

Chapter 1  
AIDS IN SAN FRANCISCO:  
CHANGING DEMOGRAPHIC TRENDS AND FUTURE PROJECTIONS  
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Introduction

California has consistently reported approximately 25 percent of the total number of AIDS cases in the country (Kizer, 1986). Nearly 45 percent of the California AIDS cases and 55 percent of the California AIDS deaths have occurred in San Francisco; nationally, eleven percent of all AIDS diagnoses are attributed to San Francisco alone (CDC, 1985). The annual incidence rate of AIDS diagnosis for single (never-married) men in San Francisco was 339.8 per 100,000 people in 1984, making AIDS the overwhelmingly dominant cause of premature mortality in San Francisco (Curran, 1985, p. 1354). Morbidity (reported cases) and mortality (reported deaths) figures indicate that the male homosexual and bisexual populations in San Francisco have been and will continue to be significantly affected by the AIDS epidemic.

In this paper, the progress of the disease is charted from its beginning until the present in order to obtain information concerning the demographics of the epidemic. Short-term projections of professionals in the field for the future of AIDS in San Francisco are compared for the first time and then analyzed for plausibility and significance. In addition, the possible impact of AIDS mortality on the gay community of San Francisco is examined. Finally, the latest information on the relationship between AIDS and ARC (and possible ARC projections) is discussed.

Past Studies

Norman (1985), Morgan (1986), and Curran (1985) have produced substantial research on AIDS trends in San Francisco which have been useful for the understanding and development of this paper. The San Francisco Chronicle has provided thorough coverage of the AIDS epidemic during the past year. In addition, Winklestein and others (1986) proved that AIDS infection is widespread in San Francisco.

Background

To date, approximately 96-97 percent of all San Francisco AIDS cases have been attributed to males of homosexual or bisexual orientation. Thirteen percent of these AIDS victims also use intravenous (IV) drugs. People classified as heterosexual IV-drug users, hemophiliacs, heterosexual partners of people with AIDS or at risk for AIDS, blood transfusion recipients, children of mothers with AIDS, and others are all said to be members of "risk groups" for AIDS transmission, although

each group accounts for substantially less than one percent of all AIDS cases in San Francisco (Bureau of Communicable Disease Control, 1987). Therefore, this paper will focus on the homosexual/bisexual risk group because of its obvious dominance in reported cases of AIDS in San Francisco.

It should be noted, however, that this situation is inconsistent with the United States AIDS distribution, where 73 percent of all AIDS cases involve gay or bisexual men (12 percent of whom also use IV-drugs), and 17 percent consist of other IV-drug users (Curran, 1985, p. 1352). This may be because certain states other than California have high concentrations of heroin addicts. Sixty percent of the heroin addicts in New York are believed to be infected with the AIDS virus now (Morganthau, 1986, p. 31).

AIDS has an extremely high fatality rate. Nationally, 42 percent of all AIDS victims have died within one year after diagnosis and 60 percent of all AIDS patients who have been diagnosed for more than one year have died (Fauci, 1984, p. 500). Some sources claim that not more than 30 percent of AIDS patients will survive for two years after diagnosis and only two percent may remain alive after five years (San Francisco Chronicle, 22 May 1986). The mean survival period of AIDS patients in San Francisco from July 1981 to March 1985 was 12 months (Bureau of Communicable Disease Control, 1985) and the mortality rate (the percentage of AIDS patients who have died) in AIDS cases reported in San Francisco as of July 1986 was 55 percent (Winklestein, 1986, p. 3).

Norman (1985, p. 1020) describes a study in which serum samples of homosexual and bisexual men in San Francisco were frozen and tested periodically. Only 4.5 percent of the samples taken in 1978 tested positive for antibodies to the AIDS virus, but for the 1980 samples, the proportion infected had risen to 24 percent. By mid-1985, 73 percent of the group were carrying antibodies. The study also proved that the incubation period for the disease is extremely unpredictable and may be well over five years. The serum of 31 of the people sampled in 1980 displayed antibodies, but by 1985, only two of them (6.4 percent) had developed AIDS and another eight had ARC.

Winklestein and others (1986) determined that 49 percent of homosexual/bisexual men tested positive for antibodies to HIV in a sample of 1,034 single men recruited from San Francisco. This is the basis for an estimate made by Dean Echenberg, the director of San Francisco's Bureau of Communicable Disease Control, that out of approximately 80,000 gays in San Francisco, about 40,000 have been infected (San Francisco Chronicle, 6 May 1986). However, the number of homosexuals in San Francisco may be closer to 75,000 (Winklestein, 1986, pers. comm.), and may even be as low as 44,800, according to a survey conducted in 1984 that suggested that 40 percent of single adult men in San Francisco are homosexual (Enstrom, 1986, p. 975). The huge range in estimates of the number of homosexuals in San Francisco proves that this information is extremely difficult to obtain and suggests that all of the figures may be unreliable.

Since ARC is difficult to diagnose because it covers a range of symptoms and severity, health officials are uncertain about the incidence rate. Some estimate that there are 10 persons with ARC

for every one with AIDS (Acevedo, p. 1086). The CDC, however, give a slightly lower ratio of eight ARC victims to one AIDS victim, while yet another estimate proposes that the ratio may be only three to one (Kizer, 1986). This has important ramifications for a city such as San Francisco where the substantial number of already-diagnosed AIDS cases suggests that a large population of ARC victims, many not yet reported, probably exists.

#### Methodology

Monthly morbidity and mortality figures were collected through January, 1987 from Paul Barnes of the Bureau of Communicable Disease Control (San Francisco Department of Public Health [SFDPH]), and subsequently divided into (1) age group, (2) race/ethnicity, and (3) risk category in order to determine the characteristics of persons that are developing AIDS in San Francisco. Seven different short-term (to 1991) projections of AIDS incidence in the city are analyzed for methodology and compared for consistency. Long-term projections (up to the year 2000) could not be found, probably because information concerning the progress of the disease is limited at the present time.

#### AIDS Morbidity and Mortality to the Present

Table 1 presents morbidity and mortality figures for AIDS in San Francisco from 1981 to January 1987. In 1981, the numbers of AIDS cases and deaths were small and continued to remain relatively low until mid-1982, when reported AIDS cases began to increase. The number of AIDS deaths remained at below ten per month until mid-1983. From 1984 on, AIDS morbidity and mortality continued to increase, with minor fluctuations. In order to visualize this progressive increase, AIDS cases are graphed in Figure 1.

Tables 2, 3 and 4 divide the AIDS morbidity into age group, race/ethnicity, and risk group, and also include the percentage of the total cases of the particular component. Although persons of all ages are developing AIDS, it is clear that about 90 percent of them are between the ages of 20 and 49, with approximately half in their thirties. Only 0.9 percent of people with AIDS are women. In addition, over 86 percent of AIDS patients are white. Homosexual or bisexual males comprise almost 97 percent of the people developing AIDS in San Francisco. IV-drug users are well-represented, but in the case of homosexual or bisexual IV-drug users, 12.5 percent of total cases, it is unclear whether sexual transmission or transmission through contaminated needles has occurred. Thus, it is clear that the incidence of AIDS in San Francisco is highly concentrated in a narrow spectrum of the population: early-middle aged, gay, white males.

#### AIDS Morbidity Projections to 1992

Table 5 presents seven AIDS projections for San Francisco through 1992. Figures are for cumulative AIDS cases to the date indicated, with the exception of Morgan (1986), whose projection is for diagnoses in that year only. There is substantial variability in the projections, with estimates for

Month	1981 Cases/Deaths	1982 C/D	1983 C/D	1984 C/D	1985 C/D	1986 C/D	1987 C/D
January	-	3/1	15/2	31/12	62/31	64/39	93/73
February	-	8/3	12/4	42/16	61/40	101/47	-
March	-	0/1	31/9	29/7	69/32	74/68	-
April	-	5/2	17/7	38/19	64/33	90/71	-
May	-	6/1	19/4	38/20	67/39	83/61	-
June	-	9/1	16/8	33/23	53/49	108/64	-
July	8/2	6/5	14/7	54/21	64/40	100/55	-
August	4/0	11/5	27/13	50/28	67/39	98/55	-
September	3/0	8/0	23/10	38/17	62/35	79/48	-
October	3/1	8/2	25/12	58/29	60/43	119/64	-
November	0/1	18/3	22/18	49/37	69/36	107/76	-
December	6/2	12/5	28/11	42/33	63/50	107/91	-
TOTAL (YEAR)	24/6	94/29	249/105	502/262	761/467	1130/739	93/73
TOTAL	24/6	118/35	367/140	869/402	1630/869	2760/1608	2853/1707

Table 1. Cumulative AIDS Morbidity and Mortality in San Francisco to Date  
Source: Bureau of Communicable Disease Control, 1987

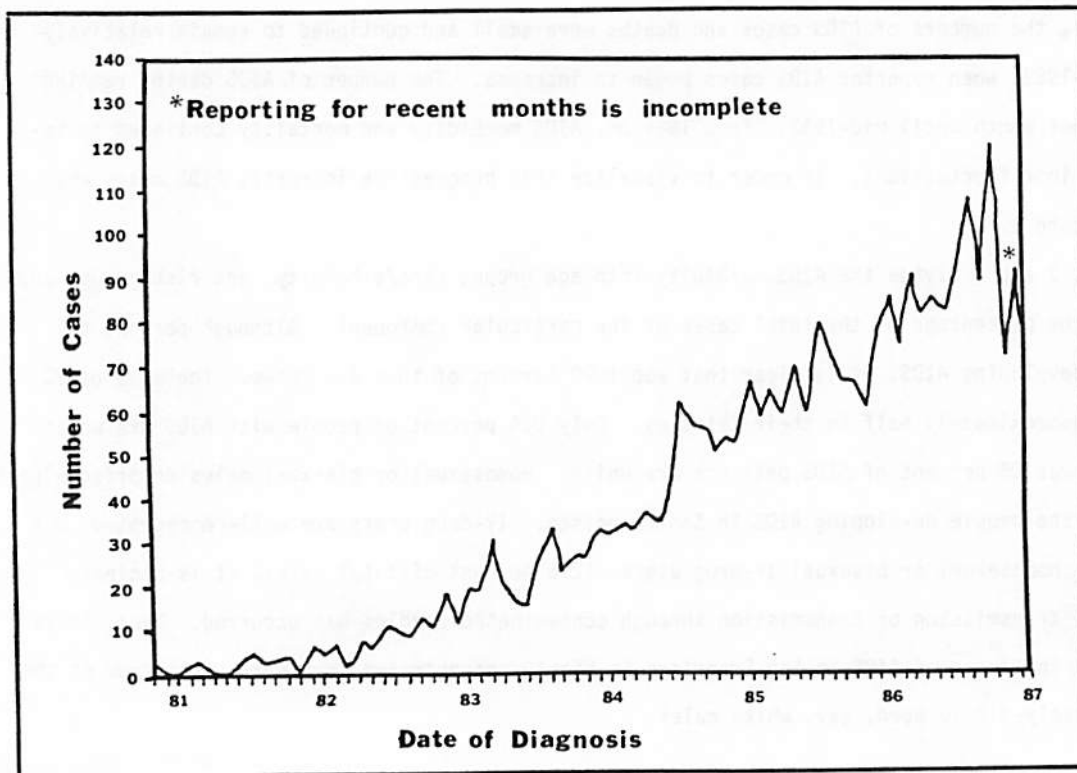


Figure 1. San Francisco AIDS Cases to Date  
Source: Bureau of Communicable Disease Control, 1987

Age Group	Cases	%
0- 4	6	0.2
5-12	1	0.0
13-19	5	0.2
20-29	407	14.3
30-39	1,432	50.2
40-49	726	25.4
50-59	226	7.9
60+	50	1.8
TOTAL	2,853	100.0

Table 2. Cumulative San Francisco AIDS Cases by Age Group to Date  
Source: Bureau of Communicable Disease Control, 1987

Race/ Ethnicity	Cases	%
White	2,461	86.3
Black	164	5.7
Hispanic	188	6.6
Asian	38	1.3
Other	2	0.1
TOTAL	2,853	100.0

Table 3. Cumulative San Francisco AIDS Cases by Race/Ethnicity to Date  
Source: Bureau of Communicable Disease Control, 1987

Risk Group	Male	Female	Total	%
Homosexual/Bisexual	2,408	0	2,408	84.4
IV-Drug User	25	9	34	1.2
Homo/Bisexual IV-DU	358	0	358	12.5
Hemophiliac	3	0	3	0.1
Heterosexual Contact	6	5	11	0.4
Blood Transfusion	17	7	24	0.8
Child of AIDS Mother	1	3	4	0.1
Unknown	9	2	11	0.3
TOTAL	2,827	26	2,853	99.8*

\*Does not equal 100% because of rounding off

Table 4. Cumulative San Francisco AIDS Cases by Risk Group to Date  
Source: Bureau of Communicable Disease Control, 1987

1991, for example, ranging from 8,000 to 21,000. However, all of the projections make it clear that AIDS morbidity will continue to increase during this time period, escalating continually from the current figure of almost 3,000 cases.

Source	1987	1988	1989	1990	1991	1992
Amory, 1986	3,294	4,485	-	-	-	-
D. Barnes, 1987	-	-	-	-	18,000	-
P. Barnes, 1987	4,760	7,470	11,470	11,070	-	-
CDC in D. Barnes, 1987	-	-	-	-	8,000	-
Morgan, 1986	-	-	-	-	[5,900]	-
SF Chronicle, 2/18/87	-	-	-	-	-	20,000
This Report	3,974-4,410	5,564-6,210	7,567-9,315	9,988-13,973	12,785-20,959	15,853-31,439

Table 5. Projections of Cumulative AIDS Cases in San Francisco, 1987-1992

Similarly, researchers have attempted to determine the number of current ARC patients and the number of ARC patients in the near future. Amory (1986) and San Francisco Chronicle (18 February 1987) discuss current ARC estimates and the latter projects ARC ranges for the next two years. Amory estimates that the present range in San Francisco is between 4,246 and 22,824. This corresponds to ratios (of ARC to AIDS) between 1.6:1 and 8.6:1. The San Francisco Chronicle estimates that present ARC sufferers in San Francisco number between 10,000 and 20,000. The ratios in this case are between 3.3:1 and 6.6:1. Amory claims that there will be between 5,143 and 25,354 ARC patients by June 30, 1987 and between 7,176 and 38,571 by June 30, 1988.

Discussion

Amory (1986) derived his figures of 3,294 and 4,485 for 1987 and 1988, respectively, from the use of "mathematical modelling to project total AIDS cases" but fails to cite a specific method. Paul Barnes (1987) acquired his projection of 17,070 in 1990 from the AIDS office at the Bureau of Communicable Disease Control. The office used data from the past seven years about the rate of development of infected individuals to project for the next seven years. Barnes claims that approximately 34,000 people are now infected with the AIDS virus and that about one-third of them will develop AIDS in the next seven years. He cautions that figures may change next year and will then allow experts to extrapolate for the next eight years (Barnes, 1987, pers. comm.).

In Kizer (1986), the rate of increase in the number of reported AIDS cases in the state of California was charted and this trend was used to extrapolate to 1990. Using the logic of this method, I derived projections for San Francisco. The lower number for each year represents the most optimistic projections (under the assumption that the rate of increase will continue to decline steadily every year); the upper figure should be viewed as the worst case scenario (assuming a 50 percent increase each year). It is likely that the actual incidence of AIDS in San Francisco will lie somewhere in between the range for each year.

The model Morgan (1986) used to derive a figure of 5,900 new cases in 1991 assumes that the observed trends in AIDS cases will continue unchanged over time. The projection involves a two-stage

process. First, the cases reported each month are adjusted to obtain estimates of the cases actually diagnosed during that month. Second, a quadratic polynomial is fitted using weighted linear regression to the adjusted case counts as transformed by a "modified Box-Cox method," and the resulting figure is projected to 1991. To project future trends in the distribution of cases, only cases diagnosed after 1982 were used in order to allow times of diagnoses and reporting to have stabilized. The projection methodology is discussed in detail in the article. By comparison, according to Kizer (1986), the number of new cases for 1991 (calculated by subtracting cumulative 1990 cases from 1991 cases) is 2,797 to 6,986.

Deborah Barnes (1987) cites a figure from the CDC of 8,000 cumulative cases for the year 1991, and also includes a higher projection for that year from Paul Volberding, director of the AIDS program at San Francisco General Hospital, of 18,000. Barnes states that evidence for the validity of Volberding's projection comes from data on more than 6,000 gay men, some of whom now have AIDS, who entered into a hepatitis B study in 1978-1979. New data on the group from George Rutherford of the San Francisco Health Department show that, while the number of people who develop AIDS is low during the first five years of infection, it increases dramatically after the sixth year, when well over half develop AIDS or ARC. According to these findings, then, the CDC projection is two to three times too low.

The San Francisco Chronicle (18 February 1987) uses the same research for its projection of 20,000 for 1992. It goes on to suggest that everybody currently infected with the AIDS virus might ultimately come down with AIDS or ARC if no cure is found, because of the increasing percentage of infected people who are developing AIDS each year in the city.

Obviously, in the next five years, there is going to be an increase in the number of AIDS cases. It seems safe to say that by 1992, there will have been at least 18,000-20,000 AIDS diagnoses. This corresponds to about six to seven times the 3,000 cases to date.

ARC projections are even more inconsistent than AIDS projections and more difficult to evaluate. Amory (1986) cites "a cohort study conducted in 1984" as rationale for the highest present ARC estimate of 22,824 and "a subset of the same cohort infected for an average of 70 months (5.8 years) examined in 1986" as evidence for the lower ARC estimate of 4,246. The latter number is low because there is evidence that the proportion of ARC to AIDS cases decreases with increasing length of infection. However, because of the relatively short duration of HIV infection among gay men in San Francisco, the true number of ARC cases currently is probably closer to the higher estimate than the lower. The San Francisco Chronicle (18 February 1987) does not include reasoning for its ARC estimates.

The broad ranges of the estimates for ARC morbidity now and in the future illustrate the lack of knowledge concerning the number of ARC cases. The uncertainty involved with the incidence of ARC and

the conversion rate of ARC to AIDS has created a frustrating gap in the comprehension of the epidemic, and has made it more difficult to determine AIDS projections.

#### Conclusions and Recommendations

Half of the sources of the projections discussed above relied on a single past epidemiological study, one which has spanned many years and included a large number of infected individuals, to project into the future. The other half used mathematical methods and current citywide morbidity and mortality trends. In general, the sources which incorporated the study tended to project a greater number of AIDS cases than the ones that did not cite the study. The CDC estimate of 8,000 in 1991 is about half the value of other projections for 1991, and therefore seems too low. Because the methods used to derive the figure are unknown to me, I cannot evaluate it further.

The gay community makes up a significant proportion of San Francisco. According to one source mentioned previously (Enstrom, 1986), about 40 percent of all single males in the city may be homosexual. Since approximately half of the gay men in San Francisco are probably infected, this may mean that 20 percent of the single men in the city are infected right now. Using information from other sources, if one assumes that the most recent San Francisco AIDS projections of a cumulative total of about 20,000-30,000 AIDS cases by 1992 are reliable, that AIDS remains as a predominantly homosexual disease in the city as it is today, and that as many as 80,000 males in San Francisco are gay (San Francisco Chronicle, 6 May 1986), this may mean that about 25-38 percent of San Francisco's gay population will be diagnosed and will probably die within the next five to six years. Likewise, if certain experts are correct in saying that nearly everyone that becomes infected with HIV will develop AIDS, maybe half of the city's homosexual population (thus 20 percent of all San Francisco males) may die during the next decade. These situations are very hypothetical but research suggests that they are possible in the absence of a cure or vaccine.

Since the AIDS epidemic is relatively recent, it is still not thoroughly understood and its present and future magnitudes are not completely known. For this reason, researchers have limited data and must speculate relying on current trends (even though the trends may change in the future), the latest group studies, and mathematical models which incorporate these trends and studies. Even though these methods may seem overly simplistic and thus somewhat inaccurate, there is no other way at this time to derive projections. It seems to me that past group studies, like the cohort study included in some of the projections, are helpful and give credibility to the projections.

Projections are a crucial aspect of the AIDS epidemic and should be highly publicized and discussed, so that the public is made aware of the possible magnitude of the epidemic and so that health care services can prepare for the growing number of AIDS patients. Scientists should continue to monitor the epidemic closely and reevaluate their projections periodically as demographic trends change.

It is easy to become preoccupied with statistics. It is equally easy to forget that every future AIDS case is in reality a person, most likely a young person, who is suffering and losing valuable



years of life. People, whether they are AIDS researchers or not, must recognize the need for compassion for AIDS victims. In addition, the public (especially people who are not considered at risk for AIDS at this time) needs to be well informed about AIDS and the methods of risk reduction so that we can begin to gain control over the situation.

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