The extent of misclassification of causes of death: a case study of Emalahleni Municipality, Mpumalanga Province, South Africa

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1. Introduction

Misclassification of causes of death has been a long-standing concern for researchers worldwide. Ideally, cause of death information should be obtained through death registration data produced by a civil registration system. However, even in developed countries, where coverage is complete and the causes of all deaths are identified based on standard medical certificate, misclassification of causes of death still occurs, though at a minimum scale. Confidential enquiries are used to identify the extent of misclassification and under reporting in these countries (WHO 2007, p. 13). Hospital record data may be an ideal confidential source for verification of misclassification of causes of death. However, hospital record data are not representative of whole populations in developing countries.

Several studies were undertaken to establish the extent of misreporting and misclassification of deaths due to HIV/AIDS in South Africa. This is because the issue of misclassification is believed to be exacerbated by the advent of HIV/AIDS. Majority of these studies sought first to estimate completeness of death registration data and thereafter estimate actual proportions of deaths due to HIV/AIDS. However, the question of proportions of causes of death misclassified is still not answered. This knowledge gap has a direct influence on prioritization of health actions. For example, in the context of misreporting and misclassification of causes of death, the reported leading causes may not be appropriate. Again, it has been a challenge for many developing countries to monitor the fifth Millennium Development Goal which requires assessment of progress towards reduction of maternal deaths.

Research has shown that relative to child mortality, knowledge about adult mortality in sub-Saharan Africa where adult mortality is acquiring a new salience due to HIV/AIDS is very limited. Preliminary analysis of the South African death registration data for 1999-2005 showed that about 85% of deaths reported to have been due to HIV/AIDS were aged 15-49. Also, the highest HIV/AIDS prevalence (23.1%) reported by the Human Sciences Research Council (2006, p. 146) for the age group 15-49 was observed in Mpumalanga Province. However, according to death registration data for 1999-2005 only four per cent of total

deaths aged 15-49 were reported as due to HIV/AIDS in this province. Interest in the age group 15-49 and Mpumalanga Province emanated from the above contradicting figures.

This case study focuses on death records of people who died aged 15-49 in Emalahleni Municipality in 2003-2005. The area of Emalahleni Municipality is 2677 km^2. In 2007, females constituted 49% of the total number of 435 217 people (Community Survey, 2007). One reason for the slightly lower female proportion may be migratory labour still prevalent owing to coal mining, where men leave their families in rural areas and reside at their place of work.

Unexpected patterns of deaths reported to be due to HIV/AIDS within Mpumalanga Province among municipalities were also observed for Emalahleni Municipality. About 56% of deaths attributed to HIV/AIDS for the age group 15-49 were for males, contrary to national, all provinces and all other municipalities within Mpumalanga Province where higher proportions are associated with females. Again, the proportion of deaths reportedly due to HIV/AIDS at the reproductive age group in Emalahleni Municipality was higher (54%) for deaths that occurred outside hospitals contrary to expectations. These peculiar patterns prompted the need to verify consistency of underlying cause in this area.

Again, budget and time constraints were other considerations for the choice. Emalahleni Municipality lies 100 kilometres from the South African capital city, Pretoria. Yet another reason for this choice was familiarity with the geographical area, cultures and local languages used. Local languages include isiZulu, isiSwati, isiNdebele, Afrikaans and Nothern Sotho.

1.1 Objectives

The overall objective is to establish the extent to which causes of death are misclassified.

Specific Objectives

- To obtain agreement of underlying cause between death certificate and hospital record
- To establish which causes of death are misclassified to which diseases

1.2 Data and methods

There were 14 health services centres (hospitals and clinics) in Emalahleni Municipality in June/July 2007. One fully-fledged hospital, the Specialised TB Hospital, one medium sized hospital and two small maternity clinics. The remaining nine are smaller clinics that provide primary health care services. Four of these clinics provide immunization of children and

contraception services only, therefore were cancelled out for the research. Data were collected from seven hospitals/clinics. The remaining three clinics had these problems: records of deceased persons who collect chronic medication are destroyed upon death because there is lack of space; records of chronic patients are given to patients to keep due to lack of space, upon death, the clinic is not notified by the family; there is shortage of staff, therefore could not follow up on chronic patients who defaulted on collecting medication, therefore do not know whether those patients are still alive or dead.

1.2.1 Research ethics approvals

Ethics approval were sought firstly from The Australian National University but had to get approval in South Africa first before they would be granted. Secondly, ethics approval was granted by the South African National Department of Health (DoH) through the South African Statistician General on 17 June 2007. Thirdly, ethics was granted by the Mpumalanga Provincial and District Health office in Emalahleni Municipality on 19 June 2007. A day later, a pilot study was undertaken to introduce the research to health services centres in the research area.

1.2.2 Data collection schedule

The schedule for data collection was designed in a way that it should accommodate the death notification form layout. However, there was a need to verify the layout and items on hospital admission forms. This was done using a sample of a hospital admission form used in Gauteng Province, assuming that all provinces use the same format. The reason for this was the delay in ethics approval, since it would not be possible to access a sample of a hospital admission form used in the research area without ethics approval. There were some differences in the layout of the Emalahleni Municipality hospital form and the one used in Gauteng Province. As a result, three of the items that were included on the schedule for data collection using the Gauteng sample of hospital admission form did not yield response. These items were 'whether patient is on medical insurance', 'language of patient' and whether patient is on a social security scheme'.

1.2.3 Research strategy

Funding was secured from the Census Research and Methodology Component under the

Census Inputs and Outputs Division at Statistics South Africa. Six research assistants were recruited, two of whom were qualified nurses with extensive experience on coding causes of death at Statistics South Africa. The other four research assistants were identified from the database at Statistics South Africa as seasonal survey workers and interviewed. Thorough training was given to all research assistants regarding the objectives of the research, their roles, materials and time schedules for fieldwork. The importance of confidentiality of personal information transcribed from administrative records was explained and each research assistant signed a Confidentiality Declaration Form designed by Statistics South Africa. This was also a requirement by the Australian National University Ethics Committee prior to granting approval. The South African DoH did request signing of confidentiality and the clarification on penalties of breaching it before commencement of data collection. As part of training, identification cards with each research assistant's photo, name and name of the project (Validation of Death Certificate Data Project June/July 2007) were designed as a means of identification during fieldwork.

1.2.4 Data collection

Actual data collection started on 25 June and ended on 31 July 2007. Upon arrival at the first fully fledged hospital, it emerged that records of deceased persons are not separated from other records and there was no indication on the outside of the hospital file that the person died. Again, though the item on identity number is on the outside of the file, few records had the identity number recorded on the outside. We then requested the mortuary register which is suppose to have information on all persons who died in that hospital, surprisingly, only a third of the deceased persons were registered compared to the reports written in the hospital wards upon death. Therefore, we decided to use the death reports from wards since the file number of the deceased is recorded on these reports. On asking about the electronic file of admission of patients, we were told by the health personnel that there are fewer cases there since for two weeks in a month the IT system is not in working condition, therefore, about half of the admission forms are not captured on the system.

1.2.5 Data processing

Overall, 2231 hospital records were collected in Emalahleni while in-hospital registered deaths extracted from the national death registration data for 2003-2005 were about 3126 for the same population. Female deaths constitute 51% of the 2231 collected hospital records. Coding was done at three-digit level (standard coding) using the International Classification

for Disease (ICD10). Coding was done by 10 professional coders while facilities were provided by the Health and Vital Statistics Division at Statistics South Africa. For quality assurance, the bulks of coded questionnaires were swapped for verification. About 11 persons were recruited to capture data on a CSPRO program. One questionnaire was captured twice by two data capturers for quality assurance. Data were screened for mismatches and verification was done. Confirmation of duplicates was done prior to data capturing and during editing.

1.2.6 Data management

The Automated Classification of Medical Entities (ACME 2005.05) developed by the United States National Center for Health Statistics (NCHS) was used for selecting the underlying cause for hospital record data collected in Emalahleni Municipality. The 2005.05 version of ACME was converted by Statistics South Africa in consultation with the WHO to recognize the three–digit ICD10 codes as valid input whereas it requires the fourth digit to select the underlying cause of death. The fourth digit was imputed as '9' or '8', indicating that further detail of the coded disease was not specified.

1.2.7 The linking process

Out of the 3126 in-hospital registered deaths, only 1292 (41%) death records were linked to hospital records pertaining to the same people. In contrast, of the 2231 hospital records collected by the study in Emalahleni Municipality, the linkage success rate was at 58%. About 93% (of a total of 1292) of linked death records were linked using the thirteen-digit national identity number and the all-or-none linking method manually. The use of the all-or-none linking method suggests that other identifiers such as date of birth, date of death, sex were not considered. However, the 13-digit national identity number does provide for date of birth, sex and nationality. Also, about 6% of the 1292 linked cases were linked using the unique death certificate serial number designed by the Department of Home Affairs. All cases on death registration data have this number in contrast to only a few hospital records.

Although the all-or-none linking method still applied with the death certificate serial number as a linking index, other identifiers such as date of birth, age and sex were also verified. The remaining one per cent of linked cases was linked by names also considering other variables such as sex, date of birth and date of death. Names were transcribed from administrative records only when there was no national identity number or death certificate serial number recorded also for the purpose of record linkage. Almost all cases on death registration data

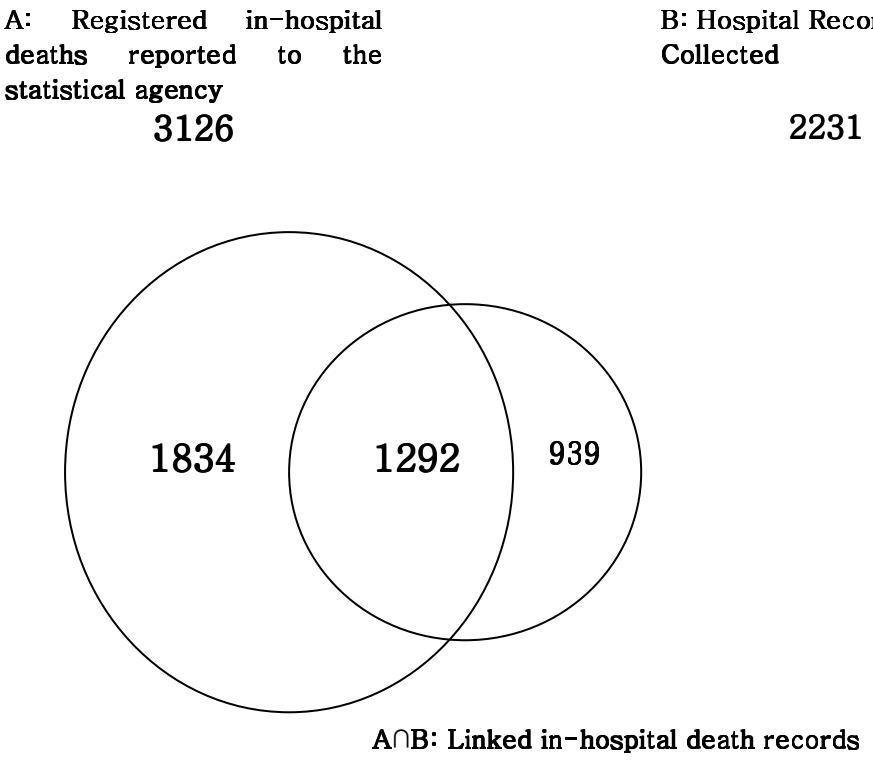
had names recorded. Thereafter, STATA Version 10 was employed to merge the files.

1.2.8 Linked and unlinked records

By and large, the linkage success rate was lower than expected given the consideration that hospital data may be comparatively more accurate than data collected outside hospitals. However, preliminary analysis of national death registration data revealed low data quality specifically on demographic indicators for in-hospital death certificates relative to deaths certified outside hospital.

One reason for unlinked records is lack of identity numbers recorded on either death certificate, hospital record or on both. On the part of hospital records this is exacerbated by the fact that requirement of the identity number is adhered to upon death, although the hospital admission form has this item on the outside of the form. Even when the national identity number is provided upon death, the hospital record is not updated; it is only recorded on the death notification form. About 63% of unlinked death certificates had no identity number recorded relative to 81% of unlinked hospital records.

Figure 1.1: Linking and matching of death records



Source: Emalahleni in-hospital death registration data for the age group 15-49 in 2003-2005 linked to hospital records

2. Results

2.1 Agreement of underlying cause

Agreement of underlying cause is derived by cross tabulating all underlying causes of death represented by individual diseases for death certificate and hospital record data. Agreement rate is calculated as the number of deaths in which each individual disease on death certificate agreed with that on hospital record, divided by the total number of deaths as recorded on hospital records. Overall, about 56% of death certificates agree with the hospital records with regards to underlying cause considering individual diseases. However, agreement is higher when considering grouped diseases (71%), signifying misclassification of cause of death to other diseases within the same group.

Hospital records are considered to provide accurate information on causes of death relative to death certificates by this study. The notion maintained is that the hospital record has more detailed morbid conditions recorded compared to the death certificate. For example, about 35% of hospital records collected in Emalahleni by this study had five causes of death mentioned relative to less than one per cent of death certificates. In contrast, about 57% of

death certificates have only one cause of death mentioned relative to six per cent of hospital records. It should be noted that this six per cent of records with only one cause of death mentioned comprise of death on arrival to health services cases.

2.1.1 Agreement of underlying cause by sex

The relationship between agreement of underlying cause and sex of the deceased is not statistically significant (p=0.168) as per Pearson's $\chi 2$. According to Figures 1.1a and b, agreement of underlying cause is higher for males (59%) relative to females (54%). At face value, this may appear as surprising given that female deaths constitute 51% of the total death records linked (1292). However, on one hand, the numbers of male deaths associated with diseases whose agreement levels are high such as tuberculosis and external causes are higher compared to those of female deaths. On the other hand, numbers of female deaths associated with diseases whose agreement levels are low such as HIV/AIDS, influenza and pneumonia and intestinal infectious diseases are higher compared to those of male deaths. Also, comparatively female hospital records tended to have more diseases reported than those of males, influencing a possible different underlying cause relative to death registration data.

Table 1.1a: Number of hospital records, death certificates and agreement percent for males: Emalahleni linked data for 2003-2005

	Death certificate											
Hospital record	**A00-A09**	**A15-A19**	**B20-B24**	***Other infectious diseases**	**C00-D48**	**E00-E90**	**I00-I99**	**J09-J18**	***Other natural causes**	**V01-Y98**	**Total**	**Agreement with hospital record: %**
A00-A09 Intestinal infectious diseases	**6**	4	0	2	0	1	0	4	4	0	21	**29**
A15-A19 Tuberculosis	3	**166**	0	11	0	2	1	14	15	0	212	**78**
B20-B24 HIV/AIDS	2	17	**12**	9	0	1	3	2	4	0	50	**24**
Other infectious diseases	3	55	0	**13**	0	0	1	8	19	0	99	**13**
C00-D48 Neoplasms	0	0	0	0	**18**	0	0	0	0	0	18	**100**
E00-E90 Endocrine, nutritional and metabolic diseases	0	1	0	0	0	**14**	1	0	2	0	18	**78**
I00-I99 Diseases of the circulatory system	0	0	0	0	0	1	**27**	0	0	0	28	**96**
J09-J18 Influenza and pneumonia	2	16	0	1	0	1	0	**15**	10	0	45	**34**
*Other natural causes	7	19	0	7	0	2	2	6	**49**	3	95	**52**
V01-Y98 External causes of morbidity and mortality	0	0	0	0	0	0	0	0	0	**45**	45	**100**
Total	23	278	12	43	18	22	35	49	103	48	**631**	**59**

Source: Emalahleni in-hospital registered deaths linked to hospital record data for the age group 15-49 for 2003-2005
*Exclude infectious diseases

Table 1.1b: Number of hospital records, death certificates and agreement percent for females: Emalahleni linked data for 2003-2005

	Death certificate											
Hospital record	**A00-A09**	**A15-A19**	**B20-B24**	**Other infectious diseases**	**C00-D48**	**E00-E90**	**I00-I99**	**J09-J18**	**O00-O99**	***Other natural causes**	**V01-Y98**	**Total**	**Agreement with hospital record: %**
A00-A09 Intestinal infectious diseases	**9**	6	0	2	0	0	0	5	0	8	0	30	**30**
A15-A19 Tuberculosis	4	**139**	0	11	0	0	0	17	0	11	0	182	**76**
B20-B24 HIV/AIDS	2	18	**17**	6	0	0	0	6	0	12	0	61	**28**
Other infectious diseases	9	28	0	**15**	0	1	3	17	0	24	0	97	**15**
C00-D48 Neoplasms	0	2	0	0	**21**	0	1	0	0	1	0	25	**88**
E00-E90 Endocrine, nutritional and metabolic diseases	1	0	0	0	0	**16**	0	0	0	2	0	19	**84**
I00-I99 Diseases of the circulatory system	0	0	0	0	0	0	**45**	0	0	0	0	45	**100**
J09-J18 Influenza and pneumonia	8	14	0	4	0	0	0	**18**	0	10	0	54	**33**
O00-O99 Pregnancy, childbirth and puerperium	0	0	0	3	0	0	0	1	**22**	0	1	27	**81**
Other natural causes excluding infectious diseases	10	16	0	16	1	0	5	16	0	**46**	0	110	**42**
V01-Y98 External causes of morbidity and mortality	0	0	0	0	0	0	0	0	0	0	**11**	11	**100**
Total	43	223	17	57	22	17	54	80	22	114	12	**661**	**54**

Source: Emalahleni in-hospital registered deaths linked to hospital record data for the age group 15-49 for 2003-2005
*Exclude infectious diseases

Table 1.1c: Number of hospital records, death certificates and agreement percent associated with the fully-fledged hospital: Emalahleni linked data for 2003-2005

	Death certificate												
Hospital record	**A00-A09**	**A15-A19**	**B20-B24**	**Other infectious diseases**	**C00-D48**	**E00-E90**	**I00-I99**	**J09-J18**	**O00-O99**	***Other natural causes**	**V01-Y98**	**Total**	**Agreement with hospital record: %**
A00-A09 Intestinal infectious diseases	**7**	4	0	3	0	0	0	8	0	7	0	29	**24**
A15-A19 Tuberculosis	3	**28**	0	13	0	1	0	14	0	17	0	76	**37**
B20-B24 HIV/AIDS	1	17	**19**	13	0	0	0	7	0	8	0	65	**29**
Other infectious diseases	7	19	0	**16**	0	1	1	15	0	23	0	82	**20**
C00-D48 Neoplasms	0	1	0	0	**30**	0	1	0	0	1	0	33	**91**
E00-E90 Endocrine, nutritional and metabolic diseases	1	1	0	0	0	**22**	0	0	0	1	0	25	**88**
I00-I99 Diseases of the circulatory system	0	0	0	0	0	1	**46**	0	0	0	0	47	**98**
J09-J18 Influenza and pneumonia	6	17	0	4	0	0	0	**14**	0	11	0	52	**28**
O00-O99 Pregnancy, childbirth and puerperium	0	0	0	2	0	0	0	1	**21**	0	1	25	**84**
*Other natural causes	11	22	0	19	0	1	7	17	0	**52**	3	132	**39**
V01-Y98 External causes of morbidity and mortality	0	0	0	0	0	0	0	0	0	0	**35**	35	**100**
Total	36	109	19	70	30	26	55	76	21	120	39	**601**	**48**

Source: Emalahleni in-hospital registered deaths linked to hospital record data for the age group 15-49 for 2003-2005
*Exclude infectious diseases

Table 1.1d: Number of hospital records, death certificates and agreement percent associated with the medium and small hospitals: Emalahleni linked data for 2003-2005

	Death certificate												
Hospital record	**A00-A09**	**A15-A19**	**B20-B24**	**Other infectious diseases**	**C00-D48**	**E00-E90**	**I00-I99**	**J09-J18**	**O00-O99**	***Other natural causes**	**V01-Y98**	**Total**	**Agreement with hospital record: %**
A00-A09 Intestinal infectious diseases	**8**	6	0	1	0	1	0	1	0	5	0	22	**36**
A15-A19 Tuberculosis	4	**277**	0	9	0	1	1	17	0	9	0	318	**87**
B20-B24 HIV/AIDS	3	18	**10**	2	0	1	3	1	0	8	0	46	**22**
Other infectious diseases	5	64	0	**12**	0	0	3	10	0	20	0	114	**11**
C00-D48 Neoplasms	0	0	0	0	**9**	0	0	0	0	0	0	9	**100**
E00-E90 Endocrine, nutritional and metabolic diseases	0	0	0	0	0	**8**	1	0	0	3	0	12	**67**
I00-I99 Diseases of the circulatory system	0	0	0	0	0	0	**26**	0	0	0	0	26	**100**
J09-J18 Influenza and pneumonia	4	13	0	1	0	1	0	**19**	0	9	0	47	**40**
O00-O99 Pregnancy, childbirth and puerperium	0	0	0	1	0	0	0	0	**1**	0	0	2	**50**
*Other natural causes	6	14	0	4	1	1	0	5	0	**43**	0	74	**59**
V01-Y98 External causes of morbidity and mortality	0	0	0	0	0	0	0	0	0	0	**21**	21	**100**
Total	30	392	10	30	10	13	34	53	1	97	21	**691**	**63**

Source: Emalahleni in-hospital registered deaths linked to hospital record data for the age group 15-49 for 2003-2005
*Exclude infectious diseases

Variation of agreement of underlying cause by cause of death is apparent for both males and females. Low agreement levels are observed for all infectious diseases except tuberculosis for both males and females. However, what may have an influence on the lower agreement level for female deaths may be the lower agreement for other natural causes (42%) compared to a borderline agreement level (52%) for male deaths. Besides, although agreement levels for tuberculosis and neoplasms are high for both males and females, agreement levels for these diseases are lower for females relative to males.

2.1.2 Agreement of underlying cause by hospital of death

Contrary to sex, the relationship between agreement of underlying cause and hospital of death is statistically significant (p=0.0001) as per Pearson's χ^2. Also, the difference between overall agreement levels for the fully-fledged and medium and small hospitals is larger than that for males and females. Agreement favours medium and small hospitals (63%) compared to the fully-fledged hospital (48%). This is unexpected, given that the fully-fledged hospital is considered to be efficient and better equipped with medical facilities. However, the functioning of this hospital may be adversely affected by overcrowding since it is the referral hospital for the whole Mpumalanga Province. Also, constraints of exodus of medical personnel from this province not only to abroad but to other better equipped provinces such as Kwa-Zulu Natal and Gauteng prevails ('Interview with Mpumalanga Mirror', 01 February 2008).

Agreement for tuberculosis is much higher (87%) for death records associated with the medium and small hospital relative to (37%) for death records associated with the fully-fledged hospital. This may be due to the high number of tuberculosis deaths linked to the Specialised TB Hospital grouped with the medium and small hospitals. However, in contrast, agreement for HIV/AIDS is lower (22%) for deaths associated with the medium and small hospitals relative to (29%) of deaths associated with the fully-fledged hospital. One reason for this is that medium and small hospitals may not have adequate medical facilities for diagnosis and testing of diseases such as HIV/AIDS. As a result, patients who are on antiretroviral treatment and are transferred to the Specialised TB Hospital for tuberculosis treatment are admitted with their HIV/AIDS medication which is administered by the referral hospital. Upon death, the referral hospital does not report HIV/AIDS as one of the causes of death since they were not involved in the testing. In some cases, such information is recorded on the hospital record with other morbid conditions.

2.2 Misclassification of causes of death

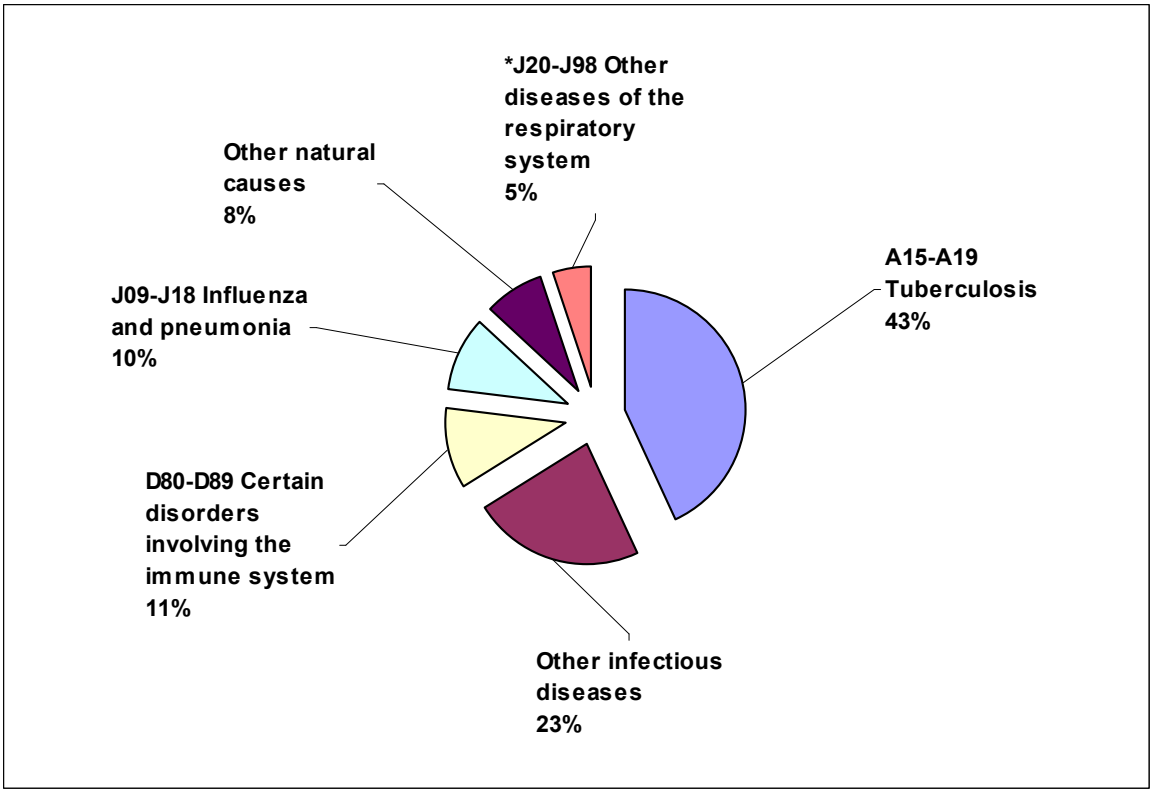
There are several factors that influence misclassification of causes of death. Type of disease, circumstances of death, qualifications and skills of the certifier, and the availability of diagnostic aids are some of the factors influencing misclassification of causes of death (Khosravi et al. 2009, p 1). In The Times (24 May 2009), shambles of the public health system in South Africa were blamed

on mismanagement and misallocation of resources. Other attributes to the collapsing health system were reportedly lack of diagnostic services and lack of incentives for doctors. Given the above mentioned state of public hospitals in a country where one doctor is expected to serve about 3800 people, hospital records are not expected to be of good quality either.

2.2.1 Deaths due to HIV/AIDS on hospital records that are misclassified on death certificates

Deaths due to HIV/AIDS on hospital records were largely misclassified. More than half of these deaths were misclassified to tuberculosis and, influenza and pneumonia on death certificates as presented in Figure 1.2. This confirms the notion that deaths due to HIV/AIDS are misclassified to tuberculosis and pneumonia. However, the finding that HIV/AIDS is also misclassified to other diseases is new information. Prominent diseases within other natural diseases to which HIV/AIDS deaths are misclassified are diseases of the nervous system and digestive diseases.

Figure 1.2: Percentages of misclassified deaths due to HIV/AIDS in Emalahleni (**N = 82**)



Source: Emalahleni in-hospital registered deaths for the age group 15-49 in 2003-2005 linked to hospital records

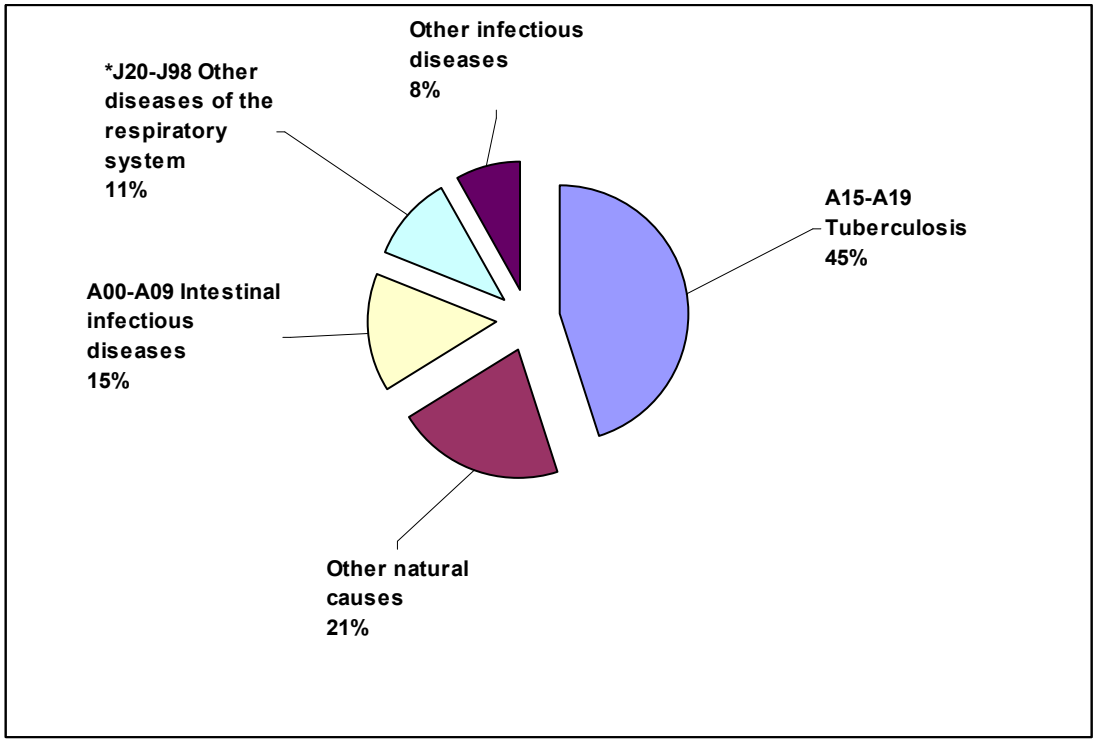
*All diseases of the respiratory system excluding influenza and pneumonia

2.2.2 Deaths due to influenza and pneumonia on hospital records that were misclassified on death certificates

Figure 1.3 shows that of the 66 deaths due to influenza and pneumonia on hospital records, about

two thirds were misclassified to infectious diseases on death certificates. Prominent diseases to within natural causes to which deaths due to influenza and pneumonia on hospital records are misclassified to are certain disorders involving the immune system, diseases of the nervous system and to a lesser extent, ill-defined causes.

Figure 1.3: Percentages of misclassified deaths due to influenza and pneumonia in Emalahleni (**N = 66**)



Source: Emalahleni in-hospital registered deaths for the age group 15-49 in 2003-2005 linked to hospital records

*All diseases of the respiratory system excluding influenza and pneumonia

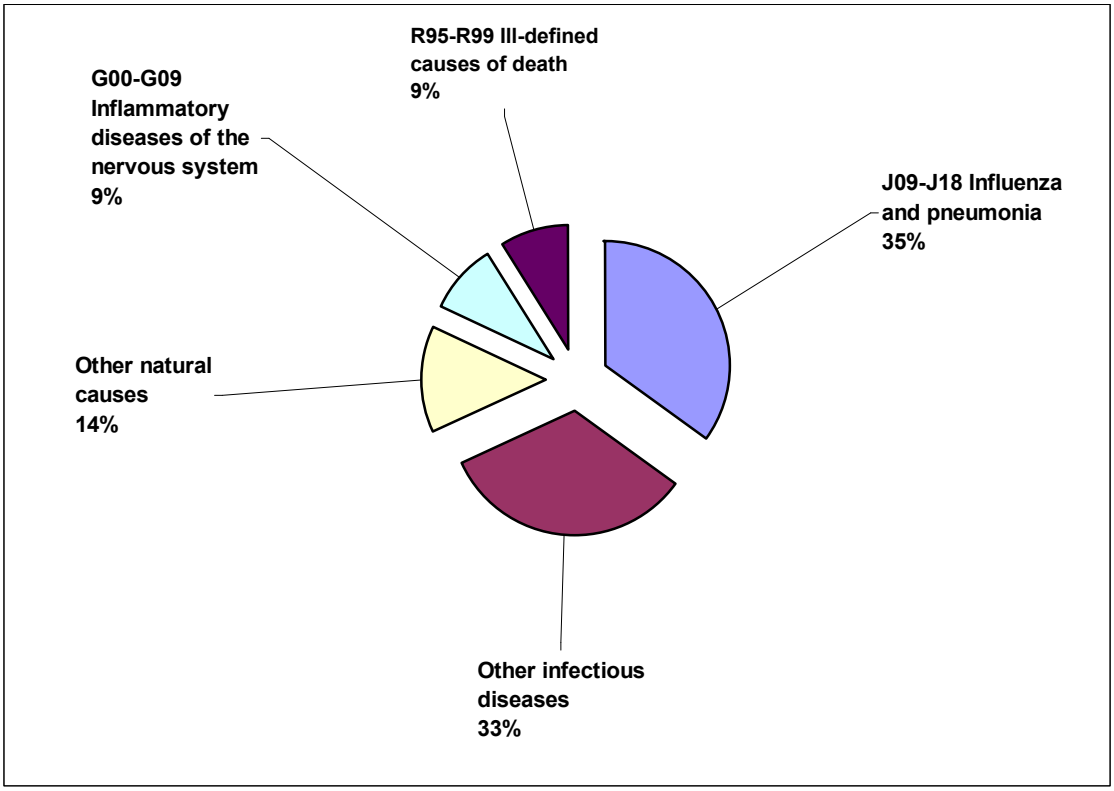
This finding of deaths due to influenza and pneumonia being misclassified to other diseases on the death certificates provides new information. It appears that deaths due to tuberculosis as well as those due to influenza and pneumonia are likely to be misclassified to and from. This may probably be due to co existence of both diseases in some of the patients, where one of these diseases may be more prominent than the other, thereby been chosen as the underlying cause upon death certification.

It is also worth mentioning that there are no deaths that were misclassified to HIV/AIDS on death certificates. This is expected given anecdotal reports of doctors being threatened by family members in cases where funeral and life insurance policies exclude cover for death from HIV/AIDS (Groenewald et al. 2004, p. 199).

2.2.3 Deaths due to tuberculosis on hospital records that were misclassified on death certificates

According to Figure 1.4, deaths due to tuberculosis on hospital records are likely to be misclassified equally to other infectious diseases and, influenza and pneumonia on death certificates. Except ill-defined causes, all mentioned diseases to which tuberculosis deaths are misclassified on death certificates seem to be somehow related to HIV/AIDS. However, there is a need to examine proportions of deaths due to HIV related diseases versus deaths due to diseases not related to HIV for both death certificate and hospital data.

Figure 1.4: Percentages of misclassified deaths due to tuberculosis in Emalahleni (N = 89)



Source: Emalahleni in-hospital registered deaths for the age group 15-49 in 2003-2005 linked to hospital records

*All diseases of the respiratory system excluding influenza and pneumonia

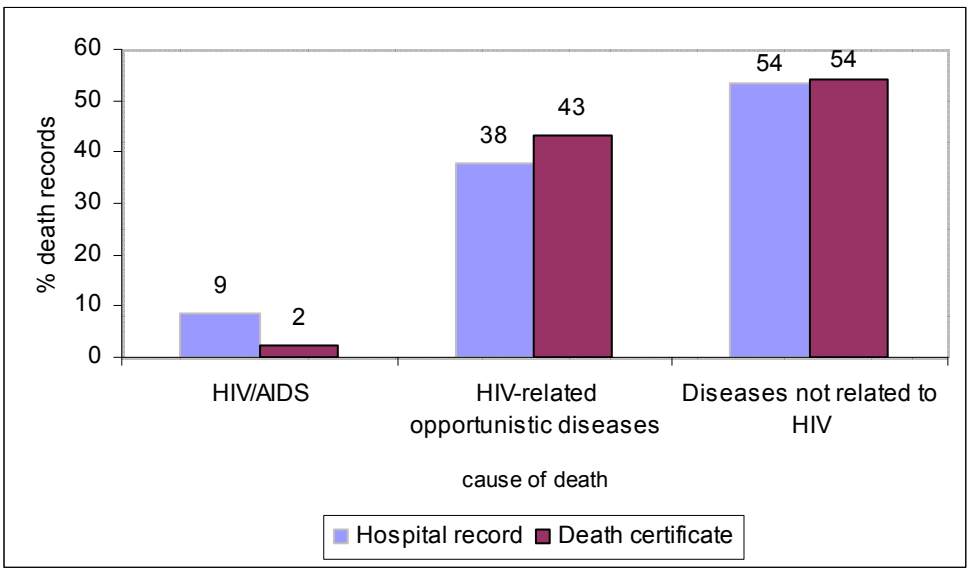
2.3 HIV/AIDS and related opportunistic diseases

According to UNAIDS (1998, p. 2), opportunistic diseases in a person with HIV are the products of two things: the person's lack of immune defenses caused by the virus, and the presence of pathogens in our daily environment. Worldwide distribution of HIV-related opportunistic diseases is highly varied. However, tuberculosis remains the leading HIV-related opportunistic disease in developing countries. For the purpose of grouping, HIV-related opportunistic diseases for hospital records and death registration data, this study uses the partial list of the world's most common HIV-related opportunistic diseases. UNAIDS provide the following list:

- Bacterial diseases such as tuberculosis, mycobacterium avium complex, bacterial pneumonia and septicaemia (blood poisoning)
- Protozoal diseases such as pneumocystis carinni (PCP), toxoplasmosis, microsporodiosis, cryptosporiodosis, isosporiasis and leishmaniasis
- Fungal diseases such as those caused by candidiasis, cryptococcal meningitis and penicilliosis
- Viral diseases such as those caused by cytomegalovirus, herpes simplex and herpes zoster virus
- HIV-associated malignancies such as Kaposi's sarcoma, lymphoma and squamous cell carcinoma.

Results of the grouping of HIV-related diseases are shown in Figure 1.5. Proportions of death due to diseases not related to HIV for hospital records and death registration data are equal at 54% each. This suggests that similarly, deaths due to HIV-related (with HIV/AIDS included) opportunistic diseases for the two data sets are also equal at 46% each. Therefore, a 100% agreement of underlying cause considering causes of death grouped by HIV-related status is implied. Although this finding is unexpected given low agreement levels of the underlying cause and misclassification of several diseases on death certificates, it provides some relief. Overall, when deaths are grouped into two broad groups of HIV-related (with HIV/AIDS included) and not HIV-related for both data sets, the quality of cause of death information reproduced from hospital records to death certificates is good.

Figure 1.5: Comparison of percentages of deaths by HIV-related status between hospital records and death certificates



Source: Emalahleni in-hospital registered deaths for the age group 15-49 in 2003-2005 linked to hospital records

Notwithstanding, On one hand, the proportion of deaths due to HIV/AIDS on death certificates is lower relative to hospital records as shown in Figure 1.5. On the other hand, the proportion of deaths due to HIV-related opportunistic diseases is higher for death certificates relative to hospital records. This suggests that deaths due to HIV/AIDS are misclassified to HIV-related diseases on death certificates.

Conclusions

Consistency of underlying cause between hospital records and death certificates varies from low to high depending on the level of aggregation of diseases. Since even the individual diseases as per the ICD10 are also aggregated from a number of specific diseases, all diseases in this study are classified in some way. This is also evident in the standard three-digit level coding used for coding causes of death. Therefore, the broader the classification, the higher the agreement of the underlying cause between hospital records and death certificates in Emalahleni in 2003-2005.

On one hand, HIV/AIDS remains the main cause of death more likely to be misclassified to other diseases on the death certificates, followed by influenza and pneumonia, which is more pronounced for female deaths. On the other hand, there are no causes of deaths that are misclassified to HIV/AIDS on death certificates. In fact, tuberculosis seems to have been the beneficiary of majority of causes of deaths misclassified. This explains the ever number one ranking of tuberculosis as a leading cause of death.

Also, deaths that are assigned to ill-defined causes on death certificates are mainly due to tuberculosis on hospital records. This finding is contrary to the notion that HIV/AIDS deaths may be reported as ill-defined causes on death certificates. However, since some of the tuberculosis deaths on hospital records may actually be HIV/AIDS deaths, the notion may still be valid.

This study found that HIV/AIDS deaths are misclassified to several other diseases on death certificates, contrary to the belief that deaths due to HIV/AIDS are misclassified to tuberculosis and pneumonia on death certificates. Again, several other diseases other than HIV/AIDS are also misclassified on death certificates. Finally, the study concludes that low data quality in hospitals depicts the dire state of public hospitals nationally. Notwithstanding, these finding refers to the reproducibility of cause of death information from hospital records to death certificates. Also, the findings refer to the age group 15-49 in Emalahleni in 2003-2005 and cannot be generalised to other places and other times in South Africa.

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