

ATLAS OF HIV/AIDS IN SAN FRANCISCO 1981-2000



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Department of Public Health
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INTRODUCTION

To assert that San Francisco's tiny, compact neighborhoods have distinctive characteristics is a waste of words for those of us lucky enough to live here. Even the short-term tourist to our city quickly labels the Haight, Tenderloin, Castro, or Noe Valley as "funky", "seedy", "gay", or "yuppy". It is local "fact" that San Francisco is the most culturally diverse city in the world. No ethnic group forms a majority, yet whites, Latinos, African Americans, Asian Americans, and Native Americans are not homogeneously distributed across the city. Examine, for example, the predominant ethnic make up of the Mission (Latino), Hunters Point (African American), Noe Valley (white), or Chinatown (Asian). Consider also the wealth of Pacific Heights, Marina, or Seacliff to that of the Western Addition, Excelsior, or Bayview. The conventional wisdom of these observations forms the central hypothesis of this *Atlas of HIV/AIDS in San Francisco*: that people who choose or are constrained to live within certain geographic boundaries often share attitudes, behavior, and social and sexual networks.

An epidemiological consequence of the variation in neighborhood characteristics is that HIV/AIDS is not equally distributed across San Francisco. Our policies, surveillance reports, and scientific publications generally define populations first by risk behavior and second by demographic characteristics. Partly because San Francisco is geographically compact, less attention has been paid to defining populations affected by HIV/AIDS by geography. Yet, geography has important implications for delivering care to persons living with HIV/AIDS and intervening to prevent HIV infection among persons at risk.

How? We feel that translation of more precise knowledge of the geography of the HIV/AIDS epidemic into effective public health action should be an area for active research. Our experience with mapping the distribution of HIV/AIDS cases to date and sharing these data with the public have alerted us to several possible uses of this *Atlas*:

- *The public's response to the HIV/AIDS epidemic has historically been mobilized at the neighborhood level. Maps can serve as powerful motivators for activists, politicians, and community-based service providers.*
- *Maps illustrating the relative burden of disease and survival outcomes by neighborhood can be used to advocate for more equitable distribution of prevention programs and care services.*
- *Maps highlighting the intersection of risk behavior (e.g., sex and drug use), other infectious diseases (e.g., hepatitis and sexually transmitted diseases), and HIV seroconversion can be used to more precisely target outreach efforts.*
- *Historical trends in the distribution of HIV/AIDS cases can assist in the evaluation of the community-level impact of prevention efforts over time.*
- *The geographic distribution of HIV/AIDS cases can generate new hypotheses on why certain populations are affected and others are not, guiding future research on the epidemiology of HIV.*
- *Maps can enhance the interpretation of surveillance and epidemiological data by validating which communities are or are not represented in studies.*

- *Maps can assist in the design, implementation, and interpretation of population-based surveys, the epidemiological “gold standard” of studies.*
- *The physical environment may be causally related to HIV transmission.*

The last hypothesis is suggested by research on the relation between gonorrhea incidence and neighborhood deterioration and the density of alcohol outlets¹. Physical, structural interventions in neighborhoods may result in reduced HIV transmission.

However, we do not want to over-state the case. Maps may also result in many incorrect assumptions and biases. People do not limit their sexual partner selection to their immediate vicinity. Sexual mixing and drug injection is very likely to be initiated or occur in many venues outside one’s place of residence. Today, the Internet affords much wider diffusion of sexual networks. A common fallacy is the assumption that the population-level data describes the risk for particular individuals within a geographic area. Moreover, our maps carry forward any biases present in the original source of the data, including the inclusiveness of the study populations, self-selective participation, and errors in measurement. Finally, this first edition of the *Atlas* uses AIDS surveillance data as its focus. AIDS cases, especially in the era of more effective treatment, do not necessarily reflect the patterns of current transmission but rather trends in access to care, treatment failure, or the epidemic that evolved more than a decade ago. The reader should therefore view these maps as suggestive of patterns of risk behavior. We anticipate future editions of this *Atlas*, and broader future public health research will include more information on the geographic distribution of recent HIV infection and more precise definition on where prevention programs can intervene. In the meantime, we offer the practical use of this first edition *Atlas* to HIV researchers, prevention and care providers, policy makers, and the public.

Willi McFarland, MD, Ph.D.
San Francisco, 15 November 2002

1. Scribner RA, Cohen DA, Farley TA, A geographic relation between alcohol availability and gonorrhea rates, *Sex Transm Dis* 1998; 25:544-548.

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EXECUTIVE SUMMARY

The epidemiology of HIV/AIDS in San Francisco

San Francisco was an early center of the HIV/AIDS epidemic in the US and for many years had the highest per capita rate of AIDS cases. HIV transmission accelerated in the late 1970s and early 1980s, peaking as early as 1982-1983 with several thousand cases occurring in those years. The rate of new HIV infection declined in the mid- to late- 1980s, reaching a nadir of around 500 new infections each year by the early 1990s. Thereafter, the number of San Franciscans infected each year remained relatively stable for several years. The peak of new HIV infections in 1982-1983 produced a peak in full-blown AIDS cases in 1992-1993, and a peak in AIDS mortality a few years later. The advent of highly active antiretroviral therapy (HAART), widely used from 1996 onward, accelerated the decline in the rate of new AIDS cases and AIDS-related deaths by slowing the progression of disease. While new AIDS cases and AIDS-related deaths have continued to decline in recent years, the rate of decline has slowed.

As of 31 December 2000, a cumulative total of 27,422 San Franciscans have had AIDS and 18,549 have died from AIDS. In 2001, an estimated 17,838 San Franciscans were living with HIV (AIDS and non-AIDS). Men who have sex with men (MSM) constitute the vast majority (77%) of past and current HIV/AIDS cases, followed by MSM who inject drugs (MSM-IDU, 13%), and other IDUs (7%). Male to female transgendered persons have only recently been recognized as a population severely affected by HIV/AIDS in San Francisco and data remain incomplete. Heterosexuals and other risk populations constitute only a small fraction of San Francisco's HIV/AIDS epidemic. By race/ethnicity, whites, Native Americans, and African Americans are disproportionately affected by the epidemic with respect to their make up in the population as a whole, although a relative shift away from whites and towards African Americans and Latinos has occurred in recent years. Among IDU and heterosexuals with HIV/AIDS, African Americans predominate. Asian/Pacific Islanders are relatively under-represented in the HIV/AIDS epidemic with respect to the population as a whole.

Recent trends in sexual risk behavior, sexually transmitted disease incidence, and HIV seroconversion provide evidence of recent resurgence in HIV transmission in San Francisco. A projected 1,084 new HIV infections occurred among San Franciscans in 2001, more than doubling from an estimated 500 new infections in 1997. Data further indicate that the increase has occurred among MSM and MSM-IDU. HIV incidence among other injection drug users and heterosexuals remains stable or slightly declining. Further, improved survival with AIDS and delayed progression of HIV disease has resulted in an increasing number of persons living with HIV/AIDS, thus expanding the epidemic independently of any increases in new infections.

Geographically, the primary HIV/AIDS epi-center in San Francisco is the Castro neighborhood, home to a large gay community for many decades. HIV/AIDS cases in the Castro tend to be among relatively well-educated, affluent, white gay men. However, the epidemic has expanded to areas adjoining the Castro which include somewhat lower-income, more ethnically diverse neighborhoods, such as Duboce Triangle, Mission Dolores, and Diamond Heights.

A second HIV/AIDS epicenter emerged in the Tenderloin somewhat later than the Castro. The character of the Tenderloin is radically different from the Castro. The Tenderloin is very low-income, very ethnically diverse, has a thriving sex industry, and is geographically the intersection of all HIV/AIDS sub-epidemics in San Francisco. HIV/AIDS cases in the Tenderloin are predominantly among gay men, but also include large numbers of MSM-IDU, other IDU, heterosexuals, and male to female transgendered persons. Extending from the Tenderloin, adjoining parts of SOMA, Nob Hill, and Civic Center show similar epidemiological patterns.

Smaller, distinct epi-centers or “hot-spots” for HIV/AIDS are evident in diverse neighborhoods of San Francisco. Potrero Hill has a high concentration of AIDS cases among MSM on its relatively higher-income north slope and a concentration of AIDS cases among IDU on its poorer south slope. Other foci of HIV/AIDS are found in low-income sections of Bayview-Hunters Point and Excelsior in the south, and Mission, Bernal Heights, and Western Addition in the center. Vast areas in the west, north, and south of San Francisco, which include both rich and poor neighborhoods, have been relatively spared the HIV/AIDS epidemic - so far. Close attention to emerging geographic patterns in HIV/AIDS surveillance data can assist in preventing expansion of the epidemic to vulnerable, but as yet relatively unaffected populations.

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GUIDE TO THE ATLAS

- *Sources of Data*
- *Definitions of Risk Populations*
- *Level of Geographic Detail*
- *Neighborhood Boundaries*
- *Map Types*
- *Data Scales, Confidentiality, Small Numbers*

Sources of Data

The majority of maps in this first addition *Atlas* illustrate the distribution of persons diagnosed with AIDS reported to the San Francisco Department of Public Health (SFDPH). The SFDPH AIDS surveillance system comprises a combination of active and passive reporting of persons meeting the 1993 case definition. An evaluation of the system in 1994 found that 89% of AIDS cases receiving care in a hospital setting were reported within 12 months and 96% were reported within 24 months. Among persons receiving care in non-hospital-based clinics or private physicians' offices, 85% were reported within 12 months and 90% within 24 months. Additionally, from 1981 to 1996, 4% of AIDS cases were identified through review of San Francisco death certificates. The AIDS case registry tracks new diagnoses, deaths, and other health outcomes among persons with AIDS. AIDS surveillance data are reported quarterly on our website at www.dph.sf.ca.us/Reports/HlthAssess.htm. This *Atlas* portrays the residence of persons at the time of their AIDS diagnosis to the block group level. Depending on the theme discussed, maps show cumulative cases, numbers of new cases from 1997 to 2000 per 100,000 population, and number of cases known or presumed alive as of 31 December 2000. We also include maps showing survival after AIDS diagnosis by neighborhood.

Several maps depict other sexually transmitted diseases (STD), gonorrhea and syphilis in particular. STDs are biological markers for engaging in unprotected sex and may act as facilitators of HIV transmission. STDs therefore serve as sentinels for populations at potentially increased risk for HIV. STD surveillance data originate from cases reported by public and private clinics and laboratories diagnosing new infections among San Franciscan residents. Monthly reports of STD surveillance data are also available on the SFDPH website.

A third type of data used in this *Atlas* is the location of HIV/AIDS prevention and care services. Several maps show the location of services in relation to the residence of persons living with AIDS. These include hospitals and clinics specializing in HIV-related care, pharmacies participating in the AIDS Drug Assistance Program, and needle exchange programs.

Finally, background information on the demographics of San Franciscan residents are provided. Maps include San Francisco's location, landmarks, neighborhood boundaries, population density, household income, and race/ethnicity. Demographic data originate from commercially available projections and estimates (GeoLytics, Inc.). We use projections for 1999 that are based on extrapolation methods to reflect changes in the population that have occurred in San Francisco from the 1990 US Census. Future editions of the *Atlas* will use similar sources updated from the 2000 US Census.

There is a conspicuous absence of maps in this first edition of the *Atlas* showing the distribution of persons with HIV infection who have not achieved an AIDS diagnosis (HIV-non-AIDS). As of writing, California was in the process of implementing a non-names HIV-non-AIDS reporting system. However, addresses of cases will not be collected. Therefore, we do not anticipate the ability to map HIV-non-AIDS cases from this source in the near future. We do anticipate the availability of specifically targeted epidemiological studies that will enable portrayal of the geographic distribution of HIV-non-AIDS. Of particular interest will be the geographic distribution of recent HIV infection in order to visualize the leading edge of the epidemic. Future editions of the *Atlas* will attempt to

provide other data relevant to HIV/AIDS prevention efforts, including the geographic distribution of populations at risk, the distribution of HIV-related risk behavior, and venues for high risk behavior.

Definitions of Risk Populations

In order to be locally relevant, risk populations illustrated in the *Atlas* correspond to those used by San Francisco HIV/AIDS community planning groups. While it is recognized that persons may engage in multiple risks, we have categorized cases into mutually exclusive groupings. Equally important, not all members of a “risk population” are necessarily at risk for acquiring HIV. The following defines the behavioral risk populations illustrated in this *Atlas*:

- **Men who have sex with men (MSM):** Men who report having sex with men regardless of sexual identity (gay, bisexual, straight, etc.)
- **Men who have sex with men and who inject drugs (MSM-IDU):** MSM who also report ever having injected drugs
- **Injection drug users:** Women who report injecting drugs regardless of sexual orientation or behavior (also abbreviated FSM/F-IDU) and men who report injecting drugs but not male-male sex (MSF-IDU)
- **Heterosexuals:** Presumptive heterosexual transmission among women who do not inject drugs (FSM) and men who do not inject drugs and do not report male-male sex (MSF)
- **Male to female transgendered persons:** Male to female transgendered persons regardless of gender reassignment surgery status and gender of their sex partners. In this *Atlas*, we include MTF who do and do not inject drugs together.

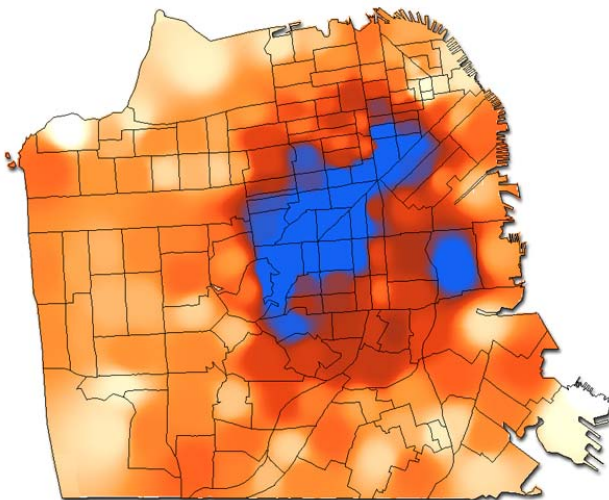
We further sub-divide the risk populations by our most commonly requested categories: sex and race/ethnicity. The distribution of AIDS among youth, children, and blood product recipients are presented separately.

Level of Geographic Detail

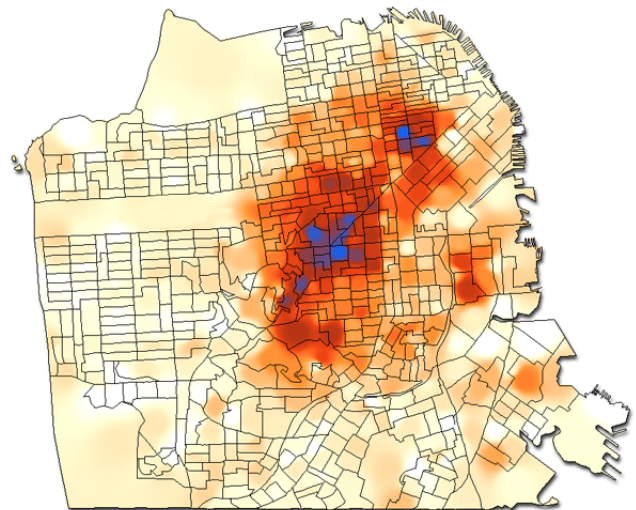
Maps in this *Atlas* display data to the US census block group level in order to provide a high level of precision. In San Francisco, block groups usually comprise several city blocks and are bounded by streets or physical features, such as bodies of water. During each decennial census, the number of block groups and their boundaries may change, depending on the population size. For this *Atlas*, we use the 651 San Francisco block groups that were formed during the 1990 census.

Census tracts are larger census units than block groups. There are 151 census tracts in San Francisco. The impact of using census tracts on the precision AIDS distribution is illustrated below. The census tract and block group maps below use the same data set and mapping scale; however, the definition around the areas truly affected by AIDS is much clearer using block group level data. Of note, mapping to the zipcode level (39 in San Francisco) provides even less precision than census tracts. Moreover, zipcode boundaries often overlap several geographically and culturally distinct neighborhoods in San Francisco. Zipcode units are not used in this *Atlas*.

Cumulative AIDS Case density by block group using:



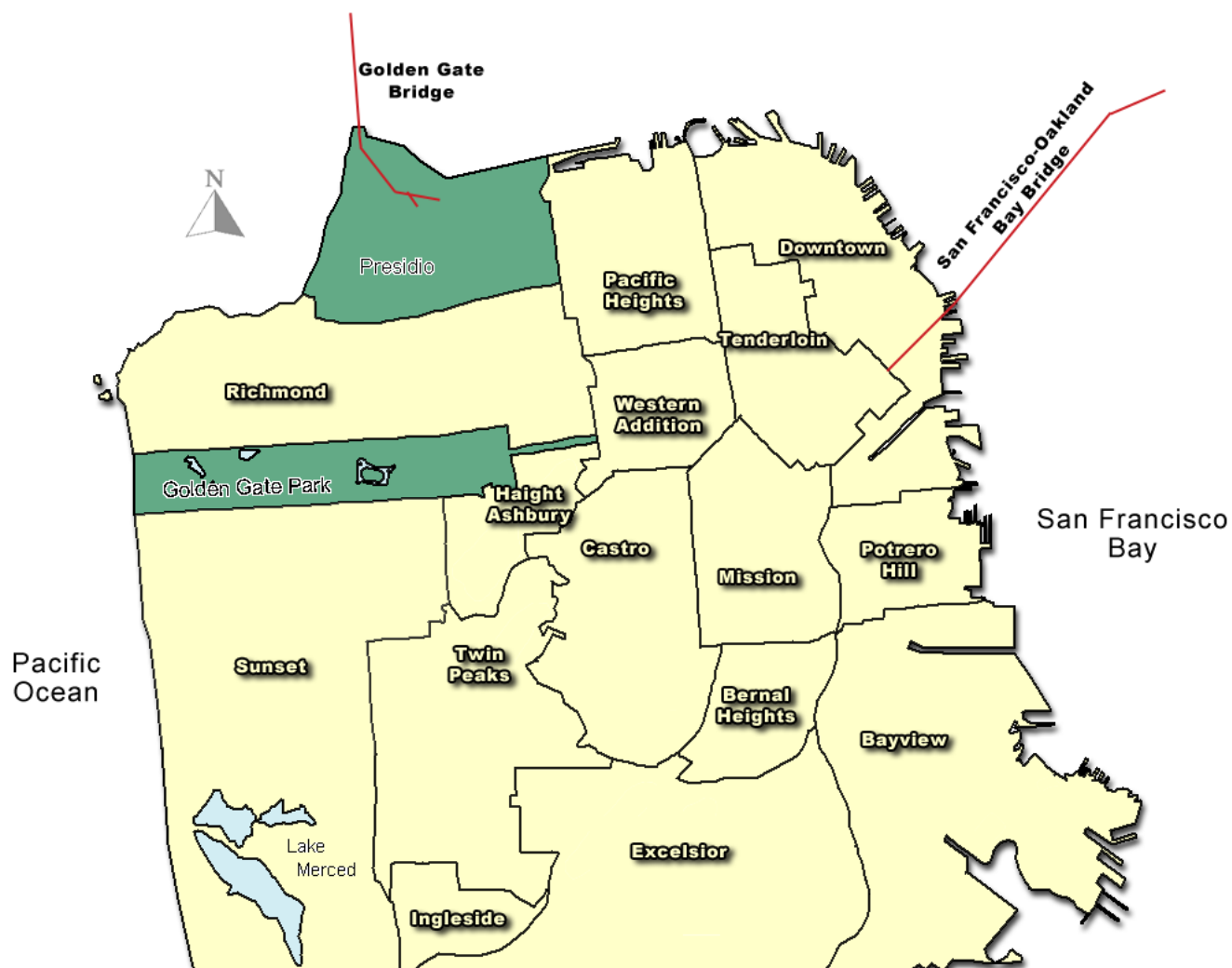
Census Tract Boundaries



Block Group Boundaries

Neighborhood Boundaries

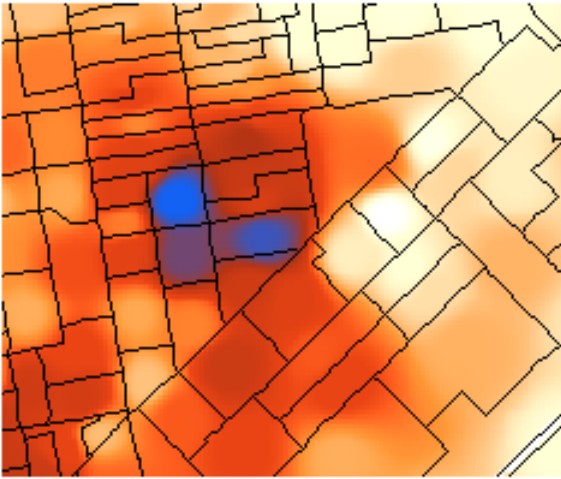
Description of the geography of HIV/AIDS is most meaningful when related to specific neighborhoods as identified by residents. However, the boundaries between neighborhoods are often subjective and fluid. We have chosen to aggregate US census block groups into 15 major neighborhoods guided by history, real estate maps, tourist guide books, and local convention. We attempted to capture boundaries that approximate demographic and cultural similarities. To the 15 major neighborhoods we attached varying numbers of sub-neighborhoods with particular focus on those that feature strongly in the HIV/AIDS epidemic. We anticipate that interpretations of San Francisco neighborhood boundaries may differ and change over time.



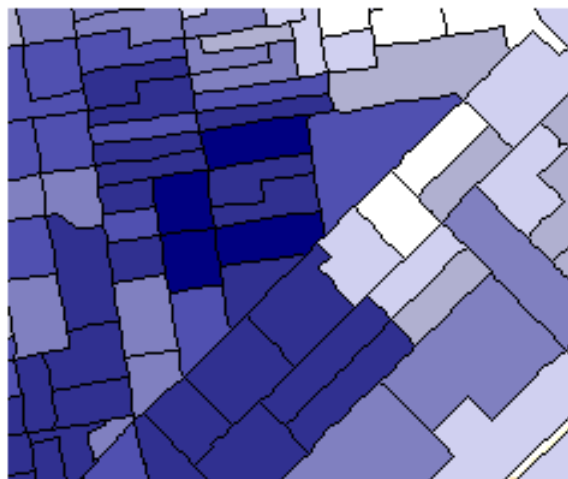
Map Types

Several methods are used to map the data in this *Atlas*. The historic progression of AIDS are portrayed using GRID-surface thematic mapping. A GRID surface thematic map displays AIDS case density using a yellow-orange-red-blue color scale. The color range is more or less continuous from light yellow (the lowest AIDS case density) to dark blue (highest AIDS case density). This technique is useful for showing patterns of clusters that cross boundaries. The GRID approach uses data associated with the midpoint of the block group but also takes into account the number of cases in surrounding block groups. Other maps in this Atlas use shaded block groups to represent AIDS case density. The scaled color scheme is applied to the entire block group with no interpolation across boundaries. A comparison of the two approaches is shown below. Finally, maps illustrating the relation between the HIV/AIDS epidemic and available services plot the coordinates' map or the exact position of the prevention and care sites.

AIDS case density



Using GRID Surface Map



Using Shaded Density Map

Data Scales, Confidentiality, Small Numbers

In comparing maps for two populations with very different numbers of AIDS cases, we are faced with trade offs in the selection of scales. On the one hand, showing data using the same scale provides a gauge of the relative magnitude of the epidemic between the two populations. On the other hand, reducing or expanding the scale more effectively shows where cases are concentrated for each population ignoring differences in absolute numbers of cases. We have elected to adapt different scales for each population and sub-population in accordance with this *Atlas*' primary aim to illustrate commonalities and differences in the geographic distribution of HIV/AIDS. We caution the reader to carefully examine the data scale provided on each map when comparing across populations. The reader is also referred to the tables in section "Overall HIV/AIDS cases" to gauge the relative magnitude of the epidemic in diverse populations. Nonetheless, we have attempted to use the same scale when feasible, particularly within the same risk population. When necessary, we have changed the scale of certain maps to highlight case clustering that would otherwise not have been observed. Most maps present data using three to five levels.

Several steps have been taken to reduce the likelihood that persons may be correctly or mistakenly identified. First, maps for populations with few cases are collapsed into only two levels (0 and 1 - 5 cases). Second, when the denominator of persons in a geographic area is small according to the US Census, we display maps at the larger Census Tract level rather than the Block Group level. Other measures taken to further safeguard confidentiality include aggregating cases over several years, omitting cases that are homeless at the time of diagnosis, omitting cases that do not provide a residence, not including cases which were delayed in being reported as of 31 December 2000, and not presenting the year of AIDS diagnosis. Furthermore, living AIDS cases are mapped to their residence at the year of AIDS diagnosis, not as of 31 December 2000.

Data Scales



Natural features and sparsely inhabited areas create artifacts in some maps. For example, block groups with few persons may appear to have wildly high or low incidence estimates based on only a few cases. For maps showing incidence per 100,000 population, we omit block groups with less than 500 residents. Other block groups contain large parks within their boundaries resulting in the appearance that a large area has an unusually high or low concentration of cases. This is particularly true of Golden Gate Park and McLaren Park which have pockets of high AIDS case density on their margins. When feasible, we depict major parks in green in contrast to the color presentation of the AIDS case data.

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