

# The Proportion of Deaths Due to HIV Infection among Persons with AIDS in New York City and San Francisco during 1987-1999

R. Selik\*, T. Singh†, L. Hsu‡

\*CDC, Atlanta, Georgia; †NYC Department of Health, ‡San Francisco Department of Health



Contact:  
Richard M. Selik, MD  
CDC, Mail-Stop E-47  
1600 Clifton Rd.  
Atlanta, GA 30333  
e-mail: rselik@cdc.gov  
Phone: (404)-639-4495  
Fax: (404)-639-2980

## BACKGROUND

Public health statistics on deaths of persons who were reported with AIDS usually do not specify the causes of the deaths, implying that almost all were caused by AIDS (or underlying HIV infection). However, the proportion not caused by HIV has increased since 1995 because of the success of highly active antiretroviral therapy (HAART) in prolonging the lives of persons with AIDS. To measure this increase, recent trends in the underlying causes of death among persons reported with AIDS were examined, including persons whose death certificates did not mention HIV infection.

## METHODS

AIDS cases reported to the health departments of New York City and San Francisco were matched to death certificate records for 1987-1999 from the health department's vital statistics office or the National Death Index. We used ICD-10 rules for selecting the underlying cause, applying them retroactively to deaths previously classified by ICD-9 rules. In addition, we imputed HIV infection as the underlying cause for death certificates that had no mention of HIV if the initially selected underlying cause was an AIDS-indicative disease or if HIV would have been selected if it had been mentioned on the death certificate. We also expanded the criteria for selecting HIV infection as the underlying cause by attributing deaths to HIV infection if the initially selected underlying cause was cervical cancer, wasting/cachexia, dementia/encephalopathy, or meningitis.

**Fig. 1: Deaths of Persons with AIDS, By Mention of HIV on Death Certificate and by Underlying Cause (HIV vs. Other)**

Mention of HIV	Underlying Cause			Total
	A cause other than HIV	HIV (by ICD-10 rules)	HIV (by expanded criteria and imputation)	
Yes	3802	67,990	114 (expanded criteria)	71,906 (90%)
No	5550	0	2523 (imputed)	8073 (10%)
<b>Total</b>	<b>9352 (12%)</b>	<b>67990 (85%)</b>	<b>2637 (3%)</b>	<b>79,979 (100%)</b>

70,627 (88%)

Fig.1: A total of 79,979 death certificate records were found for persons with AIDS who resided in New York City and San Francisco at diagnosis and died during 1987-1999. Of these, 67,990 (85.0%) had HIV infection mentioned and selected as the underlying cause by ICD-10 rules. Another 8073 (10.1%) had no mention of HIV infection, but 2523 of these were attributed to HIV infection by our imputation criteria. Another 114 deaths were attributed to HIV infection by our expanded selection criteria. Consequently, we attributed 70,627 (88.3%) of the deaths to HIV infection and 9352 (11.7%) to other underlying causes.

## CONCLUSIONS

In recent years, almost a quarter of deaths of persons with AIDS have not been caused by HIV infection. To avoid exaggerating the impact of HIV infection on mortality in the HAART era, the causes of death should be taken into account, rather than simply the number of deaths of persons with AIDS.

The increase in the proportion of deaths due to underlying causes other than HIV, including heart disease and liver disease, resulted largely from the decrease in the number of deaths due to HIV infection, rather than increases in the numbers due to the other causes.

## RESULTS

**Fig. 2: Annual Number of Deaths among Persons with AIDS By Underlying Cause (HIV vs. Other), 1987-1999**

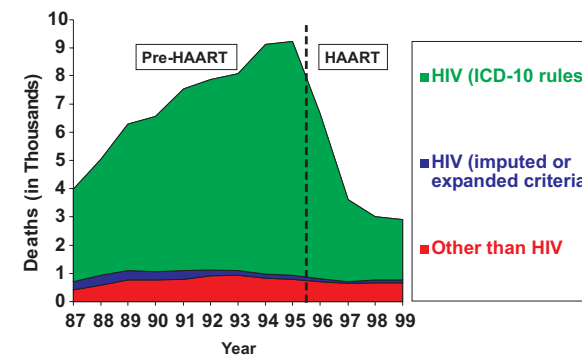


Fig.2: The number of deaths of persons with AIDS increased from 3992 in 1987 to 9217 in 1995, and then decreased to 2901 in 1999. The number of these deaths due to underlying causes other than HIV was relatively stable compared with the number due to underlying HIV.

**Fig. 3: Annual Proportional Distribution of Deaths among Persons with AIDS, by Underlying Cause (HIV vs. Other), 1987-1999**

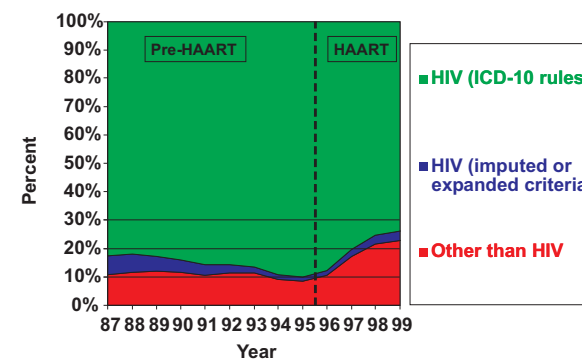


Fig.3: As a result of the changes in numbers of deaths, the annual proportion of deaths for which HIV infection was not the underlying cause decreased from 10.6% in 1987 to 8.4% in 1995, and then increased to 22.9% in 1999.

**Fig. 4: Annual Number of Deaths among Persons with AIDS, By Underlying Cause, 1987-1999**

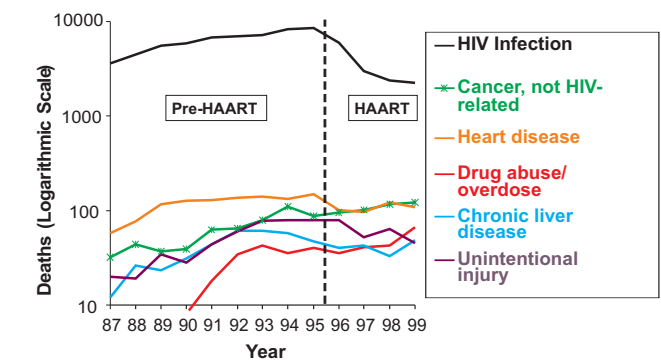


Fig.4: When underlying causes of death other than HIV were divided into various categories of diseases and injuries, the number of deaths due to each of these was found to be relatively stable compared with the decrease in the number due to HIV during the HAART era. In particular, no increasing trend in deaths due to underlying heart disease or chronic liver disease was apparent.

**Fig. 5: Annual Proportional Distribution of Deaths among Persons with AIDS, By Underlying Cause, 1987-1999**

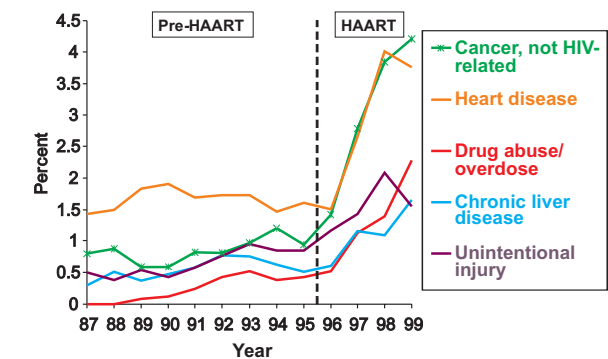


Fig.5: The decrease in the number of deaths due to underlying HIV infection shown in Fig. 4 was largely responsible for the increase in the annual proportion of deaths due to each of the other underlying causes. In the HAART era, the most common of these other causes were heart disease and cancer (not due to HIV), which each accounted for about 4% of deaths of persons with AIDS in 1998-1999.