Impact of Human Immunodeficiency 
Virus Infection on Mortality among 
Young Men and Women in Spain

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Background. This paper describes the impact of human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) mortality among young adults in Spain with specific reference to other causes of death. 

Methods. Based on death registration data for the period 1980–1993, HIV/AIDS was compared against all other causes of death by gender, using specific rates in the 25–44 age group and standardized rates for potential years of life lost (PYLL). 

Results. In 1993, HIV/AIDS was the leading cause of death among men aged 25–44 years (21.8% of all deaths) and the second leading cause of death among women (14.9%), exceeded only by cancer. Since 1982, the trend in the overall standardized mortality rate for men in the 25–44 age group has been reversed, showing a progressive increase. Similarly, since 1984 there has been a halt in the decline in female mortality. For both sexes, maintenance of these trends in mortality was largely attributable to the effect of HIV/AIDS deaths which registered a marked rise, a rise far sharper than that witnessed for variations in all other causes studied. In 1993, the adjusted PYLL rate for HIV/AIDS for ages 1–70 rose to 615 per 100 000 population in men and 156 in women. These values accounted for 9.2% and 5.8% of PYLL for all causes, thereby ranking HIV/AIDS behind motor vehicle accidents as the second leading cause of premature death in men, and behind motor vehicle accidents and breast cancer as the third leading cause in women. For both sexes, the rise in the PYLL rate for HIV/AIDS from 1992 to 1993 proved far greater than that for all other causes of death. 

Conclusion. In Spain, HIV/AIDS has become the leading cause of death among young adults and is counteracting improvements in mortality due to other causes. It should therefore be regarded as a priority public health problem. 

Keywords: HIV infection, AIDS, mortality, potential years of life lost, men, women, Spain

Since 1990 Spain has registered the highest acquired immunodeficiency syndrome (AIDS) incidence in Europe and has surpassed an annual figure of 170 new cases per one million population from 1994 onwards. In contrast to other industrialized countries, AIDS incidence in Spain continues to show a rising trend. This high incidence is proof in itself of the importance of AIDS as a public health problem in Spain. Nevertheless, to determine its degree of priority with respect to other health problems, a comparison must be made of its magnitude in terms of mortality, since such data are the only measure available enabling inter-disease comparisons.

In developed and developing countries alike, AIDS is a cause of death chiefly among young adults, resulting in the loss of many years of productive life and hence conferring upon it a social and demographic repercussion greater than that of other health problems which cause death at more advanced ages.

In Spain, the principal transmission route for the human immunodeficiency virus (HIV) is injecting drug use. The consequences of this are seen in the younger age of those affected and the higher proportion of women, as compared to those countries where homosexual practices among men account for most infections.

These characteristics of AIDS in Spain led to the suspicion that this would impact strongly on population mortality. We thus proposed comparing HIV/AIDS mortality with that reported for other leading causes of death among young adults, and in addition to assess the disease’s impact on mortality trends from the time when the epidemic began up to 1993. Moreover, given that the epidemiological characteristics differed between men and women, it was felt that a gender-based analysis would prove of great interest.
METHODS

All information for this study was taken from anonymous Spanish mortality data bases drawn up by the National Statistics Office (Instituto Nacional de Estadística), covering all deaths reported annually in Spain. Owing to the time needed for data compilation and processing, the most recent data available were those for 1993. Causes of death were denoted by the four-digit codes of the International Classification of Diseases, Ninth Revision (ICD-9). Supplementary ‘E’ codes were used for external causes.

This study made use of data on deaths registered in the period 1980–1993, broken down by the following variables: gender, age and underlying cause of death. Until 1988, no cause-specific code was used in Spain for HIV/AIDS deaths, these being included instead under the general rubric covering deaths due to deficiency of cell-mediated immunity (ICD-9 279). Owing to the impossibility of cause-specific identification, all pre-1988 deaths assigned this code were therefore assumed to be HIV/AIDS-induced. This assumption did not however amount to an error of importance in view of the rarity of deaths due to other cell-mediated immune deficiencies. In the post-1988 study period, all deaths due to AIDS (ICD-9 279.5), AIDS-related complex (ICD-9 279.6) and HIV infection without mention of AIDS (ICD-9 795.8) were classified as HIV/AIDS deaths.

A comparison was made between HIV/AIDS cause-specific mortality rates and those for the remaining causes of death in the population aged 25–44 years. The causes, recorded with greatest frequency in Spain and thus used in the comparisons, were: cancer (ICD-9 140–208), cardiovascular disease (ICD-9 390–459), motor vehicle accidents (ICD-9 E810–E819) and suicide (ICD-9 E950–E959). Age-specific rates were expressed as rates per 100 000 population.

In addition, HIV/AIDS was compared with other causes in terms of premature mortality, using rates for potential years of life lost from ages 1 to 70 years (PYLL) standardized by age by the direct method. In this instance, the categories employed for the other causes of death were more specific: motor vehicle accidents (ICD-9 E810–E819), ischaemic heart disease (ICD-9 410–414), female breast cancer (ICD-9 174), lung cancer (ICD-9 162), cirrhosis (ICD-9 571), suicide (ICD-9 E950–E959), cerebrovascular disease (ICD-9 430–438) and colon cancer (ICD-9 153). Standardized PYLL rates were expressed as rates per 100 000 population.

For rate calculation purposes, the denominators used were mid-year Spanish population estimates, obtained by polynomial interpolation on the basis of existing censuses. For rate standardization European age distribution was taken as reference.

RESULTS

In 1993, there were 3363 male and 796 female deaths in Spain attributed to AIDS or HIV infection, giving adjusted rates of 16.9 and 3.9 per 100 000 inhabitants, respectively. Mean age at death was 34 years in men and 31 in women. A high proportion of these deaths (79.8% in men and 80.8% in women) occurred between ages 25 and 44 years. In this age group, HIV/AIDS was the cause underlying the highest number of deaths. Analysed separately by gender, HIV/AIDS proved to be the leading cause of death among men (21.8% of deaths), and the second leading cause among women (14.9% of deaths), exceeded only by cancer (Table 1).

The trend in the mortality rate for all causes of death in the 25–44 age group for the period 1980–1993 is shown in Figure 1. From 1982 to 1992, mortality in men rose from 155 to 221 deaths per 100 000 population. This trend was halted by a slight decline in 1993. Among women in the same age group, mortality decreased up to 1984 to a rate of 71, thereafter rising slightly to 75 in...
1993. The increase in male mortality and the halt in the decline in women were largely ascribable to the effect of HIV/AIDS.

Figures 2 and 3 depict the trends for the leading causes of death in the Spanish population aged 25–44 years. Remarkable among men and women alike was the steep and sustained rise registered in HIV/AIDS mortality which was in no way comparable to the much less pronounced variations plotted for other causes. In men (Figure 2), there was a decline in the mortality rate due to motor vehicle accidents, which had been the leading cause of death from 1989 to 1991. From 1992 onwards, mortality due to motor vehicle accidents, cancer and cardiovascular diseases was far exceeded by that of HIV/AIDS. In women, despite its later appearance, HIV/AIDS mortality surpassed cardiovascular disease mortality from 1993 (Figure 3).

Taking the period 1980–1982 as reference, Table 2 shows the change in the mortality rate for the 25–44 age group in 1993. Whereas men registered an overall rise of 52 deaths per 100 000, female mortality remained practically the same as that for the reference period. A great proportion of the rise in male mortality can be explained by the appearance of HIV/AIDS, since all the remaining causes underwent variations of a lower magnitude. In women, the introduction of AIDS...
counteracted the decline in mortality registered for most other causes.

Focusing more specifically on the 25–34 age group, the impact of HIV/AIDS deaths is shown to be greater still, with rates of 60 in men and 17 in women. In both cases, it was the leading cause of death, accounting for 29% and 27% of deaths, respectively.

Table 3 shows the impact of HIV/AIDS on premature mortality. In 1993, the adjusted PYLL rate for HIV/AIDS for ages 1–70 rose to 615 per 100 000 population in men and 156 in women. These values respectively account for 9.2% and 5.8% of PYLL for all causes, thereby ranking HIV/AIDS behind motor vehicle accidents as the second leading cause of premature death in men,

### Table 2 Cause-specific mortality rates in population aged 25–44 years in 1993, and difference with respect to rates for the period 1980–1982

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Men Mortality in 1993</th>
<th>Women Mortality in 1993</th>
<th>Difference in rates&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Difference in rates&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV/AIDS</td>
<td>46.2</td>
<td>11.1</td>
<td>46.2</td>
<td>11.1</td>
</tr>
<tr>
<td>Cancer</td>
<td>32.1</td>
<td>2.0</td>
<td>2.0</td>
<td>27.5</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>29.5</td>
<td>9.1</td>
<td>-5.3</td>
<td>-6.3</td>
</tr>
<tr>
<td>Motor vehicle accidents</td>
<td>27.0</td>
<td>5.8</td>
<td>3.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Suicide</td>
<td>11.2</td>
<td>3.0</td>
<td>4.9</td>
<td>1.2</td>
</tr>
<tr>
<td>All other causes</td>
<td>66.1</td>
<td>22.4</td>
<td>-4.5</td>
<td>-9.1</td>
</tr>
<tr>
<td>Total</td>
<td>212.2</td>
<td>78.8</td>
<td>52.0</td>
<td>-0.1</td>
</tr>
</tbody>
</table>

<sup>a</sup> Mortality rates per 100 000 population aged 25–44 years in 1993.


### Table 3 Adjusted rates for potential years of life lost (PYLL) for ages 1–70 per 100 000 population for the leading causes of premature death, by sex. Spain, 1992–1993

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>1992 PYLL (%)</th>
<th>1993 PYLL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle accidents</td>
<td>817.3</td>
<td>740.9</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>553.0</td>
<td>615.1</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>538.4</td>
<td>525.7</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>481.5</td>
<td>486.3</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>312.2</td>
<td>291.9</td>
</tr>
<tr>
<td>Suicide</td>
<td>222.0</td>
<td>252.6</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>233.8</td>
<td>235.9</td>
</tr>
<tr>
<td>All causes</td>
<td>6827.2</td>
<td>6666.2</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>295.4</td>
<td>309.4</td>
</tr>
<tr>
<td>Motor vehicle accidents</td>
<td>233.6</td>
<td>204.7</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>116.2</td>
<td>156.1</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>130.1</td>
<td>120.6</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>91.3</td>
<td>91.5</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>79.7</td>
<td>71.2</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>65.1</td>
<td>70.3</td>
</tr>
<tr>
<td>All causes</td>
<td>2690.5</td>
<td>2681.6</td>
</tr>
</tbody>
</table>
and behind motor vehicle accidents and breast cancer as the third leading cause in women. The rise in the PYLL rate for HIV/AIDS from 1992 to 1993 proved far greater than for all other causes of death.

DISCUSSION

By 1993, HIV/AIDS had become a leading cause of death in adults aged 25–44 years in Spain: in men it was the leading, and in women the second leading cause of death. In both cases, HIV/AIDS was responsible for an appreciable percentage of all deaths occurring in this age group. Compared to other developed countries, a similar impact has only been described in those hit hardest by the AIDS epidemic, and in certain especially affected cities or regions.

The order in which causes are ranked is heavily influenced by the categories established for comparison. In our analysis, the criterion used had the effect of diminishing the relative importance of HIV/AIDS. This category, which includes deaths occasioned by the action of a single species of virus, was compared with the groupings for all cancers and all cardiovascular diseases. If, as with certain other studies, comparisons had been run separately against each individual type of cancer, then HIV/AIDS would have ranked as the leading cause of death in women as well as in men, ahead of breast cancer.

As regards the comparison between HIV/AIDS mortality and that of other causes, account must be taken of the limitations arising from the source of information used. Some studies in Spain have described underreporting of HIV/AIDS deaths in mortality statistics on a par with other countries. It could be due, in part, to a reluctance to register AIDS on the death certificate. This implies that the real impact of HIV/AIDS on mortality is likely to be greater than that found by us.

The spread of the AIDS epidemic in Spain is having considerable impact on the mortality trend among young adults. In men aged 25–44 years, the mortality rate has risen since the beginning of the 1980s. Although this rise was initially influenced by other causes (motor vehicle accidents in particular), the maintenance of this upward trend in recent years is fundamentally explained by the extent of the HIV/AIDS epidemic. The slight decline witnessed in 1993 can only be ascribed to a drop in other causes of death, because that period registered a continuing increase in HIV/AIDS mortality. In women in the same age group, there was a levelling off in the favourable trend which had been in evidence until 1984; a development attributable in part to HIV/AIDS. In young adults of both sexes HIV/AIDS is counteracting reductions in mortality which are being achieved for other causes.

In 1993, HIV/AIDS deaths accounted for 1.2% of all deaths registered for the Spanish population as a whole; as indicated above however, the impact is greater still in that it tends to centre on deaths occurring among young adults. In this respect, the different demographic, social and public health repercussions of mortality by age at death is better reflected when causes are compared in terms of premature mortality. Hence, HIV/AIDS was responsible for a considerable proportion of total PYLL in Spain in 1993, as well as being one of the principal causes of premature death in men and women alike. Furthermore, the PYLL rate for HIV/AIDS shows a clearly upward trend with respect to the other causes, which have either remained stable or, like motor vehicle accidents, are manifestly on the decline.

In Spain, two out of every three AIDS cases are diagnosed among injecting drug users and increasingly among their sexual partners. Such epidemiological characteristics are associated with a greater proportion of women and young adults among affected people in comparison to other countries where homosexual men are the main transmission category. Thus, by focusing on the 25–34 age group, the impact of HIV/AIDS has become far more dramatic and is indeed the cause underlying more than one out of every four deaths in both men and women. Although HIV/AIDS mortality in women is lower, it nonetheless ranks high among the causes of death, given that female mortality for most of the remaining causes is likewise lower. The important impact exerted by HIV/AIDS on mortality among young Spanish women is remarkable when compared to that described for other developed countries, which report noteworthy results for men alone.

As with other countries, wide geographical differences have been described for the distribution of HIV/AIDS mortality in Spain. Previous papers have reported the great impact of AIDS on mortality in some of the hardest-hit cities and regions, i.e. Madrid and Catalonia. The present study corroborates the great impact that AIDS has on overall young-adult mortality nationwide.

Availability of cause-specific mortality data has limited this analysis to the period up to 1993. Nevertheless, Spain’s AIDS case surveillance system provides evidence to show that incidence has continued to increase, at least until 1995. On this basis, and excluding the possibility that recent advances in treatment may have achieved relevant improvements in subsequent survival, it can be assumed that HIV/AIDS mortality has in all likelihood continued upward.

These results highlight the importance of AIDS and HIV infection as a cause of premature death and mortality among young adults in Spain. At present,
prevention of HIV transmission and clinical care of HIV infected people are the main measures relied upon as a means of controlling this epidemic and avoiding the deaths it occasions. It is therefore evident that AIDS should be regarded as a priority public health problem in Spain to be targeted for intervention.

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REFERENCES

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