Study No. 5

AIDS-attributable mortality amongst South African health workers

1. Introduction

Literature on HIV/AIDS morbidity or mortality amongst health workers is very scarce. To date, few studies have been conducted to estimate the proportion of health workers who have AIDS or have died of AIDS. The CDC reported that up until December 2002, 5.1 per cent of all reported AIDS cases in the USA for whom occupational information was available (23 951 of 469 850), had worked in the health sector. They also reported that 73 per cent of those health workers with AIDS had already died of the disease (www.cdc.gov/ncidod/hip/BLOOD/hivpersonnel.htm, last accessed 27 January 2003).

In Malawi researchers reported that in 1999 two per cent of health workers died of AIDS (60 deaths out of 2 979). For female health workers, the highest death rate was among those aged 25–34 years. The cause of death was reported to be TB in 47 per cent of cases, chronic illness in 45 per cent, and acute illness in the remainder. Chronic illness was thought to be due to AIDS, with TB being the common cause of death (Harries, Hargreaves, Gausi et al. 2002). The study did not measure AIDS mortality directly.

In a hospital study of deaths of female nurses in Zambia, Buve et al. (1994) estimated that the mortality rate was two in every 1 000 between 1980 and 1985, increasing to 7.4 in 1986–1988 and 26.7 in 1989–1991, but with few deaths (1, 2 and 7 respectively).

Several researchers and organisations have tried to use the limited data available to raise the issue of the impact of HIV/AIDS on the supply and demand of health workers. These works have alluded to HIV/AIDS as a major contributor to the morbidity and mortality of health workers and, therefore, the need to plan the development of human resources in the health sector (Tawfik & Kinoti 2003; USAID, Academy for Educational Development and Support for Analysis and Research in Africa 2003; Martinez & Martineau 2002; UK Parliament, Select Committee on International Development, 2003).

Health workers may acquire HIV through heterosexual transmission and/or nosocomial infection. Heterosexual sex is considered the dominant mode of HIV transmission in South Africa. Concerns have been raised regarding the transmission of nosocomial HIV amongst health workers. Another study from South Africa which evaluated occupational exposure to HIV/AIDS found that 13 per cent of health care workers reported exposure to medical sharps leading to injuries with HIV-positive patients (Gounden & Moodley 2000). The chances of nosocomial infection are high where health worker training in infection control is inadequate and equipment is reused, coupled with inadequate sterilization.

There is evidence that the disposal of medical waste in South Africa is not safe. Medical sharps (i.e., syringes, needles and blades that are capable of causing penetrating injuries,, thus exposing persons to HIV and hepatitis) are disposed of in a manner that raises questions about the possibility that HIV infection in South Africa may be transmitted nosocomially. In a study conducted by the Management Sciences for Health (2001), in 1999 one in five clinics across the Eastern Cape province disposed of the sharps locally within premises – between seven days and three months may elapse before the medical waste containing sharps is collected from the clinic premises for incineration. During this time, medical waste may be contained in plastic refusal and disposal bags, which increases the risk of infection to health workers. Infected health workers may also transmit HIV to their partners.

2. Study objectives

One of the objectives of the tender awarded to MEDUNSA and the HSRC was to determine the current status and projected morbidity, mortality and orphanhood among South African health workers and their dependants. As stated elsewhere in this report, we indicated in our response to the tender that we would not conduct a study of orphanhood and dependants of health workers given the complexity and time required to do justice to this issue and the resources available for the survey.

In order to meet the objective of determining the current and projected morbidity attributable to AIDS among South African health workers, a questionnaire was developed and pilot-tested in Gauteng. The aim was to compare the data obtained from the questionnaire with information on known AIDS cases among health workers admitted to hospitals. However, the pilot and Phase I of the study did not yield useful information about AIDS cases among health personnel since none of the patients treated at any of the sampled health facilities indicated that they were health workers. It was therefore not possible to use this method in the final phase of the study in the other eight provinces. Instead it was decided to test oral fluid samples of health workers for HIV antibodies.

To answer the question of AIDS-attributable mortality among health workers, the researchers proposed to the DoH that they analyse mortality data using death notification data from the Department of Home Affairs, which is processed by Statistics South Africa. The plan was based on an understanding that the DoH would assist in securing this data, which was only made available to us at the end of January 2003.

The objective of this study (No. 5) was to estimate the proportion of health workers who died of AIDS by using death notification data from Stats SA, and to provide the demographic profile of the deceased health workers.

3. Method

3.1 Database

Mortality data was obtained from Stats SA. The following description of their methods is summarised from a full description provided by Stats SA. The source documents are printed images of death notification forms collected from 1997 to 2001. The cause of death classification is based on the 10th revision of the International Classification of Diseases (ICD-10) using multiple causes of death. Statistics South Africa drew a 15 per cent probability sample of microfilm rolls for each year from 1997 to 2001 for analysis (see Table 66). The cutoff date for registering deaths occurring in 2001 was April 2002. All the data were recorded on 1 872 microfilm rolls. There were less microfilm rolls for 2001 than for 2000, which raised questions about the completeness of the death records. The 15 per cent sample of rolls yielded 279 681 death notification forms – this corresponds to 12 per cent of all death notification forms (i.e., 2.4 million deaths occuring between 1997 and 2001 inclusive).

Table 66: Number of universe, sample rolls and sampling fraction, January 1997 to April 2002

YEAR OF REGISTRATION	NUMBER OF ROLLS IN THE UNIVERSE	NUMBER OF ROLLS IN THE SAMPLE	SAMPLING FRACTION (%)
Jan–Dec 1997	290	44	15
Jan–Dec 1998	341	51	15
Jan–Dec 1999	374	56	15
Jan–Dec 2000	345	52	15
Jan–Dec 2001	382	57	15
Jan–Apr 2002	140	21	15
Total	1 872	281	15

Source: Statistics South Africa, 2002

The process entailed scanning information on the microfilms and then printing it in a format similar to the original death notification form (see Appendix 8). The information on the forms was keyed into the computer by experienced clerical staff.

3.2 Cause of death classification

In this study the definition of HIV-related cause of death was based on the classification made by Statistics South Africa. Specifically, 'in cases where HIV or its synonyms (eg., immunocompromised, immunosuppression, retroviral disease, wasting syndrome) are stated on the certificate, an appropriate code related to HIV was used. ICD-10 has different codes for different HIV-related illnesses. On the other hand, if HIV or its synonyms are not stated on the certificate, the reported diseases are coded as stated, with no relation to HIV.'[1] The definition of HIV included the following codes:

1 From e-mail correspondence sent by Stats SA on 22 November 2002: Final appendices cause of death.

- B20 Human immunodeficiency virus (HIV) disease resulting in infectious and parasitic diseases;
- B21 Human immunodeficiency virus (HIV) disease resulting in malignant neoplasms;
- B22 Human immunodeficiency virus (HIV) disease resulting in other specified diseases;
- B23 Human immunodeficiency virus (HIV) disease resulting in other conditions;
- B24 Unspecified human immunodeficiency virus (HIV) disease.

Because of the stigma associated with AIDS, it is likely that health workers may not enter AIDS as a cause of illness in medical records, nor as a cause of death on death records. This is not surprising – in a probability sample of nearly 10 000 people in South African households, 41.1 per cent indicated that health workers should not write AIDS on the medical records and 38.5 per cent said they should not write AIDS on the death notification form (Shisana, Simbayi, et al. 2002). It is thus likely that the recorded number of people who died of AIDS will be lower than expected.

Multiple cause of death was used as in the Statistics South Africa database. This is defined in ICD-10 as: All morbid conditions, diseases and injuries entered on the death certificate. These include those involved in the morbid chain of events leading to the death, which are classified as either the underlying, intermediate or any intervening cause, and those conditions that contributed to death but were not related to the disease or condition causing death. A second definition of HIV-related cause of death was TB, but only that which was indicated as related to HIV/AIDS. The specific codes for TB Associated with Aids are listed below:

- A15 Respiratory tuberculosis bacteriologically and histologically confirmed;
- A16 Respiratory tuberculosis not confirmed bacteriologically or histologically;
- A17 Tuberculosis of nervous system;
- A18 Tuberculosis of other organs;
- A19 Miliary tuberculosis;
- J65 pneumoconiosis associated with tuberculosis.

4. Results

In the following section we present three categories of mortality:

- overall mortality of health workers due to all causes;
- mortality due to HIV/AIDS-related diseases, and mortality due to TB associated with AIDS among health workers;
- cause-specific mortality (due to HIV/AIDS) among health workers.

Due to small numbers, these categories of mortality are based on the aggregated data for the period 1997 to 2001. Note that since the absolute distribution of the sub-groups examined is not uniform, the percentages presented in the following tables were computed as row percentages so as to control for differences in the size of the sub-groups, hence the row percentages in each of the tables do not add up to 100%.

4.1 Overview of registered mortality among health workers

The sample produced a cumulative overall mortality ratio of 0.185 per 1 000 deaths among health workers. The cumulative overall mortality ratio was derived from the number of deaths among health workers during the period 1997 to 2001 (518), divided by the total number of deaths (279 581) during the period. Of the total number of deaths among health workers during the period, 5.6 per cent (29) were due to HIV/AIDS-related illness. If another 7.5 per cent (39) deaths due to TB associated with AIDS are added, then according to the registration data, 13 per cent of deaths among health workers were due to HIV/AIDS-related illness during the period.

4.2 Mortality of health workers due to HIV/AIDS related illness by background characteristics

Table 67: Mortality attributable to AIDS by age, South African health workers, 1997–2001

AGE	NUMBER IN GENERAL POPULATION THAT HAVE DIED OF AIDS	AIDS AS A % OF ALL DEATHS	TOTAL NO. OF HEALTH WORKERS WHO DIED OF AIDS	AIDS AS A % OF ALL DEATHS AMONG HEALTH WORKERS
0–4	2 315	11.9		
5–9	116	0.6		
10–15	44	0.2		
15–19	307	1.6		
20–24	1 643	8.5	1	33.3
25–29	3 381	17.4	3	14.3
30–34	3 719	19.1	6	13.0
35–39	3 041	15.7	4	8.0
40–44	1 970	10.1	8	15.4
45–49	1 313	6.8	3	7.1
50–54	698	3.6	1	2.5
55–59	356	1.8	1	2.9
60+	519	2.7	2	0.9
Total	**19 422**	**100.0**	**29**	**–**

Table 67 shows mortality of health workers due to AIDS as a percentage of the sample of deaths due to HIV/AIDS. The results show that 0.1 percent of all deaths attributable to AIDS in the general population were people who worked as health workers (29/19 422). However, if the analysis is confined to the working age group in the general population (i.e. persons aged 15–64), the proportion of deaths attributable to AIDS contributed by health workers during the period is about nine per cent.

Table 68 presents the percentage of health workers who died from HIV/AIDS-related illness classified by race. The majority of health workers who died from HIV/AIDS-related illness were Africans. This is in line with the pattern of prevalence by race in the general population. Whites and coloureds appeared in equal proportion.

Table 68: Percentage of health workers who died from HIV/AIDS-related disease by race, South Africa 1997–2001

RACE	FREQUENCY	PERCENT
African	22	10.89
White	2	1.18
Coloured	2	9.09
Unspecified	2	1.82
Total	**28**	

Table 69 shows the distribution of registered deaths of health workers by marital status. The table appears to suggest that of all the marital status categories, widowed health workers are less likely to die of HIV/AIDS-related disease compared to single, married or divorced health workers.

Table 69: Percentage of health workers who died from HIV/AIDS-related disease by marital status, South Africa 1997-2001

MARITAL STATUS	FREQUENCY	PERCENT
Single	9	6.87
Married+living together	10	5.05
Widowed	2	1.94
Divorced	2	5.88
Unspecified	5	17.24
Total	**28**	

Table 70 presents the distribution of health workers dying of HIV/AIDS-related illnesses by education of the deceased. The table appears to suggest that dying of an HIV/AIDS-related illness is negatively associated with the level of education among health workers.

Table 70: Distribution of deaths of health workers due to HIV/AIDS-related illness by education of the deceased, South Africa 1997–2001

EDUCATIONAL LEVEL	FREQUENCY	PERCENT
None	3	15.79
Less than matric	11	8.21
Matric	9	7.83
University/Technikon	3	2.61
Unspecified	5	3.42
Total	**28**	

Table 71 shows the occupation of the health workers who died from HIV/AIDS-related illness. The table suggests that nurses, aides, attendants and orderlies are more likely to die of HIV/AIDS-related illness than doctors and specialists.

Table 71: Distribution of deaths of health workers due to HIV/AIDS-related illness by occupation, South Africa 1997–2001

	FREQUENCY	PERCENT
Doctors and specialists	1	1.11
Professional nursing staff	9	6.04
Associate professional nursing staff	16	6.81
Aides, attendants and orderly	2	5.56
Total	**28**	

Table 72 suggests that health workers with HIV/AIDS-related illness are more likely to die in hospital than in their homes or elsewhere.

Table 72: Distribution of deaths of health workers due to HIV/AIDS-related illness by place of death, South Africa 1997–2002

LOCATION	FREQUENCY	PERCENT
Hospital	18	8.82
Non-hospital	10	4.18
Unspecified	4	5.97
Total	**28**	

4.3 Mortality of health workers due to TB associated with HIV/AIDS

Due to under-reporting of AIDS deaths, it is prudent to examine mortality due to other closely related causes of deaths. Tuberculosis is an opportunistic infection associated with HIV/AIDS. For this reason, we examined mortality due to TB associated with AIDS.

Table 73 shows mortality of health workers due to TB associated with HIV/AIDS as a percentage of the sample of deaths due to TB associated with AIDS. The results show that 0.1 per cent of all deaths attributable to TB associated with HIV/AIDS in the general population were people who worked as health workers (39/29 245). The proportion of deaths attributable to TB associated with HIV/AIDS in the working age group in the general population contributed by health workers during the period is about 11 per cent.

Table 73: Mortality attributable to TB associated with AIDS by age among South African health workers, 1997–2001

AGE	NO. IN GENERAL POPULATION WHO HAVE DIED OF TB	% OF ALL DEATHS FROM TB	TOTAL NO. OF HEALTH WORKERS WHO DIED OF TB	PERCENTAGE OF ALL DEATHS OF HEALTH WORKERS ATTRIBUTABLE TO TB
0–4	721	2.5		
5–9	170	0.6		
10–15	101	0.3		
15–19	453	1.5		
20–24	1 827	6.2		
25–29	3 761	12.9	6	28.6
30–34	4 498	15.4	9	19.6
35–39	4 124	14.1	8	16.0
40–44	3 256	11.1	3	5.8
45–49	2 690	9.2	4	9.5
50–54	1 974	6.7	4	10.0
55–59	1 558	5.3	3	8.8
60+	4 112	14.1	2	0.9
Total	**29 245**	**100.0**	**39**	**28.6**

Similar to the pattern in HIV/AIDS-related illness (see Table 72), Table 74 shows that health workers who die from TB associated with HIV/AIDS are more likely to die in health institutions than elsewhere.

Table 74: Percentage of health workers who died from TB associated with HIV/AIDS by place of death, South Africa 1997–2001

LOCATION	FREQUENCY	PERCENT
Hospital	19	9.31
Non-hospital	10	4.18
Unspecified	8	3.35
Total	**37**	

In contrast with the pattern of HIV/AIDS-related illness described above, Table 75 appears to suggest that health workers without education are less likely to die of TB associated with HIV/AIDS than health workers who have some form of education, with the exception of health workers with a tertiary education.

Table 75: Percentage of health workers who died from TB associated with HIV/AIDS by education of the deceased, South Africa 1997–2001

	FREQUENCY	PERCENT
None	1	5.26
Less than Matric	8	6.96
Matric	10	8.70
University/technikon	2	1.74
Unspecified	16	10.96
Total	**37**	

With regard health workers dying of TB associated with HIV/AIDS by occupation, race and marital status, Tables 76–78 show a similar pattern to that of health workers dying of HIV/AIDS-related illness by occupation, race and marital status described in Tables 68, 71 and 69.

Table 76: Percentage of health workers who died from TB associated with HIV/AIDS

OCCUPATION	FREQUENCY	PERCENT
Doctors and specialists	4	4.44
Professional nursing staff	13	8.72
Associate professional nursing staff	16	6.81
Aids, attendants and orderlies	4	11.11
Total	**37**	

Table 77: Percentage of health workers who died from TB associated with HIV/AIDS by race, South Africa 1997–2001

RACE	FREQUENCY	PERCENT
African	22	10.89
White	1	0.59
Coloured	1	4.55
Unspecified	13	11.82
Total	**37**	

Table 78: Percentage of health workers who died from TB associated with HIV/AIDS by marital status, South Africa 1997–2001

MARITAL STATUS	FREQUENCY	PERCENT
Single	18	13.74
Married + living together	10	5.05
Widowed	2	1.94
Divorced	2	5.88
Unspecified	5	17.24
Total	**37**	

5. Discussion and conclusions

It is difficult to estimate accurately the proportion of health workers who died from HIV/AIDS-related illnesses using death notification data. Families and doctors fear that the insurance industry may not pay out benefits if the deceased did not declare their HIV status when the insurance policy was purchased. Anecdotal evidence also suggests that some of the African burial societies refuse to bury someone who died of HIV/AIDS-related illness. This is because AIDS is stigmatised. All these factors may contribute to underreporting of mortality due to AIDS.

As research has indicated, 'Projections based on different stages of the epidemic suggest that a country with a stable 15 per cent prevalence can expect that each year between 1.6 and 3.3 per cent of its healthcare providers will die from AIDS' (Tawfik & Kinoti 2003). Earlier we reported that in a random probability sample of health workers in four provinces, in the public and private sectors, working in primary, secondary or tertiary hospitals, an estimated 15.7 per cent tested positive for HIV antibodies. This figure is similar to the 15 per cent found amongst South Africans aged 15–49 years in another recent study (Shisana, Simbayi et al. 2002). This study estimated that 13 per cent of health workers died from HIV/AIDS-related illness during 1997–2001. If the projections suggested by Tawfik and Kinoti (2003) are applied to the results from this study, the estimated 13 per cent deaths of health workers over a five-year period is within the cumulative mortality range of eight to 16 per cent derived from the projections.

Despite the difficulty of establishing the accurate number of health workers dying of HIV/AIDS-related illness from registration data, certain patterns emerge from this study, despite the small numbers, as follows. African health workers appear to be more at risk of dying of HIV/AIDS- related illness than other health workers in other race groups. This may be related to educational attainment impacting on knowledge about HIV/AIDS (Africans generally have lower educational attainment than other race groups). Also, nurses and other para-medical personnel appear to have a higher risk of dying of HIV/AIDS than doctors and specialists. It is most likely that proportionately Africans are more likely to be nurses than doctors, which may partly be a reflection of disparities in educational attainment that have their roots in the history of the country.