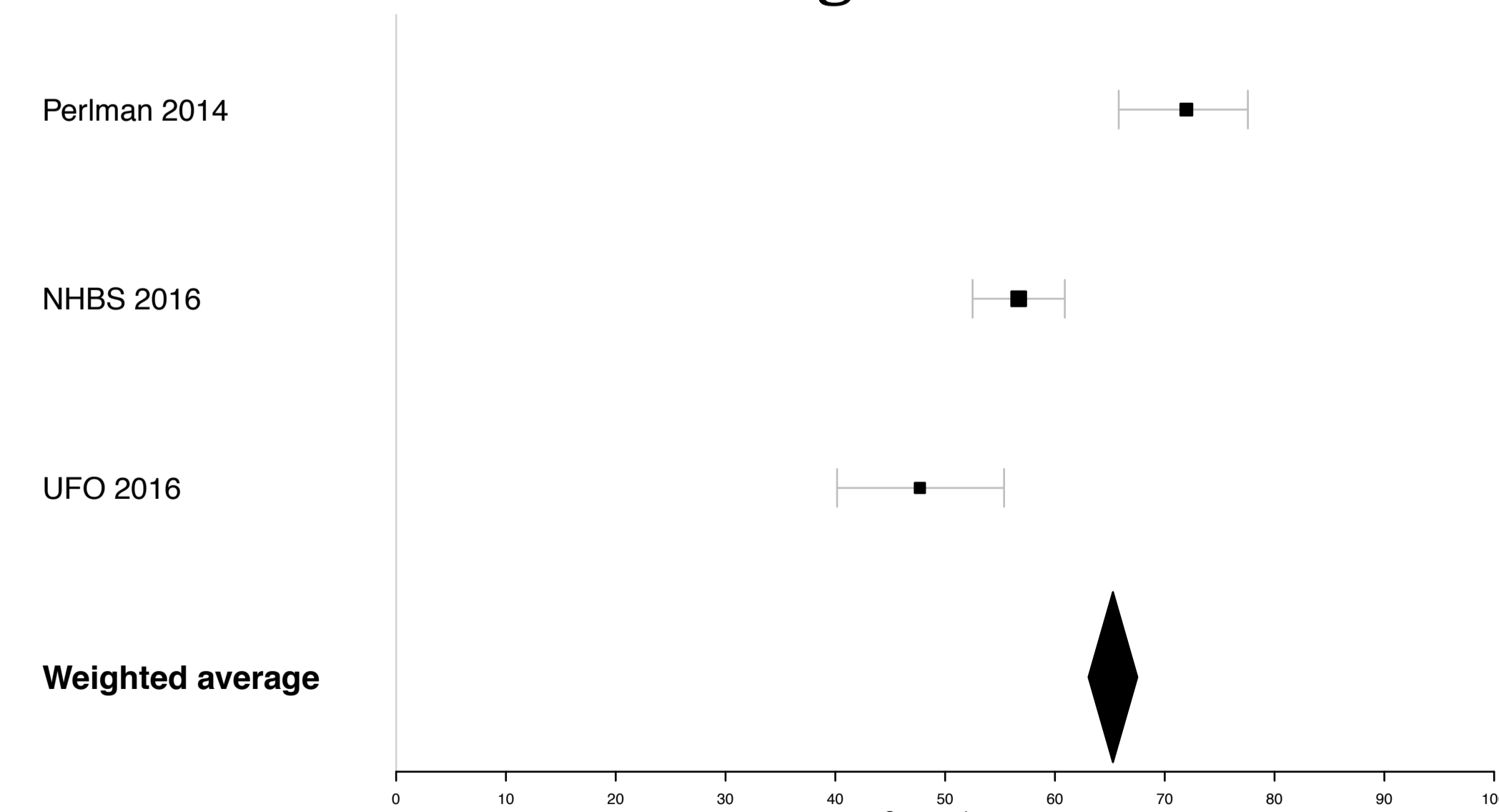


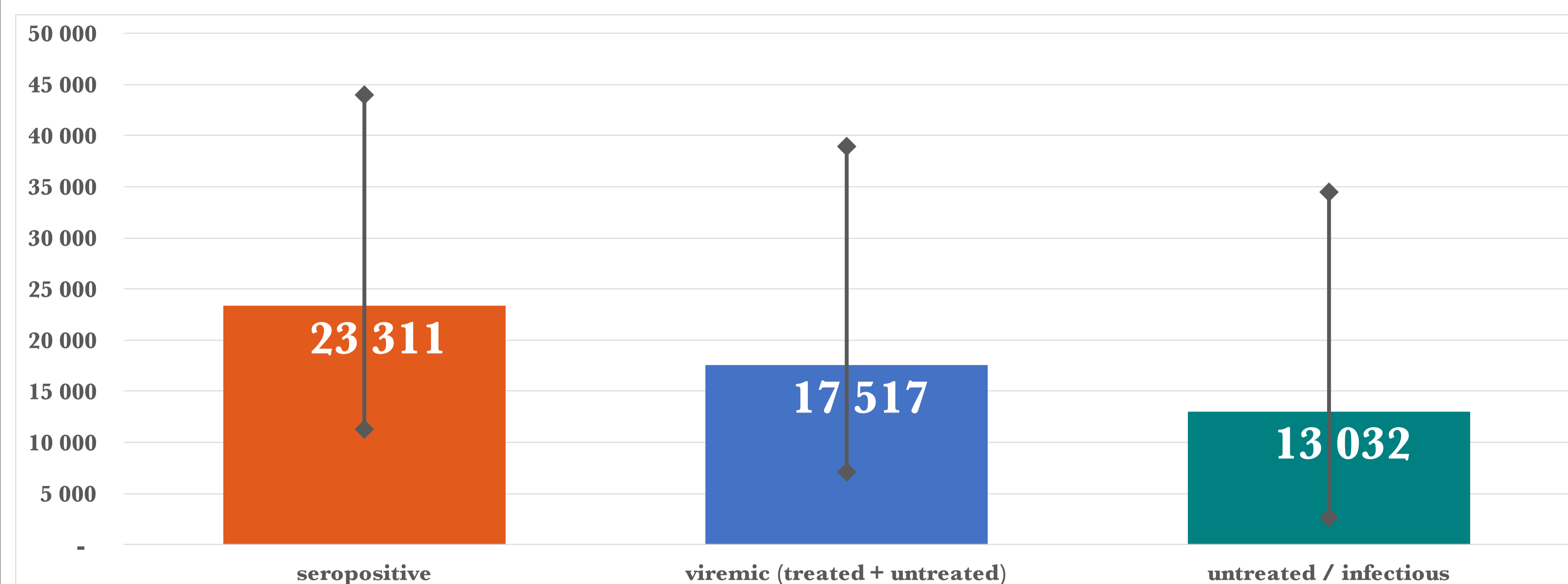
Figure 2. People Who Inject Drugs HCV seroprevalence estimates and weighted average



San Francisco City Hall lit up for World Hepatitis Day, celebrating the official launch of End Hep C SF on July 28, 2016

Results

Figure 3. Estimated number HCV seropositive, viremic, and untreated/infectious



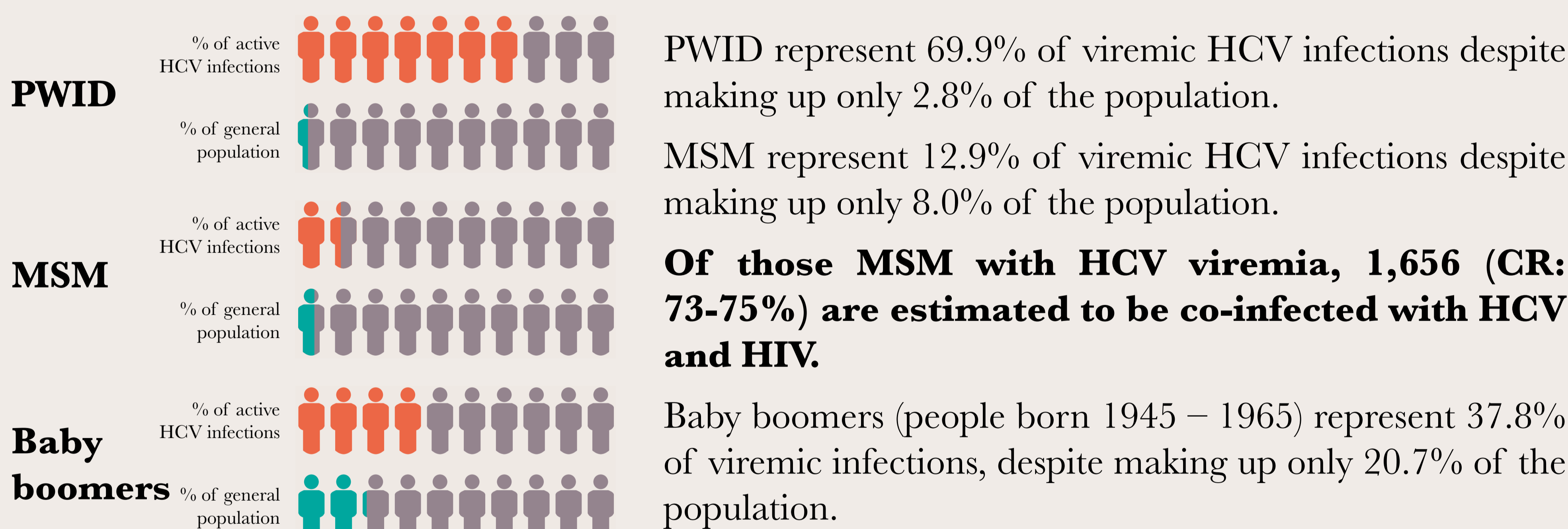
We estimate that 23,311 residents of San Francisco are HCV seropositive (Credible Range: 11,281-43,997), representing an overall seroprevalence of 2.7% (CR: 1.3%-5.1%). Of these, 17,517 are estimated to be viremic (CR: 7,114-38,968), but this estimate includes treated (and cured) cases. Though treatment efforts have been substantial in San Francisco to date, up to 13,032 viremic cases were still untreated as of the end of 2016 (CR: 2,629-34,482).

Table 1. Estimated population sizes, prevalence, and number infected, 2015

Subpopulation	Population size estimate (PSE)		Seroprevalence (anti-HCV)		# HCV seropositive		Prevalence of acute infection		Prevalence of chronic infection		# Viremic* (acute + chronic)	
	pt. est.	(credible range, CR)	pt. est.	(CR)	pt. est.	(CR)	pt. est.	(CR)	pt. est.	(CR)	pt. est.	(CR)
PWID	24,492	(14,037 - 34,946)	65.3%	(63.1 - 67.6)	15,988	(8,852 - 23,592)	3.4%	(1.3 - 7.3)	46.6%	(38.2 - 54.5)	12,253	(5,535 - 21,594)
MSM	69,466	(68,069 - 70,863)	4.4%	(2.4 - 6.4)	3,057	(1,634 - 4,535)	0.1%	(0.0 - 0.2)	3.2%	(1.6 - 5.0)	2,264	(1,099 - 3,717)
TW (low SES)	951	(889 - 1,013)	22.1%	(14.9 - 29.5)	211	(132 - 299)	1.2%	(0.1 - 3.4)	16.0%	(9.9 - 23.1)	163	(89 - 268)
Children	99,391	(95,756 - 103,026)	0.1%	(0.0 - 0.2)	69	(7 - 242)	0.0%	(0.0 - 0.0)	0.1%	(0.0 - 0.2)	69	(7 - 242)
Men 15-49	185,452	(180,070 - 190,834)	0.4%	(0.1 - 1.1)	777	(176 - 2,135)	0.0%	(0.0 - 0.02)	0.3%	(0.0 - 0.8)	478	(88 - 1,560)
Men 50-69	83,174	(78,915 - 87,432)	1.4%	(0.3 - 3.8)	1,173	(252 - 3,361)	0.0%	(0.0 - 0.1)	1.1%	(0.2 - 3.1)	880	(167 - 2,816)
Men 70+	33,943	(31,044 - 36,843)	0.6%	(0.0 - 5.3)	207	(2 - 1,952)	0.0%	(0.0 - 0.5)	0.0%	(0.0 - 3.5)	0	(0 - 1,460)
Women 15-49	225,137	(221,173 - 229,102)	0.2%	(0.0 - 0.7)	504	(87 - 1,650)	0.0%	(0.0 - 0.02)	0.2%	(0.0 - 0.7)	432	(68 - 1,549)
Women 50-69	95,718	(91,682 - 99,753)	0.7%	(0.1 - 2.5)	694	(107 - 2,455)	0.0%	(0.0 - 0.1)	0.4%	(0.0 - 1.7)	347	(30 - 1,738)
Women 70+	47,321	(44,268 - 50,374)	1.3%	(0.1 - 7.5)	631	(31 - 3,775)	0.0%	(0.0 - 0.5)	1.3%	(0.1 - 7.5)	631	(31 - 4,024)
Totals	865,046	(825,904 - 907,188)	2.7%	(1.3-5.1)	23,311	(11,281 - 43,997)	0.1%	(0.0 - 0.4)	1.9%	(0.8 - 4.1)	17,517	(7,114 - 38,968)

* Estimated number HCV viremic include those who have been treated and cured of HCV since becoming chronically infected

Disproportionate burden of HCV in San Francisco



Conclusions

Our estimate contrasts with a national NHANES seroprevalence estimate of 1.4% (95% CI: 0.9% - 2.0%). When applied to San Francisco, this results in an estimated 12,293 cases. Our higher estimate is nonetheless expected, since the larger number of individuals in key populations in San Francisco suggest a greater than average proportion of people at high risk for HCV.

Our estimate also suggests that in San Francisco there are approximately 9,000 more HCV seropositives than are included in the local Viral Hepatitis Surveillance Registry [2]. This is somewhat better than national estimates that only about 50% of the 3.5 million chronically HCV-infected Americans are actually diagnosed [3].

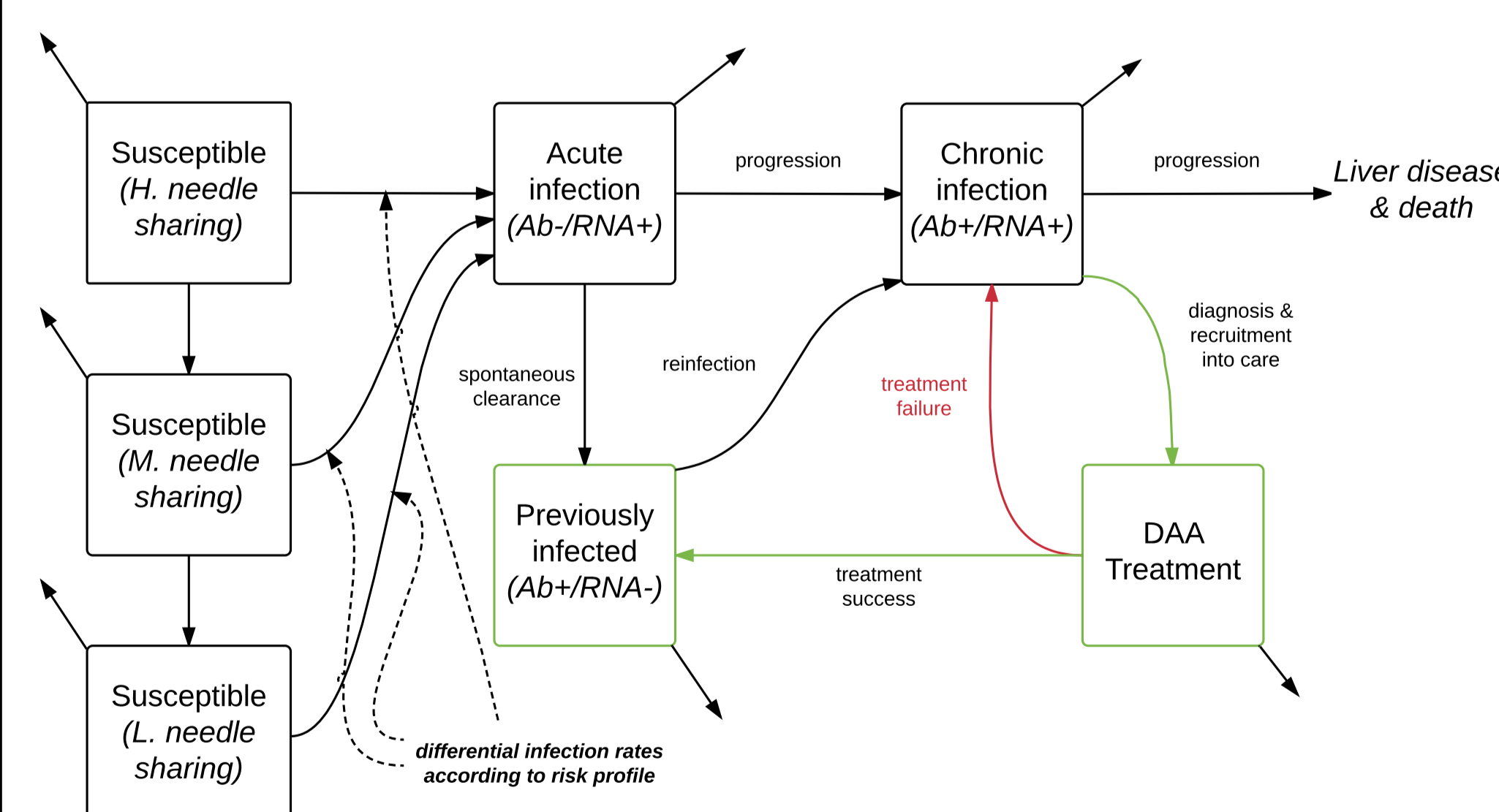
This estimate provides a useful baseline against which the impact of End Hep C SF can be measured.

References

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- Adams DA, Thomas KR, Jajosky RA, et al. Summary of Notifiable Infectious Diseases and Conditions - United States, 2014. *MMWR* 2016; 63(54): 1–152.
- Yehia BR, Schranz AJ, Umscheid CA, Lo Re V 3rd. The treatment cascade for chronic hepatitis C virus infection in the United States: a systematic review and meta-analysis. *PLoS One* 2014; 9(7):e101554.

Next steps

Dynamic model of HCV transmission, prevention interventions and treatment in PWID



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