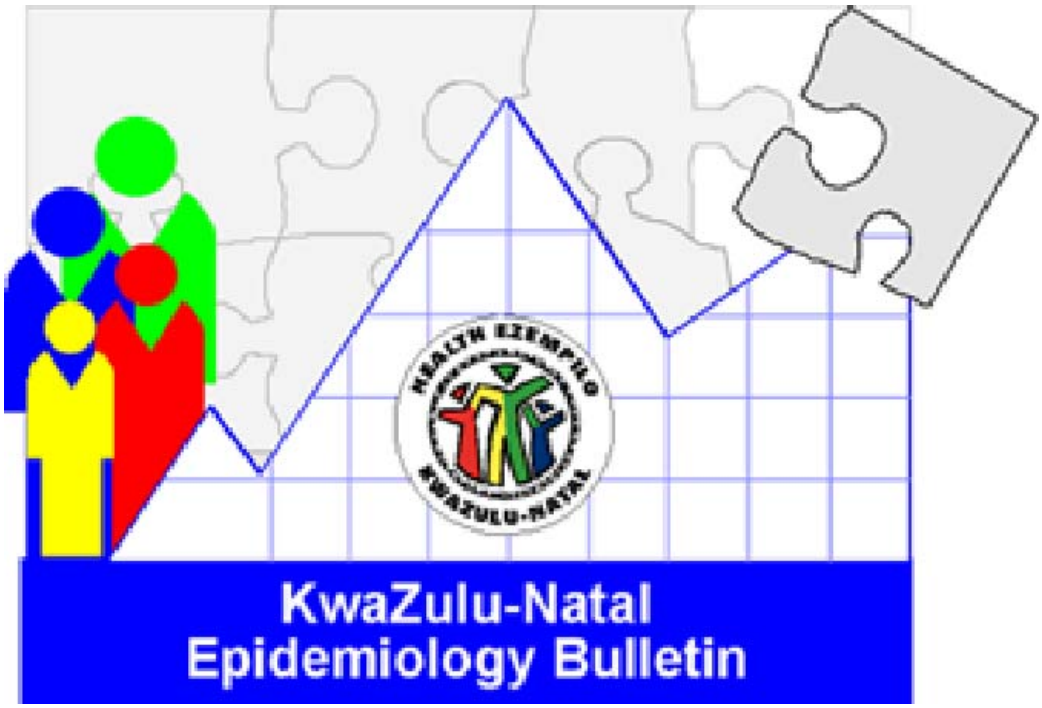

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Burden of Mortality in KwaZulu-Natal

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Editorial

Public Health systems are perceived as monolithic resource hungry structures that provide a defined set of services based on historic service demand patterns. The question then raised is, "**How do health systems respond to changing health needs?**"

Health systems can change gradually through an increase in demand for services if access is not limited by administrative controls such as user fees or referral patterns. Change can also be planned through re-structuring stimulated by change in policies, management structures, changing health profiles or a combination of the above factors.

Setting strategic priorities for a health system is difficult but is an important driver for planning within a health system. Often the competing needs for financial efficiency, service coverage and political ideology dominate the planning landscape with changing health profiles being relegated to a secondary role due to the lack of accurate and reliable data on health profiles to inform planning.

The World Health Report in 1993, (Investing in Health, World Bank) identified the need for health systems to establish health priorities and respond accordingly by means of identifying the national Burden of Disease and financing appropriate cost-effective interventions. However the methodology recommended was criticized for being data intensive and technically demanding which put it beyond the reach of most countries without sophisticated systems of data collection and resources to collect and analyse the data.

South Africa reviewed the vital registration system for births and deaths in 1994. Since the implementation of the new births and deaths forms, there have been gradual improvements in the quality and coverage and completeness of the data. This valuable data source has experienced problems in disease coding delaying the timeous analyses and release of health statistics. Analyses of many synergistic data sources, including the mortality data from StatsSA, made this report possible.

The analysis of mortality data at district level is a breakthrough for establishing district health planning priorities. In addition, identifying typologies of districts, allows for resource allocation and co-ordination of planning initiatives according to the burden of disease profile. It is hoped this report provides the foundation for district priority setting required for planning and budgeting.

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ACRONYMS & DEFINITION OF TERMS

ARV	Antiretroviral therapy
ASSA03	Actuarial Society of South Africa AIDS Demographic Model version 2003
BOD	Burden of Disease
DHIS	District Health Information System
DHS	Demographic and health Survey
DOH	Department of Health
KZN	KwaZulu-Natal
ICD-10	International Classification of Diseases

AKNOWLEDGMENT

This issue of the Epidemiology Bulletin is a joint product of the KwaZulu-Natal Department of Health and the Italian Cooperation, which provided the funds for the printing and the technical support for the analysis. The authors are Dr Venanzio Vella, Epidemiologist of the Italian Co-operation and Dr Thilosini Govender principal Epidemiologist of the DOH. The Africa Centre provided the data on Hlabisa while the 12% sample of death certificates are from StatisticsSA. The ASSA model is the version 2003.

Abstract

Available data sources were analyzed to estimate the burden of mortality in KZN and its districts in the early 2000s. The data is based on representative samples of death certificates and hospital discharges for KZN, a cohort study from the district of Hlabisa and the prediction of the ASSA model version 2003. HIV/AIDS was the first cause of death and its burden is under-estimated because many of these deaths were recorded under TB, diarrhoea, respiratory infections and meningitis. Chronic degenerative diseases accounted for more than one third of the mortality, with cardiovascular diseases being the major contributor. Male mortality was more characterized by ischaemic heart diseases, intentional and unintentional injuries, chronic respiratory diseases, lung cancer and cirrhosis. Females were more frequently dying from stroke, hypertension and diabetes.

A high proportion of deaths from AIDS occurred in hospitals. Of the expected 45,000 deaths caused by HIV/AIDS and TB in 2001, about 30,000 occurred in hospitals, making these two causes over-represented compared to other causes in the hospital mortality. Also a high proportion of the mortality caused by perinatal and nutritional conditions was captured by the hospitals. On the other hand, only a minor proportion of the deaths due to cardiovascular diseases and injuries occurred in hospitals.

The provincial mortality rates were extrapolated to the demographic structure of the districts to build the districts' burden of mortality. The similarity between the mortality of Zululand district and that one of the cohort study in Hlabisa, suggested that the extrapolation could be used to build district profiles. As expected, eThekwini and Umgungundlovu contributed more than 40% of total mortality in KZN. Without considering issues related to equity, a concentrated effort on these two districts would have the potential of obtaining the highest impact. The first causes of mortality were: (a) AIDS, unintentional injuries and respiratory infections in eThekwini and Amajuba; (b) AIDS and stroke in Umgungundlovu and Ugu districts and (c) AIDS, diarrhoea, respiratory infections, unintentional injuries and stroke in the other districts.

The major burden of mortality could be prevented if the resources were used efficiently. Although prevention of risk factors is the long-term solution, it is difficult to change ingrained behavior. Curative treatment against HIV/AIDS and TB remains the short-term solution and they could reduce most of the mortality, if guidelines were efficiently implemented. But this is not the case, as confirmed by the low cure rate and the epidemic of extremely drug resistant TB (XDR). More information is urgently required to monitor the insurgence of new XDR cases but especially to identify inefficiencies in the implementation of the TB programme. Evidence-based medicine can become ineffective if guidelines are not properly implemented. Therefore, better documentation is needed on the critical mix of inputs and outputs required to meet the minimum conditions of effectiveness in everyday medical practice. It is critical to monitor what is happening in operational settings to identify solutions to management problems and to transfer the efficacy found in ideal conditions into operational effectiveness.

Introduction

Mortality statistics is needed for planning but it is hard to get. The provincial Department of Health (DOH) of KZN does not have direct access to the individual records related to the death certificates. The mortality data are processed by StatisticsSA, which does not release the electronic datasets. The most recent mortality statistics is related to 2004 but it is characterized by the absence of HIV/AIDS among the first 10 causes of deaths, and by 16% of mortality caused by TB. This is a clear example that published statistics are reporting the immediate cause of death found on the death certificates instead of trying to identify the underlying cause. It is highly unlikely that 16% of mortality is due to TB and that HIV/AIDS is not even among the first causes of death. There is sufficient scientific evidence that most TB patients are also HIV positive and that about 80% of TB mortality is associated with HIV. Another problem with the published mortality statistics is the presentation of the number of deaths for the first 10 causes only, clustering the remaining half into "other conditions". Last but not least, district profiles of mortality are not available because the maximum disagregation of the statistics is by province.

One major problem in the analysis of the burden of mortality is the assignment of the most likely underlying cause of death. This has policy and planning implications, because without tackling the roots of the problem, mortality will continue to increase. For example, most deaths from TB cannot be avoided with TB treatment alone because most of these patients are HIV positive and they will become sick again due to the decline in CD4. Not properly considering the underlying cause of death, leads to the misleading conclusion that treating TB without dealing with HIV/AIDS through antiretroviral therapy (ARV) would reduce mortality. This would not reduce mortality because of the repeated bouts of infections and would also increase extremely drug resistance (XDR) TB deteriorating further the chance of treating even HIV negative TB. That this might be the case is demonstrated by the recent epidemic of extremely drug resistance (XDR), which is associated with almost 100% mortality. The selection of XDR strains are inevitable if ARV is ignored as the underlying problem because the persistent low levels of CD4 will be accompanied by TB re-infection and selection of XDR TB strains.

Therefore, any analysis of mortality needs to re-assign the underlying cause by assessing trends, using evidence from secondary sources and using epidemiological modeling. This is done by the present Issue of the Epidemiology Bulletin, which has applied the Burden of Disease (BOD) methodology to the dataset of a representative sample of death certificates related to the period 1997-01. The analysis has taken into account the potential misallocation of the underlying cause of death and the under-registration of mortality. The provincial mortality rates have been extrapolated to the demographic structure of each district to obtain district mortality profiles. Although the analysis did not take into account the district variation in race, urbanization and other risk factors, the low variation of these factors in most districts is unlikely to affect the estimation of the most frequent causes of death.

Methodology

The Burden of Disease (BOD) methodology was used to estimate the most likely underlying cause of death. Although each death certificate should contain the immediate (e.g. sepsis), intermediate (e.g. diabetic foot) and underlying causes of death (e.g. diabetes), it is frequently found that only one of these cause is mentioned on the death certificate. It is therefore critical to use epidemiological methods to assess if the cause mentioned on the death certificate is the immediate, intermediate or the underlying cause that started the train of events leading to death, and without which deaths could have been avoided. Correctly identifying this cause is important to select the priority interventions to tackle the roots of the problem. Each record was assigned a unique underlying cause of death (e.g. ischaemic heart), records were aggregated into categories (e.g. cardiovascular) and categories into Groups (e.g. non communicable). Group I included communicable, perinatal, maternal and nutritional diseases; Group II was composed of non-communicable diseases and Group III was related to injuries.

The analysis was based on the following steps:

(a) Frequency distribution of the ICD-10 codes as originally reported on the death certificates;
(b) Reassignment of the most likely underlying cause according to the change in mortality between 1997 and 2001. This allowed to identify clear inconsistencies due to the incorrect assignment of the underlying cause of death and to reallocate the most likely underlying cause of death;
(c) Reassignment of the ill-defined causes within a disease category. For example cardiac failure was reassigned according to the age and gender proportional distribution of the known cardiac causes except stroke;
(d) Age and gender proportional reassignment of the "ill-defined" causes to the known diseases of Group I and Group II;
(e) Validation of the mortality rates against secondary data (e.g. Hlabisa, ASSA version 2003).
(f) Age and gender specific mortality estimates for KZN in 2001;
(g) Comparison between population and hospital mortality for KZN in 2001;
(h) KZN mortality estimates after 2001;
(i) Extrapolation of the provincial mortality estimates to the district demographic structures to produce the district mortality profiles.

There were provincial and district data sources:

(a) The analysis was carried out on a representative sample of 12% of death certificates related to KZN for the period 1997-01. StatisticsSA released this data set to provide the opportunity for a preliminary analysis before the completion of the full sample.
(b) The provincial Hospital Discharge Survey was used to estimate the fraction of population mortality occurring in hospital. This survey was carried out in 2003 by the Epidemiology Unit and the Italian Cooperation on a representative sample

of medical records from all the hospitals in KZN. The underlying cause of each death in the hospitals was given independently double blind by two medical doctors on the basis of the medical history.

(c) The provincial age and gender specific mortality rates were applied to the age and gender structure of the district population of Zululand and validated against the mortality profile of the Hlabisa cohort study. This study has been ongoing since the year 2000 and although it only covers a small area of Zululand it was the only secondary data to validate the extrapolation of the provincial rates to a district population.

Results

Mortality has been increasing in the age groups which has been most affected by HIV/AIDS. Figure 1 represents the proportion of total deaths, which occurred in each age group, according to the 12% sample of death certificates. The proportion of annual deaths occurring between 15 and 54 years of age has been increasing monotonically between 1997 and 2001, which is similar to the predictions of the ASSA model version 2003 (ASSA03) in Figure 2.

Figure 1 & 2 Proportional mortality in each age group 1997-01, KZN, 12% sample

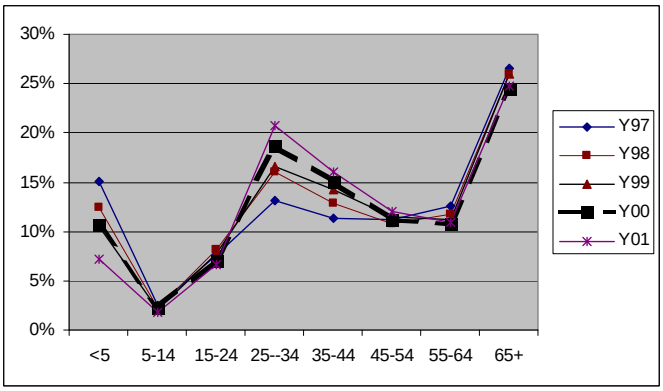
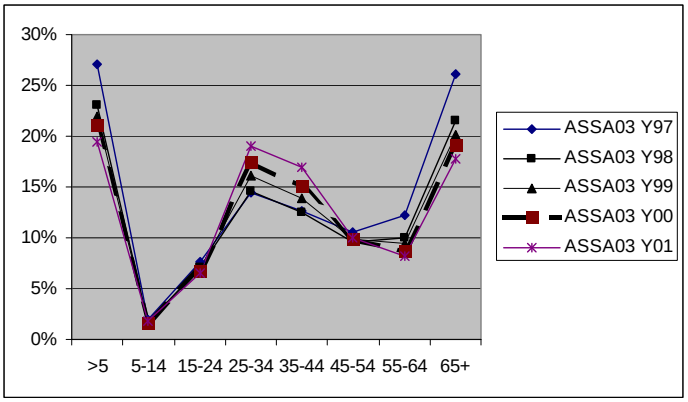


Figure 2 Proportional mortality in each age group 1997-01, KZN, ASSA 2003



AIDS mortality was hidden under other communicable disease. Figure 3 shows the proportional mortality due to the three BOD groups according to the 12% sample. Groups I and II contributed an almost equal share of mortality in 1998, while the remaining 15% was due to Group III (injuries). Between 1998 and 2001, the proportion of deaths due to Group I increased from 40% to about 50%, while Group II and Group II declined. Figure 4 shows that, according to the predictions of ASSA version 2003, the proportion of total deaths due to AIDS increased from 24% to 44% between 1998 and 2001 while the rest of the other causes declined from 77% to 56%. This suggests that the AIDS share of mortality in Figure 4 is likely to have been increasingly contributed to the mortality from diseases related to Group I in Figure 3. The rest of the mortality in Figure 4 reflects the mortality from Group II and III in Figure 3.

Figure3 Proportional mortality, according to the 12% sample, KZN, 2001

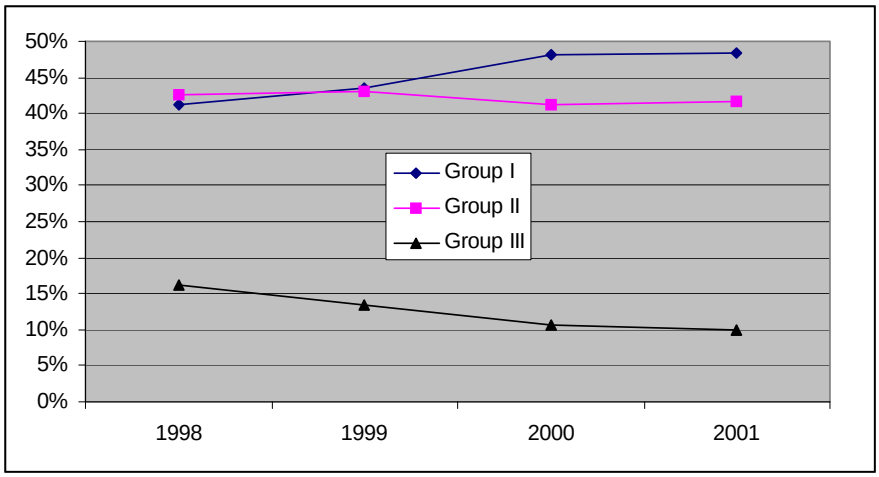
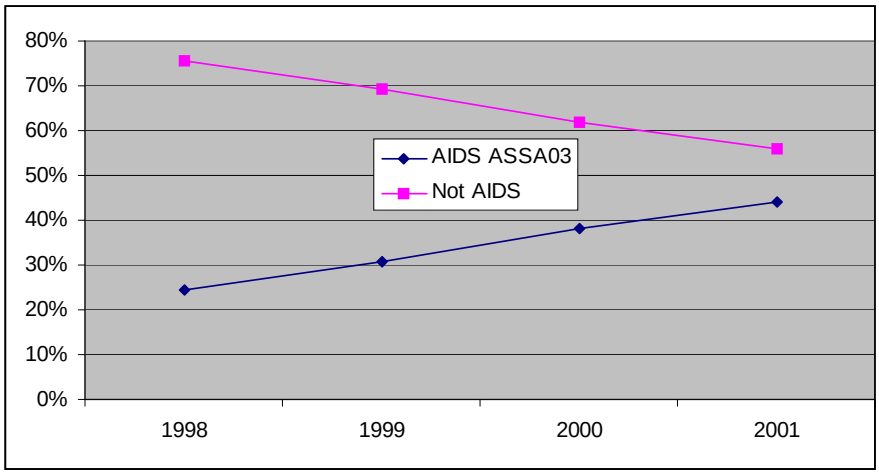
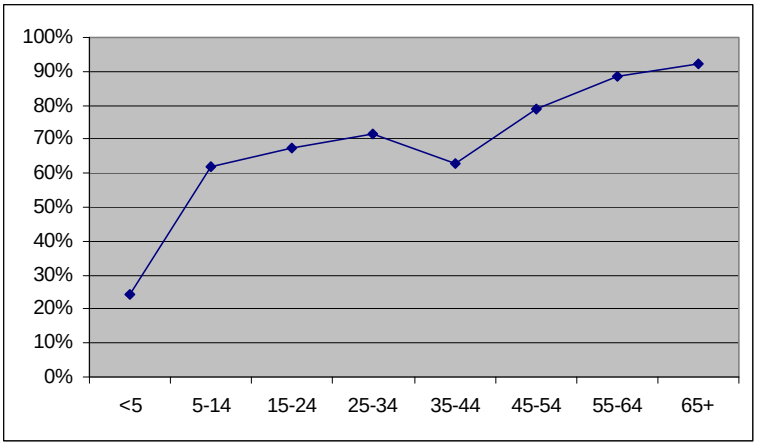


Figure 4 Proportional mortality due to AIDS according to ASSA03



Mortality was under-reported among children and adults. Figure 5 shows the number of deaths estimated for 2001 according to the inflation of the 12% sample versus the prediction of ASSA03 for the same year. Less than 10,000 child deaths were recorded versus the 30,000 expected in this age group by ASSA03. The under-registration improved with age, with a slight dip for the deaths, which occurred between 35 and 44 years of age.

Figure 5 Under-registration of certified deaths, KZN, 2001



The proportion of deaths due to HIV/AIDS was underestimated. Figure 6 shows that the proportional mortality coded under B20-B24, which is the ICD10 code for HIV/AIDS, increased in almost all age groups between 1997 and 2001. This situation, which is based on the original coding found on the death certificate suggest that the major problem is related to the correct assignment of the underlying cause. The fact that the increase in the proportion of death recorded as HIV/AIDS did not increase between 1997-01 in the 25-34 age group is inconsistent with the age pattern shown in Figures 1 and 2, where this age group was especially hit by increased mortality. This is also inconsistent with what was predicted by the ASSA epidemiological model, according to which the proportional mortality due to HIV/AIDS increased substantially between 25 and 44 years of age (Figure 5).

The above-mentioned discrepancy is due to the wrong assignment of the underlying cause of death. Figure 7 shows that the proportional mortality for TB, respiratory infections, diarrhoea and meningitis increased between 15-64 years of age groups between 1997-01. The hypothesis that such increase is due to HIV/AIDS is strengthened by the fact that this age group is the most affected by HIV prevalence and these diseases are typically associated with HIV/AIDS. Furthermore, the fact that besides these specific causes, mortality for other causes did not increase between 1997-01, strengthen the hypothesis that HIV was behind such increase. Therefore, the extra mortality under the age of 65 for the above-mentioned diseases was reassigned to HIV/AIDS as underlying cause of death.

Figure 6 Proportion of death due to AIDS, in 1997 and 2001, KZN, 12% sample

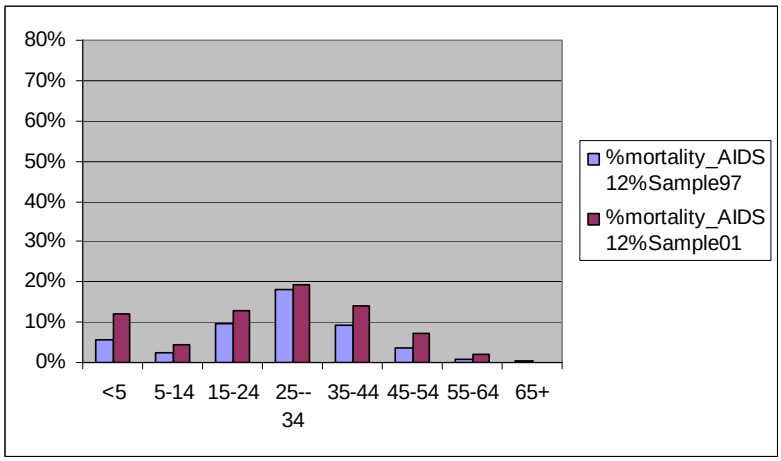


Figure 7 Proportion of deaths due to AIDS, in 1997 and 2001, KZN, ASSA 2003

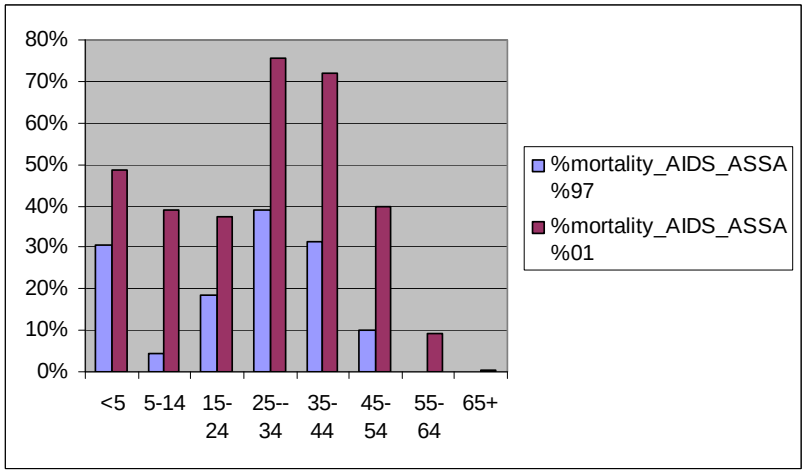
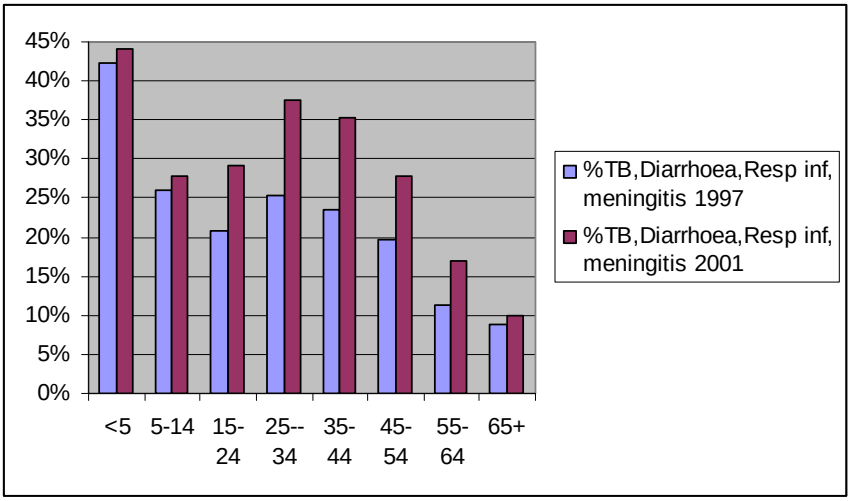


Figure 8 Proportion of deaths due to TB, in 1997 and 2001, KZN, 12% sample



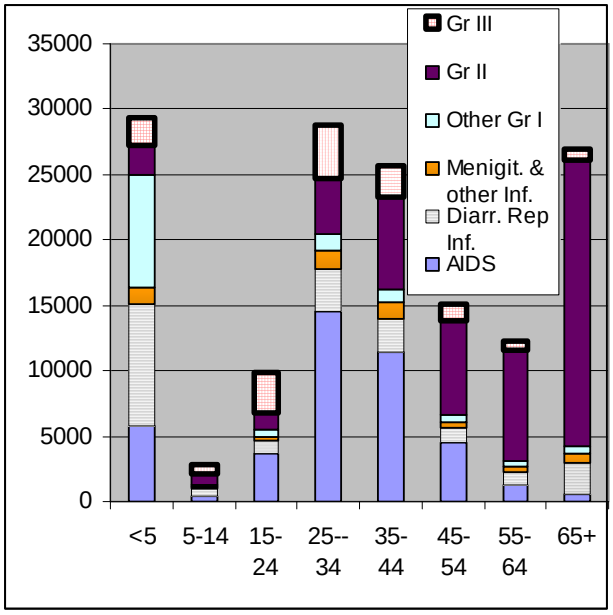
Eighty per cent of the mortality from TB was reassigned to HIV/AIDS according to the estimation of HIV prevalence among patients dying from TB. The literature has reported that about 80% of TB patients are HIV positive and this has been confirmed by the Hlabisa study, which found that about 80% of the TB deaths under the age of 55 were associated to HIV.

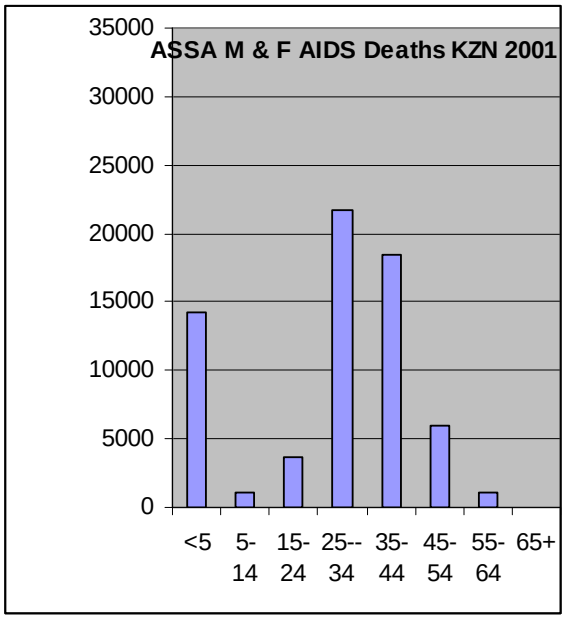
Notwithstanding the reassignment of the underlying causes and the adjustment for the under-registration, the impact of HIV/AIDS was still under-estimated. The expected number of deaths by cause in each age group in Figure 9 was compared with the expected number of deaths due to HIV/AIDS predicted by ASSA03 for 2001 in Figure 11. The number of AIDS deaths was in line with the predictions of ASSA03 for most age groups with the exception for children and for adults who died between 25 and 44 years of age. To reach the 15,000 child deaths due to AIDS predicted by ASSA it would be necessary to add the deaths due to diarrhea and respiratory infections. The number of AIDS deaths predicted by ASSA03 for the age group 25-44 corresponds to all the deaths under Group I in Figure10. Most child deaths recorded under diarrhoea and respiratory infections and most deaths recorded under Group I between the age of 25 and 44 were probably caused by HIV.

These findings are represented in Figures 11-12, which present the burden of mortality due to AIDS, Group I likely to be due to HIV, rest of Group I not caused by HIV, Group II and Group III. The proportional mortality by BOD Groups shows that HIV is behind 42% of mortality directly causing AIDS and other diseases of Group I. The rest of Group I, Group II and Group III cause respectively 13%, 35% and 10% of mortality. In proportional term, males are almost three times more affected by injuries compared with females, which are more affected by the HIV/AIDS, Group I and Group II.

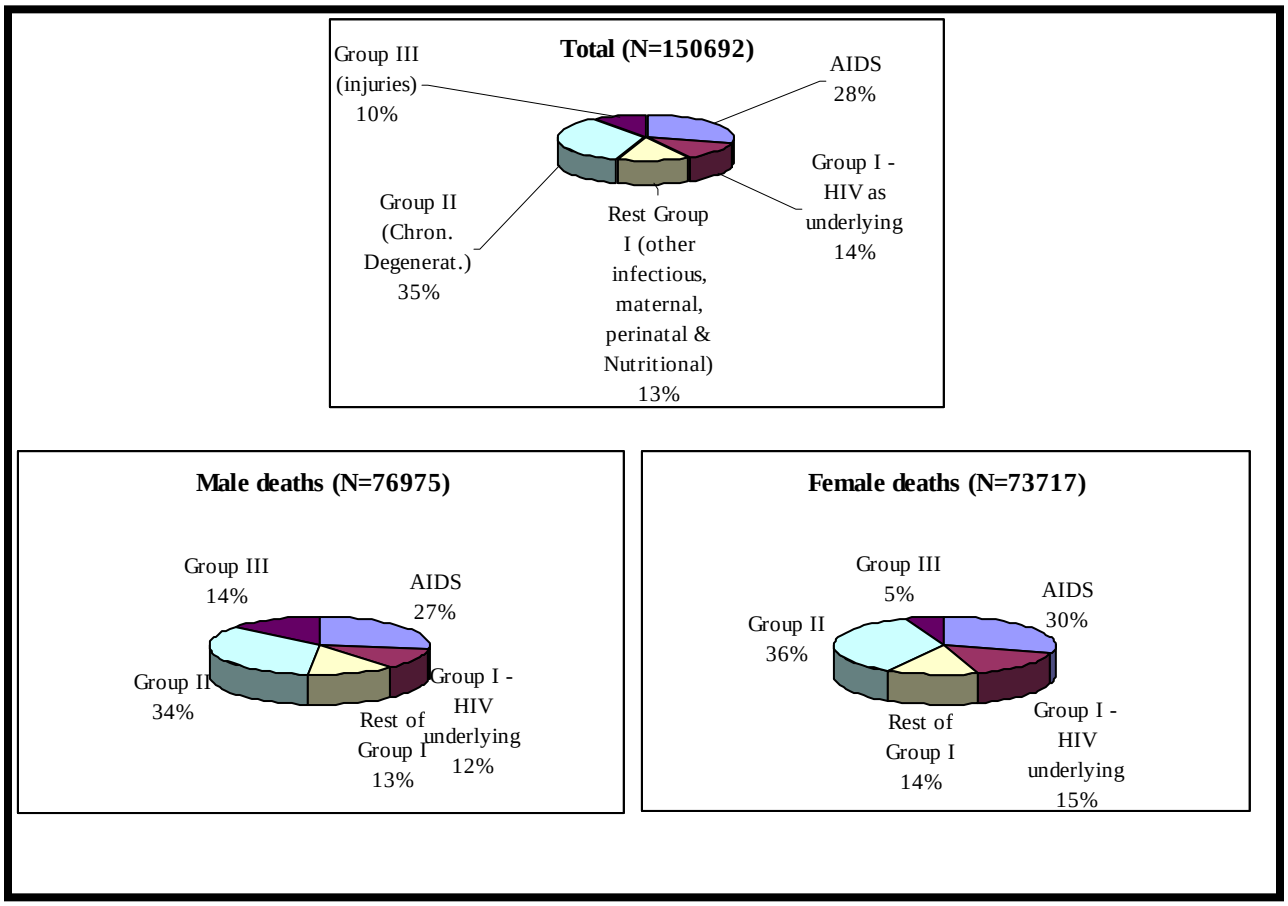
Figure 13 ranks the expected number of death by cause among males and females for 2001 in KZN. HIV/AIDS contributed by far the highest number of deaths in 2001, especially considering that most deaths due to respiratory infections, diarrhoea and meningitis were due to HIV. Stroke, ischaemic heart, hypertension and other cardiovascular diseases were the second major block of diseases causing a high burden of mortality. The other major causes of death were injuries, chronic respiratory diseases, diabetes, TB without HIV, other infections and malignant neoplasms. Males were dying more frequently than females from injuries, chronic respiratory diseases, cancer of the lung, TB, cancers of the gastrointestinal tract and cirrhosis. Females were dying more than males from stroke, hypertension and diabetes. The above causes reflect the higher prevalence of violence, smoking and alcohol consumption among males; and obesity and hypertension among females.

Figures 9 and 10 Mortality according to the 12% sample and ASSA03, KZN, 2001



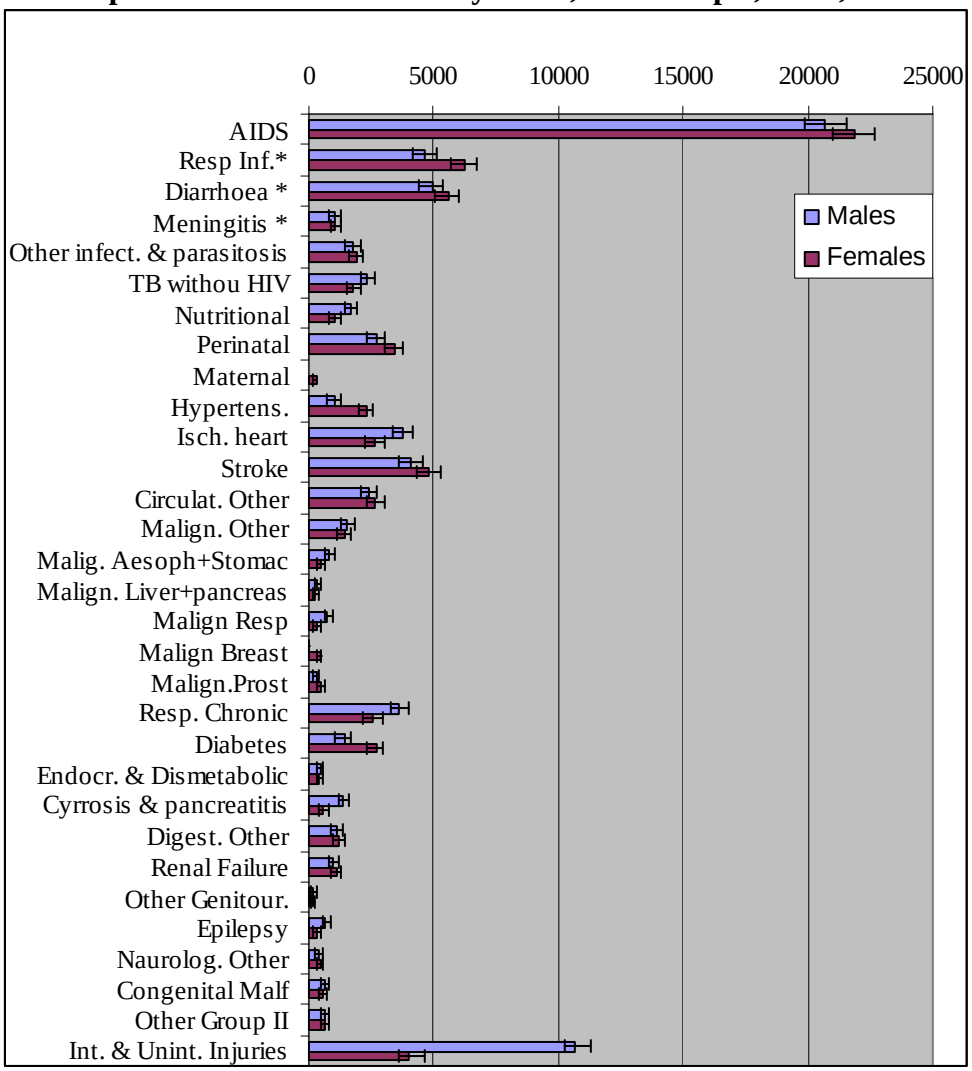


Figures 11-13 Burden of mortality, KZN, 2001



The mix of both communicable and non-communicable diseases poses serious challenges to the DOH. The persistence of infectious and chronic degenerative diseases is known as epidemiological transition. The communicable diseases are mainly the result of HIV, while the non-communicable diseases are the result of smoking, alcohol and high fat consumption, and other risk factors of lifestyle. This pattern poses a particular challenge to the health sector because lifestyle is difficult to change and because most of these diseases require long-term treatment.

Fig 12 Expected number of deaths by cause, 12% sample, KZN, 2001

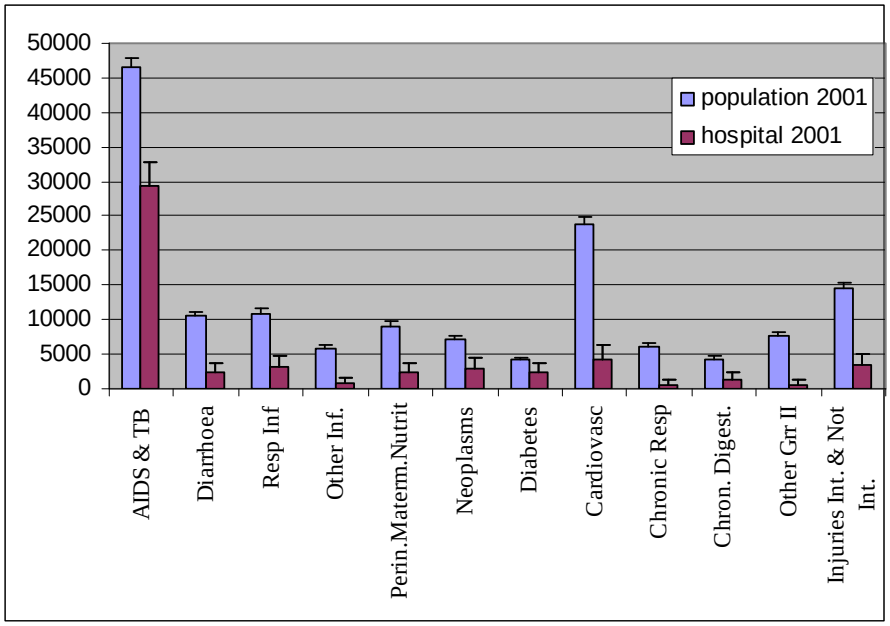


* 74%, 86%, 63% and 44% of deaths respectively recorded as respiratory infections, diarrhoea, meningitis and other infections were likely associated with HIV.

Only a fraction of the mortality in the population occurred in hospitals. Figure 13 compares the expected number of deaths by major causes in the population and in the hospitals in 2001. The estimated population deaths are from the inflation of the 12% sample after the reassignment of the underlying cause of death and the adjustment for

under-reporting. The estimated hospital deaths are from the discharge survey carried out by the DOH and the Italian Cooperation in 2003. This was based on a representative sample of medical records of all provincial hospitals and the assignment of the underlying cause was assigned double blind by two medical doctors on the basis of the medical history. Of the slightly more than 45,000 deaths estimated to have been caused by AIDS and TB in 2001, about 30,000 occurred in hospitalized patients. Also a high proportion of deaths from perinatal and nutritional conditions occurred in hospitals. The proportion of deaths captured by the hospital system was much lower for cardiovascular diseases and injuries because most of these patients died before reaching the hospitals.

Figure 14 Comparison between population and hospital mortality, KZN, 2001



Provincial Mortality after 2001

The main change after 2001 has been the increasing burden of HIV/AIDS mortality. Because no data was available on the causes of deaths after 2001, the trends in the annual number of deaths occurring in each age group was used together with epidemiological modeling to estimate the pattern of mortality after 2001. Figures 15 and 16 represent respectively the number of deaths by age reported by Statistics SA between 1997 and 2004 and the number predicted by ASSA03. It is noticeable that, although the reported deaths from StatisticsSA (Figure 15) are lower than ASSA03 (Figure 16), the two figures shows very similar pattern, with a double of the number of deaths between 1997 and 2004. This is the result of the increasing mortality between 15 and 49 years of age, which according to ASSA03 was mainly due to the increased number of AIDS deaths (Figure 17). It can be concluded that the main change after 2001 was a further increase in mortality from HIV/AIDS, while that other causes are likely to have remained similar to the estimates of 2001 reported in the Annex.

Figure 15 Reported number of deaths

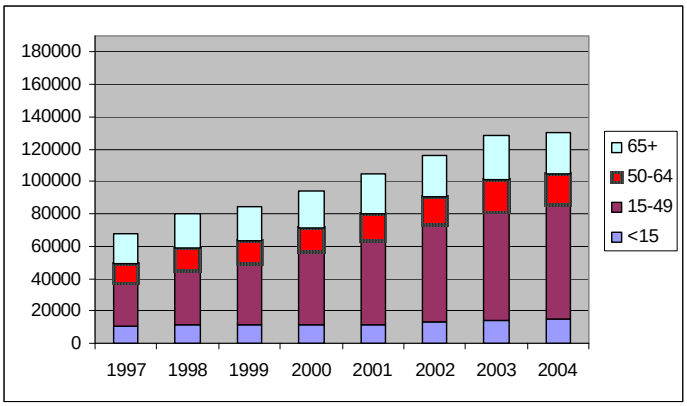


Figure 16 Number of deaths estimated according to ASSA03

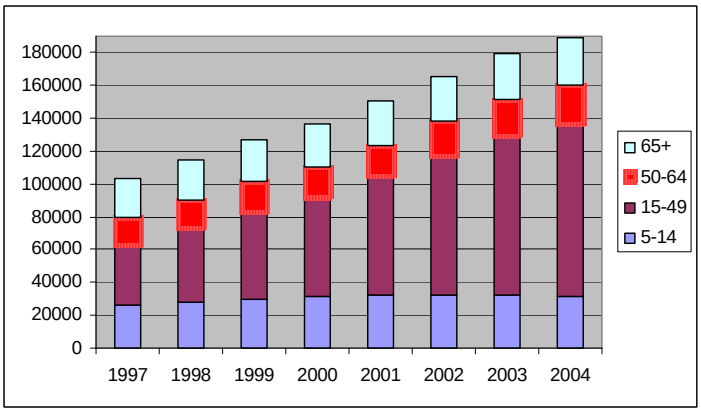
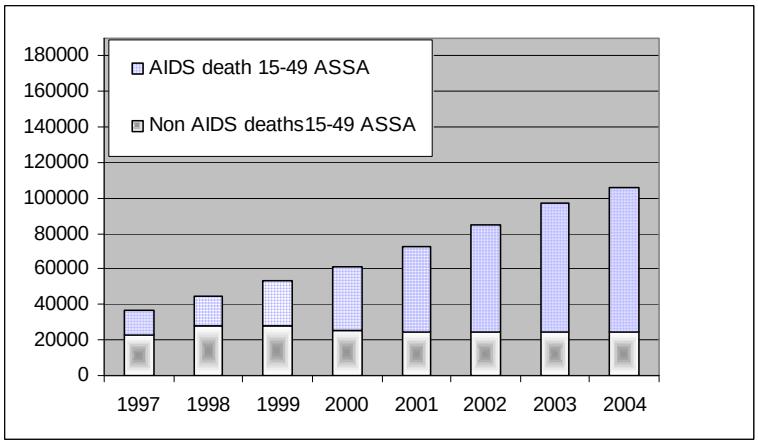


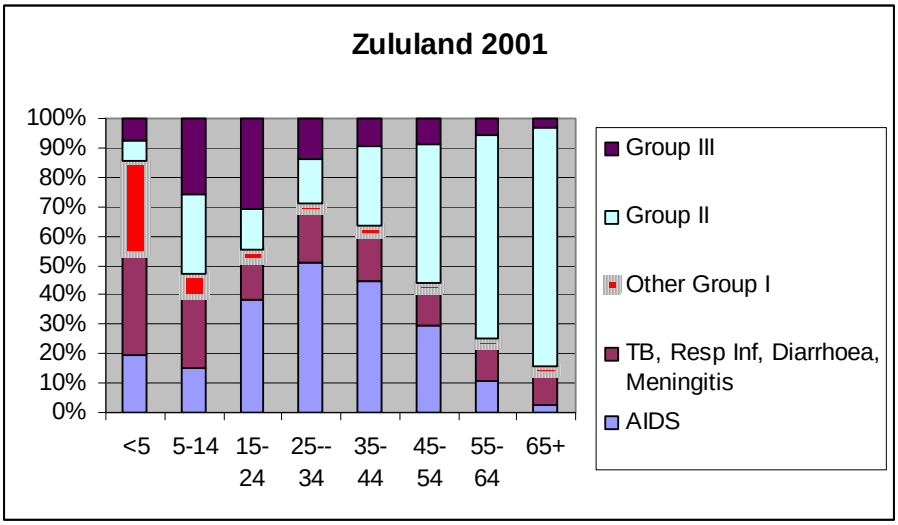
Figure 17 Estimated number of deaths due to AIDS in the 15-49 age group



District estimates

As mentioned in the methodology, the provincial mortality rates were applied to the district demographic structure. To validate if such extrapolation was a valid reflection of the mortality pattern in the districts, the mortality for the Zululand district was compared with the mortality obtained for 2001 in Hlabisa. Although this is a small area, which is not representative of the whole Zululand district, nonetheless it can provide a good comparison because of the high registration and the high reliability of the assignment of the underlying cause of death. Figures 18 and 19 confirm the underestimation of HIV/AIDS as the underlying cause of mortality, especially among child deaths. Similar to what was reported for Figures 9 and 10, if most deaths recorded under diarrhoea and respiratory infections in Figure 17 were reassigned to HIV, the pattern would become similar to Figure 18. These considerations should be taken into account when using the mortality rates.

Figures 17-18 Estimated burden of mortality in Zululand and Hlabisa in 2001



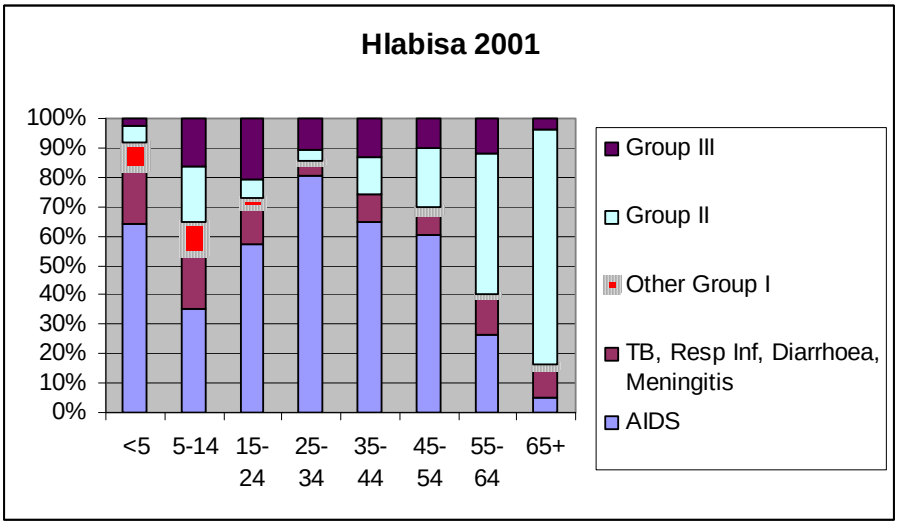


Figure 20 shows the number of expected deaths by districts in 2001. Ethekwini and uMgundundlovu accounted for more than 40% of the total mortality the highest number of deaths due to HIV/AIDS was almost equal to all the deaths from chronic degenerative diseases. Table 1 shows that all the districts have similar priority causes of mortality with AIDS, diarrhoea and respiratory infections, most of which were related to HIV, coming first, followed by injuries and stroke. The other causes of deaths varied slightly across district, with some district having similar ranking of causes of deaths.

Figure 19 Expected number of death across districts in 2001

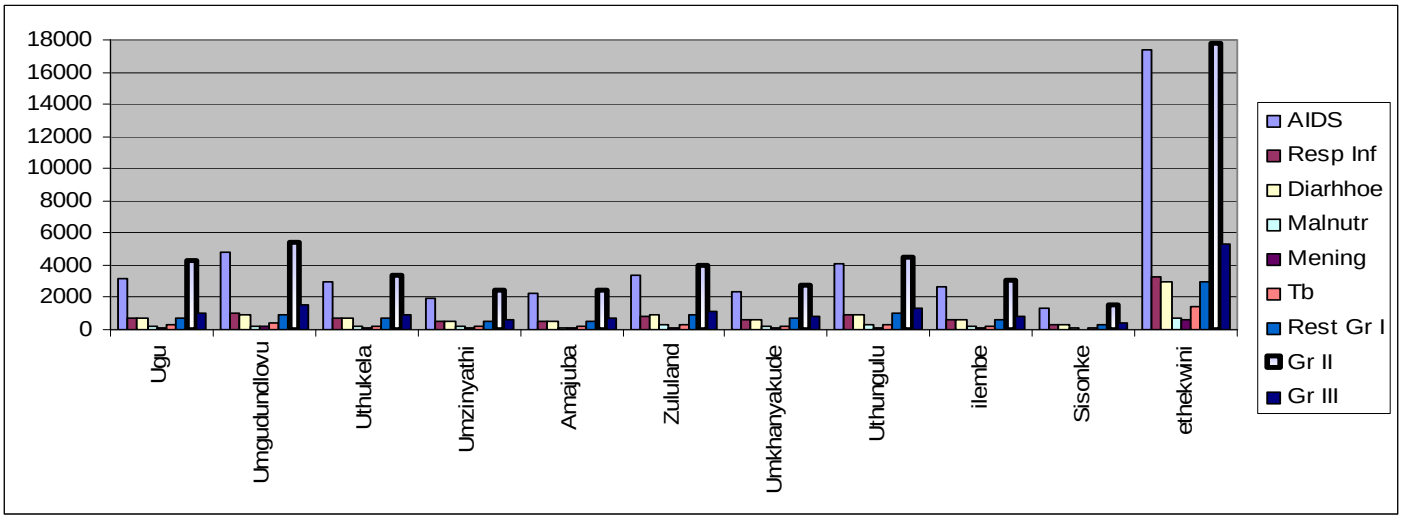


Table 1 District mortality profiles

Rank	Ethekwini	Umkundun	Uthukela	Zululand	Uthungulu	Sisonke	Ugu	Umzinyathi	Umkhanya	Amajuba
1	AIDS		AIDS				AIDS	AIDS		
2	Resp Inf.		Resp Inf.				Resp Inf.	Resp Inf.		
3	Diarrhoea		Diarrhoea				Diarrhoea	Diarrhoea		
4	Injuries		Injuries				Injuries	Injuries		
5	Stroke		Stroke				Stroke	Stroke		
6	Isch. Heart disease		Perinatal				Isch. heart	Perinatal		
7	Resp. Chronic		Isch. Heart disease				Resp. Chronic	Isch. Heart disease		
8	Other Circulatory		Resp. Chronic				Perinatal	Resp. Chronic		
9	Perinatal		Other Circulatory				Other Circulato	Other Circulatory		
10	TB	diabetes	diabetes				diabetes	diabetes	diabetes	TB
11	diabetes	TB	TB				Hypertens.	Hypertens.	Other infec	diabetes
12	Other infect.		Other infect.				TB	Other infec	TB	Other infect.
13	Hypertens.		Hypertens.				Other infect.	TB	Nutritional	Hypertens.
14	Other malignancies		Nutritional				Malign. Other	Nutritional	Hypertens.	Other Malignancies
15	Other digestive		Malign. Other				Nutritional	Other Malignancies		Nutritional
16	Meningitis	Nutritional	Digest. Other				Digest. Other	Digest. Oth	Digest. Oth	Digest. Other
17	Nutritional	Renal Failu	Meningitis				Renal Failure	Renal Failu	Meningitis	Meningitis
18	Renal Failu	Meningitis	Renal Failure				Meningitis	Meningitis	Renal Failu	Renal Failure
19	Cyrrosis & pancreatitis		Cyrrosis & pancreatitis				Cyrrosis & pan	Cyrrosis & pancreatitis		
20	Malig. Aesoph+Stoma		Congenital Malf				Malig. Aesoph+	Congenital Malf		Malig. Aesoph+Stomac

Discussion

The analysis has provided age and gender specific mortality rates for KZN and for the districts. HIV/AIDS is the first cause of death and its number has doubled between 1997 and 2004 and can only have increased further after 2004. Most deaths under the age of 54, which were recorded as due to respiratory infections, diarrhoea and meningitis had HIV/AIDS as underlying cause. Other major causes of death included cardiovascular diseases, injuries, chronic respiratory conditions, diabetes, malignant neoplasms and cirrhosis. Most mortality could be prevented by promoting changes in lifestyle and by effectively implementing evidence based medicine guidelines.

Although prevention is better than cure, changes in lifestyle are complex. Modification of sexual behavior could prevent the transmission of HIV and decrease mortality from full-blown AIDS and related infectious diseases. A decrease in the prevalence of smoking, alcohol consumption and high fat diet could bring down rates of hypertension, obesity, cardiovascular diseases, malignant neoplasms, cirrhosis, diabetes and other chronic degenerative diseases. Strengthening education of motorists and enforcing traffic regulation could reduce most of the causes of death from accidents. However, change in knowledge through education cannot per se change attitude and behavior. Lifestyle is influenced by cultural values, peer pressure, advertisement, economic conditions and other factors, which are not under the direct control of the health sector. Besides, risk factors take a long time to change and even longer time is required for these changes to be reflected in a change in mortality.

The high level of awareness recorded by the 1998 Demographic and Health Survey (DHS) confirms that although health education is important it is insufficient per se to change ingrained behavior. According to the DHS, 97% of the South African population knew about AIDS, and more than 87% knew that AIDS could be prevented by staying faithful, by using condoms, and by avoiding sharing injections and razors. Similarly, although 89% of males in South Africa knew that smoking was bad for health and 66% tried to quit, only 20% stopped. According to the DHS about one third of men and one half of women were overweight or obese and the white educated men were the most obese among all men. These statistics indicate that certain behaviors and conditions are culturally acceptable, producing insufficient social pressure to change. Without social pressure, the short-term gratification prevails over the long-term health gains and knowledge is insufficient to produce a change in attitudes and practices especially if they require a lot of sacrifices and efforts. When society gradually changes, certain behaviors, which are not considered acceptable anymore and the short-term gain in conforming to society and being accepted are powerful enough to produce an inner re-evaluation of individual attitudes and practices. Although traffic patrols and road bumps are almost everywhere, traffic accidents are still high, suggesting that the short-term gain in speeding is still higher than the long-term gains in avoiding heavy fines. It is only when speeding is condemned by society as an unacceptable behavior, that speeding will conflict with the individual moral code, producing a change in attitude and practice.

The short-term solution remains to treat medical conditions but even this become difficult if management cannot transfer efficacy into operational effectiveness. Although the pharmaceutical industry has produced efficacious treatment against HIV/AIDS, TB and hypertension, their operational effectiveness is lagging behind expectations. The failure of the Direct Observed Treatment (DOT) in increasing cure rates in KZN is a good example of how guidelines are still far from being transformed into operational effectiveness. Good intentions have not been transferred into general practice and drug resistance is increasing at an alarming rate. Major problems include access to treatment, inefficient communication between staff and patients, presence of side effects, lack of monitoring mechanisms to identify and trace defaulters, poor compliance and poor monitoring of programme indicators. The poor use of the TB electronic register cannot even ensure the reliability of the treatment outcomes and therefore the measurement of effectiveness. ARV, which is being distributed by more than 60 clinics, is likely to be affected by similar problems. The coverage and compliance of hypertensive patients is likely to be in even worst conditions.

The solution is to identify the critical conditions of effectiveness. The most common mistake is to take for granted that because treatment has a demonstrated efficacy has an automatic effectiveness and no further information should be collected. That this is the case is proved by the absence of reliable monitoring and evaluation systems to measure coverage, process indicators and treatment outcomes. Issues 12 and 13 of the Epidemiology Bulletin have shown that the TB statistics derived from the TB electronic register is not reliable because the register is affected by several problems. Monitoring and evaluation has been given only leap services in the TB control programme and this has resulted in low cure rate and extremely drug resistant TB. The validation of the TB register and the measurement of the activities carried out by the TB clinics should be carried out in every district to check the reliability of the treatment outcomes, the status of the activities in the clinics, the implementation problems requiring attention to increase the effectiveness of the TB programme.

Similarly, each district should create an electronic database of its ARV activities. At the moment all the data are on paper modules, which cannot be analyzed to quantify the status of the activities of specific programmes to identify implementation problems and relative solutions and to measure changes in programme activities and outcomes.

The first recommendation is therefore to monitor and evaluate the implementation of the guidelines to control priority diseases such as ARV, TB and hypertension. Although there are treatment guidelines there are scarce data on their application and on patients' compliance.

Last but not least, a few hospitals should set up a database on the causes of hospital discharges. At the moment the District Health Information System (DHIS) does not collect such information although there is an archive in each hospital where the paper medical records are kept. The lack of transformation of the information stored in the medical history forms into electronic records is due to lack of time by the staff and the complexity involved in assigning the underlying cause of discharge. As shown by Issues

7-9 of the Bulletin, reliability of the numbers reported on beds, admissions and discharges is far from being reliable. It is therefore unlikely that adding the routine reporting of difficult information on the medical diagnosis of discharge would be feasible. Assigning the cause of discharges in a standardized and reliable manner will be a very difficult challenge for the DHIS. It is therefore necessary to test the system in a few sentinel hospitals before universal recording can be attempted.

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ANNEX Age standardized mortality rates per 100000, KZN, 2001

Age standardized mortality rates per 100000, KZN, 2001									
	Males	min	max	**Females**	Min	Max	**M&F**	min	max
GROUP I									
TB without HIV	**74**	48	100	**36**	20	53	**50**	36	68
AIDS	**537**	477	597	**434**	389	479	**474**	437	542
Diarrhoea *	**127**	93	162	**125**	94	156	**126**	102	152
Resp Inf. *	**136**	99	174	**137**	104	170	**135**	108	162
Meningitis *	**25**	10	41	**22**	9	34	**23**	13	35
Other Group I	**52**	28	76	**42**	23	60	**45**	31	63
Perinatal	**64**	51	77	**82**	68	95	**73**	64	83
Maternal				**5**	1	9	**3**	1	6
Nutritional	**39**	24	55	**24**	13	35	**31**	21	42
GROUP II									
Hypertens.	**45**	29	61	**57**	43	72	**54**	43	66
Isch. heart	**153**	125	182	**65**	49	80	**98**	83	113
Stroke	**166**	135	197	**118**	98	137	**138**	121	157
Other Circulatory	**84**	57	112	**62**	44	81	**73**	57	91
Asthma & Other Obstr. Pul	**135**	102	168	**57**	38	77	**85**	67	104
Malig. Aesoph+Stomac	**33**	19	47	**12**	5	19	**20**	13	27
Malign. Liver+pancreas	**12**	3	21	**6**	2	11	**9**	4	13
Malign Resp	**31**	18	44	**7**	2	13	**15**	10	21
Malign Breast				**12**	5	19	**8**	4	12
Malign. Cervix				**13**	6	20	**8**	4	13
Malign.Prost	**14**	6	22				**4**	2	7
Malign. Other	**58**	36	80	**34**	20	47	**43**	30	56
Diabetes	**58**	38	77	**69**	53	84	**67**	54	80
Endocr. & Dismetabolic	**15**	4	25	**9**	2	16	**11**	5	18
Cyrrosis & pancreatitis	**43**	25	61	**13**	4	21	**26**	16	36
Other Digestive System	**32**	14	50	**26**	12	39	**29**	18	41
Epilepsy	**18**	6	30	**6**	0	13	**12**	4	20
Other Neurological	**14**	3	25	**10**	2	18	**12**	5	19
Renal Failure	**36**	18	54	**25**	12	37	**29**	18	40
Other Genitourinary	**7**	**	**	**4**	**	**	**5**	**	**
Congenital Malf	**15**	7	23	**12**	5	19	**13**	8	19
Other Group II	**18**	4	32	**13**	3	22	**15**	7	25
GROUP III									
Injuries Unintent	**263**	216	311	**84**	58	111	**168**	142	221
Total	**2306**			**1620**			**1896**		

Annex Estimated number of deaths and rates per 100000, Males, KZN, 2001

BOD Categories	Expected Deaths Males KZN 2001															Mortality Rates per 100,000 Males KZN 2001													
	<15	min	max	15-44	min	max	45-64	min	max	65+	min	max	T	min	max	<15	min	max	15-44	min	max	45-64	min	max	65+	min	max	T	min	max
GROUP I																														
TB without HIV	**121**	2	240	**1108**	893	1324	**719**	554	884	**402**	279	526	**2350**	2018	2682	**7**	0	15	**52**	42	63	**140**	108	172	**275**	191	360	**53**	46	61
AIDS	**3318**	2756	3880	**12949**	12377	13521	**3992**	3644	4341	**402**	279	526	**20662**	19807	21517	**203**	169	238	**612**	585	639	**777**	709	845	**275**	191	360	**469**	449	488
Diarrhoea *	**2730**	2209	3250	**1258**	1029	1487	**399**	275	524	**308**	200	417	**4695**	4234	5157	**167**	135	199	**59**	49	70	**78**	53	102	**211**	137	285	**106**	96	117
Resp Inf. *	**2040**	1579	2500	**1258**	1029	1487	**540**	396	684	**805**	633	976	**4642**	4183	5101	**125**	97	153	**59**	49	70	**105**	77	133	**551**	433	668	**105**	95	116
Meningitis *	**394**	181	608	**580**	422	737	**87**	29	146	**13**	**	**	**1074**	848	1301	**24**	11	37	**27**	20	35	**17**	6	28	**9**	**	**	**24**	19	30
Other infect. & paras.	**495**	256	733	**652**	485	818	**337**	222	451	**268**	167	370	**1751**	1463	2039	**30**	16	45	**31**	23	39	**66**	43	88	**184**	114	253	**40**	33	46
Perinatal	**2343**	1855	2832										**2343**	2012	2675	**143**	114	173	**0**	0	0	**0**	0	0	**0**	0	0	**53**	46	61
Nutritional	**1449**	1053	1845	**41**	**	**	**87**	29	146	**0**	0	0	**1578**	1304	1851	**89**	64	113	**2**	0	4	**17**	6	28	**0**	0	0	**36**	30	42
GROUP II																														
Hypertens.	**0**	0	0	**161**	77	244	**324**	212	436	**582**	435	730	**1067**	841	1292	**0**	0	0	**8**	4	12	**63**	41	85	**398**	297	499	**24**	19	29
Isch. heart	**0**	0	0	**398**	267	528	**1622**	1381	1864	**1693**	1454	1932	**3713**	3300	4127	**0**	0	0	**19**	13	25	**316**	269	363	**1159**	995	1323	**84**	75	94
Stroke	**126**	5	248	**595**	436	755	**1522**	1287	1756	**1891**	1640	2141	**4134**	3699	4569	**8**	0	15	**28**	21	36	**296**	250	342	**1294**	1123	1465	**94**	84	104
Other Circulatory	**260**	86	434	**672**	503	842	**823**	647	999	**688**	528	847	**2443**	2105	2782	**16**	5	27	**32**	24	40	**160**	126	194	**471**	362	580	**55**	48	63
Malig. Aesoph+Stomac	**0**	0	0	**69**	14	124	**474**	339	609	**282**	178	385	**825**	626	1023	**0**	0	0	**3**	1	6	**92**	66	119	**193**	122	264	**19**	14	23
Malign. Liver+pancreas	**0**	0	0	**83**	23	143	**112**	46	179	**121**	52	189	**316**	193	439	**0**	0	0	**4**	1	7	**22**	9	35	**83**	36	129	**7**	4	10
Malign Resp	**0**	0	0	**69**	14	124	**274**	171	378	**389**	267	510	**732**	545	920	**0**	0	0	**3**	1	6	**53**	33	74	**266**	183	349	**17**	12	21
Malign Breast	**0**	0	0	**0**	0	0	**0**	0	0	**13**	**	**	**13**	**	**	**0**	0	0	**0**	0	0	**0**	0	0	**9**	**	**	**0**	0	1
Malign.Prost	**0**	0	0	**14**	**	**	**62**	13	112	**228**	134	322	**304**	183	425	**0**	0	0	**1**	**	**	**12**	2	22	**156**	92	220	**7**	4	10
Other Malign.	**76**	**	**	**332**	213	452	**649**	491	806	**483**	348	618	**1539**	1269	1809	**5**	**	**	**16**	10	21	**126**	96	157	**330**	238	423	**35**	29	41
Asthma & Obstr. Pulm	**260**	86	434	**830**	642	1017	**1198**	987	1408	**1354**	1137	1572	**3642**	3232	4051	**16**	5	27	**39**	30	48	**233**	192	274	**927**	778	1076	**83**	73	92
Diabetes	**33**	**	**	**83**	23	144	**748**	580	917	**550**	406	693	**1415**	1156	1674	**2**	**	**	**4**	1	7	**146**	113	178	**376**	278	475	**32**	26	38
Endocr. & Dismetabolic	**42**	**	**	**207**	112	302	**87**	29	146	**134**	62	206	**471**	320	621	**3**	**	**	**10**	5	14	**17**	6	28	**92**	42	141	**11**	7	14
Cyrrosis & pancreatitis	**42**	**	**	**526**	376	676	**561**	415	708	**201**	113	289	**1331**	1079	1582	**3**	**	**	**25**	18	32	**109**	81	138	**138**	77	198	**30**	24	36
Other Digestive System	**143**	13	272	**663**	495	831	**249**	151	348	**94**	33	154	**1149**	915	1383	**9**	1	17	**31**	23	39	**49**	29	68	**64**	23	106	**26**	21	31
Epilepsy	**126**	5	248	**374**	247	501	**187**	101	273	**40**	1	80	**728**	541	914	**8**	0	15	**18**	12	24	**36**	20	53	**28**	0	55	**17**	12	21
Other Neurological	**118**	0	235	**83**	23	143	**50**	5	94	**188**	103	273	**438**	293	583	**7**	0	14	**4**	1	7	**10**	1	18	**128**	70	187	**10**	7	13
Renal Failure	**76**	**	**	**290**	178	402	**324**	212	437	**322**	211	433	**1012**	792	1231	**5**	**	**	**14**	8	19	**63**	41	85	**220**	144	296	**23**	18	28
Other Genitour.	**33**	**	**	**56**	7	105	**0**	0	0	**94**	33	154	**183**	89	277	**2**	**	**	**3**	0	5	**0**	0	0	**64**	23	106	**4**	2	6
Congenital Malf	**502**	262	742	**14**	**	**	**25**	**	**	**0**	0	0	**541**	380	702	**31**	16	45	**1**	**	**	**5**	**	**	**0**	0	0	**12**	9	16
Other Group II	**151**	18	284	**318**	201	435	**137**	64	211	**67**	16	118	**673**	494	853	**9**	1	17	**15**	9	21	**27**	12	41	**46**	11	81	**15**	11	19
GROUP III																														
Injuries Unint. & Int.	**2002**	1545	2459	**7158**	6669	7647	**1540**	1304	1775	**511**	372	649	**11210**	10530	11891	**123**	95	151	**338**	315	361	**300**	254	345	**350**	255	444	**254**	239	270
TOTAL	**16880**			**30840**			**17132**			**12123**			**76975**			**1034**			**1458**			**3333**			**8298**			**1746**		
*** HIV as underline < 45 years of age ** Unreliable due to small sample**																														

Annex Estimated number of deaths and rates per 100000, Females, KZN, 2001

BOD Categories	Expected Deaths Females KZN 2001															Mortality Rates per 100,000 Females KZN 2001													
0	<15	min	max	15-44	min	max	45-64	min	max	65+	min	max	T	min	max	<15	min	max	15-44	min	max	45-64	min	max	65+	min	max	T	min	max
GROUP I																														
TB without HIV	**160**	26	294	**1306**	1051	1560	**215**	127	303	**160**	89	231	**1841**	1546	2135	**10**	2	18	**54**	43	65	**32**	19	45	**55**	31	79	**37**	31	43
AIDS	**2671**	2172	3171	**17164**	16507	17821	**1699**	1471	1927	**215**	133	297	**21750**	20889	22610	**163**	133	194	**710**	683	737	**253**	219	287	**74**	46	102	**434**	416	451
Diarrhoea *	**2479**	1994	2964	**1873**	1570	2175	**621**	475	767	**418**	305	532	**5392**	4900	5883	**151**	122	181	**77**	65	90	**93**	71	114	**144**	105	183	**107**	98	117
Resp Inf. *	**2285**	1816	2754	**2479**	2135	2824	**587**	445	730	**870**	709	1031	**6221**	5697	6746	**139**	111	168	**103**	88	117	**87**	66	109	**299**	244	355	**124**	114	134
Meningitis *	**205**	54	357	**782**	583	981	**69**	19	120	**22**	**	**	**1079**	852	1305	**13**	3	22	**32**	24	41	**10**	3	18	**8**	**	**	**22**	17	26
Other infect. & paras.	**377**	173	582	**962**	742	1182	**240**	147	333	**352**	248	457	**1932**	1630	2233	**23**	11	36	**40**	31	49	**36**	22	50	**121**	85	157	**39**	32	45
Perinatal	**3072**	2544	3599										**3072**	2694	3449	**188**	155	220										**61**	54	69
Maternal	**0**	0	0	**295**	172	418	**0**	0	0	**0**	0	0	**295**	176	414	**0**	0	0	**12**	7	17	**0**	0	0	**0**	0	0	**6**	3	8
Nutritional	**873**	567	1178	**66**	8	125	**12**	**	**	**22**	**	**	**973**	757	1188	**53**	35	72	**3**	**	**	**2**	**	**	**8**	**	**	**19**	15	24
GROUP II																														
Hypertens.	**80**	**	**	**243**	131	354	**582**	440	724	**1500**	1293	1707	**2405**	2070	2740	**5**	**	**	**10**	5	15	**87**	66	108	**516**	445	587	**48**	41	55
Isch. heart	**40**	**	**	**327**	198	457	**646**	497	795	**1664**	1448	1881	**2678**	2325	3031	**2**	**	**	**14**	8	19	**96**	74	118	**572**	498	647	**53**	46	60
Stroke	**0**	0	0	**652**	470	834	**1042**	857	1227	**3150**	2869	3430	**4844**	4376	5311	**0**	0	0	**27**	19	35	**155**	128	183	**1083**	987	1180	**97**	87	106
Other Circulatory	**99**	**	**	**719**	528	909	**487**	357	618	**1351**	1154	1549	**2656**	2305	3008	**6**	0	0	**30**	22	38	**73**	53	92	**465**	397	533	**53**	46	60
Malig. Aesoph+Stomac	**0**	0	0	**81**	17	146	**207**	121	293	**176**	102	251	**464**	315	614				**3**	**	**	**31**	18	44	**61**	35	86	**9**	6	12
Malign. Liver+pancreas	**0**	0	0	**65**	7	123	**91**	34	149	**99**	43	155	**256**	145	367				**3**	**	**	**14**	5	22	**34**	15	53	**5**	3	7
Malign Resp	**0**	0	0	**33**	**	**	**115**	51	180	**143**	76	210	**291**	173	409				**1**	**	**	**17**	8	27	**49**	26	72	**6**	3	8
Malign Breast	**0**	0	0	**114**	38	191	**196**	112	280	**165**	93	237	**476**	325	627				**5**	2	8	**29**	17	42	**57**	32	82	**9**	6	12
Malign. Cervix	**0**	0	0	**65**	7	123	**299**	196	402	**143**	76	210	**507**	351	663				**3**	0	5	**45**	29	60	**49**	26	72	**10**	7	13
Other Malign.	**241**	77	404	**376**	237	514	**459**	332	586	**485**	363	607	**1560**	1288	1831	**15**	5	25	**16**	10	21	**68**	49	87	**167**	125	209	**31**	26	37
Asthma & Other Obstr. P	**139**	14	264	**1075**	843	1307	**515**	381	649	**826**	669	983	**2555**	2210	2901	**8**	1	16	**44**	35	54	**77**	57	97	**284**	230	338	**51**	44	58
Diabetes	**0**	0	0	**310**	184	436	**984**	803	1164	**1454**	1250	1658	**2747**	2390	3105				**13**	8	18	**147**	120	173	**500**	430	570	**55**	48	62
Endocr. & Dismetabolic	**80**	**	**	**179**	83	275	**34**	**	**	**176**	102	251	**470**	319	620	**5**	**	**	**7**	3	11	**5**	0	10	**61**	35	86	**9**	6	12
Cyrrosis & pancreatitis	**40**	**	**	**180**	84	277	**219**	130	307	**121**	59	183	**560**	396	724	**2**	**	**	**7**	3	11	**33**	19	46	**42**	20	63	**11**	8	14
Other Digestive System	**113**	<1	226	**782**	583	981	**195**	111	279	**165**	93	237	**1256**	1011	1500	**7**	0	14	**32**	24	41	**29**	17	42	**57**	32	82	**25**	20	30
Epilepsy	**66**	**	**	**229**	121	337	**11**	**	**	**11**	**	**	**317**	194	441	**4**	**	**	**9**	5	14	**2**	**	**	**4**	**	**	**6**	4	9
Naurolog. Other	**146**	18	274	**82**	17	147	**35**	**	**	**220**	137	303	**483**	331	635	**9**	1	17	**3**	1	6	**5**	0	10	**76**	47	104	**10**	7	13
Renal Failure	**33**	**	**	**474**	319	630	**207**	121	293	**374**	267	482	**1089**	861	1316	**2**	**	**	**20**	13	26	**31**	18	44	**129**	92	166	**22**	17	26
Genitour. Othet	**0**	0	0	**98**	27	169	**35**	**	**	**44**	7	81	**177**	84	269	**0**	0	0	**4**	1	7	**5**	0	10	**15**	2	28	**4**	2	5
Congenital Malf	**476**	248	705	**32**	**	**	**0**	0	0	**11**	**	**	**520**	362	678	**29**	15	43	**1**	0	3	**0**	0	0	**4**	**	**	**10**	7	14
Other Group II	**73**	**	**	**458**	305	611	**46**	5	87	**66**	20	112	**644**	468	819	**4**	**	**	**19**	13	25	**7**	1	13	**23**	7	38	**13**	9	16
GROUP III																														
Injuries Unint. & Int.	**1505**	1113	1897	**1912**	1606	2217	**429**	307	552	**364**	258	470	**4210**	3772	4648	**92**	**68**	**116**	**79**	**66**	**92**	**64**	**46**	**82**	**125**	**89**	**162**	**84**	**75**	**93**
TOTAL	**15255**			**33415**			**10278**			**14769**			**73717**			**931**			**1383**			**1531**			**5079**			**1469**		

*** HIV as underline < 45 years of age ** Unreliable due to small sample**

Annex Estimated number of total deaths and rates per 100000, KZN, 2001

BOD Categories	Total Expected Deaths, KZN 2001															Total Mortality Rates per 100,000 Total KZN 2001													
0	<15	min	max	15-44	min	max	45-64	min	max	65+	min	max	T	min	max	<15	min	max	15-44	min	max	45-64	min	max	65+	min	max	T	min	max
GROUP I																														
TB without HIV	**282**	102	463	**2405**	2074	2736	**924**	738	1109	**531**	397	818	**4142**	3701	4583	**9**	3	14	**53**	46	60	**78**	62	94	**122**	91	187	**44**	39	49
AIDS	**5982**	5231	6733	**29853**	28982	30724	**5657**	5241	6072	**591**	449	7726	**42083**	40872	43294	**183**	160	206	**659**	639	678	**477**	442	512	**135**	103	1768	**446**	434	459
Diarrhoea *	**5209**	4498	5921	**3089**	2715	3462	**1039**	843	1236	**731**	574	1917	**10068**	9395	10742	**159**	138	181	**68**	60	76	**88**	71	104	**167**	131	439	**107**	100	114
Resp Inf. *	**4334**	3675	4994	**3644**	3241	4048	**1140**	935	1345	**1664**	1431	2049	**10783**	10088	11479	**133**	112	153	**80**	71	89	**96**	79	113	**381**	328	469	**114**	107	122
Meningitis *	**596**	336	856	**1349**	1099	1599	**158**	80	235	**36**	1	439	**2138**	1819	2458	**18**	10	26	**30**	24	35	**13**	7	20	**8**	0	100	**23**	19	26
Other Group I	**870**	557	1184	**1592**	1321	1864	**579**	431	726	**623**	478	728	**3664**	3249	4080	**27**	17	36	**35**	29	41	**49**	36	61	**143**	109	167	**39**	34	43
Perinatal	**5436**	4713	6160								0	1060	**5436**	4933	5940	**166**	144	188	**0**	0	0	**0**	0	0	**0**	0	243	**58**	52	63
Maternal				**270**	157	383					0	69	**270**	156	384	**0**	0	0	**6**	3	8	**0**	0	0	**0**	0	16	**3**	2	4
Nutritional	**2312**	1813	2811	**106**	35	176	**97**	36	158	**24**	-5	515	**2539**	2191	2886	**71**	55	86	**2**	1	4	**8**	3	13	**6**	-1	118	**27**	23	31
GROUP II																														
Hypertens.	**82**	**	**	**398**	261	535	**926**	740	1111	**2156**	1893	709	**3561**	3151	3971	**3**	0	5	**9**	6	12	**78**	62	94	**493**	433	162	**38**	33	42
Isch. heart	**41**	**	**	**734**	548	919	**2252**	1970	2534	**3320**	3002	1229	**6347**	5805	6889	**1**	**	**	**16**	12	20	**190**	166	214	**760**	687	281	**67**	62	73
Stroke	**124**	4	243	**1247**	1006	1488	**2570**	2271	2870	**5120**	4740	1731	**9060**	8419	9702	**4**	0	7	**28**	22	33	**217**	192	242	**1172**	1085	396	**96**	89	103
Other Circulatory	**356**	154	558	**1392**	1138	1646	**1310**	1091	1529	**2087**	1829	1006	**5145**	4655	5635	**11**	5	17	**31**	25	36	**111**	92	129	**478**	419	230	**55**	49	60
Malig. Aesoph+Stomac	**0**	0	0	**150**	66	234	**677**	518	836	**442**	319	270	**1269**	1022	1516	**0**	0	0	**3**	1	5	**57**	44	71	**101**	73	62	**13**	11	16
Malign. Liver+pancreas	**0**	0	0	**150**	66	235	**205**	116	293	**215**	129	131	**571**	405	736	**0**	0	0	**3**	1	5	**17**	10	25	**49**	30	30	**6**	4	8
Malign Resp	**0**	0	0	**105**	35	176	**387**	266	508	**501**	370	216	**993**	775	1212	**0**	0	0	**2**	1	4	**33**	22	43	**115**	85	49	**11**	8	13
Malign Breast	**0**	0	0	**105**	34	175	**206**	117	295	**193**	111	118	**504**	348	659	**0**	0	0	**2**	1	4	**17**	10	25	**44**	25	27	**5**	4	7
Malign. Cervix	**0**	0	0	**60**	7	113	**314**	205	423	**157**	83	123	**530**	371	690	**0**	0	0	**1**	0	2	**26**	17	36	**36**	19	28	**6**	4	7
Malign.Prost	**0**	0	0	**15**	**	**	**60**	12	109	**202**	118	70	**278**	162	393	**0**	0	0	**0**	0	1	**5**	1	9	**46**	27	16	**3**	2	4
Other Malign.	**320**	128	512	**707**	525	889	**1111**	908	1313	**958**	778	621	**3095**	2713	3478	**10**	4	16	**16**	12	20	**94**	77	111	**219**	178	142	**33**	29	37
Asthma & Other Obstr. P	**397**	184	610	**1890**	1595	2185	**1702**	1454	1950	**2103**	1844	1182	**6093**	5561	6624	**12**	6	19	**42**	35	48	**144**	123	165	**481**	422	271	**65**	59	70
Diabetes	**33**	**	**	**375**	242	508	**1759**	1507	2011	**2077**	1819	837	**4244**	3797	4690	**1**	-1	3	**8**	5	11	**148**	127	170	**475**	416	192	**45**	40	50
Endocr. & Dismetabolic	**123**	4	243	**390**	254	525	**121**	53	189	**312**	208	207	**945**	732	1158	**4**	0	7	**9**	6	12	**10**	4	16	**71**	48	47	**10**	8	12
Cyrrosis & pancreatitis	**82**	**	**	**739**	553	925	**774**	604	944	**311**	207	394	**1905**	1604	2207	**3**	0	5	**16**	12	20	**65**	51	80	**71**	47	90	**20**	17	23
Other Digestive System	**255**	84	427	**1440**	1182	1698	**447**	317	577	**264**	169	490	**2406**	2068	2744	**8**	3	13	**32**	26	37	**38**	27	49	**60**	39	112	**26**	22	29
Naurolog. Other	**265**	90	439	**166**	77	254	**85**	28	142	**407**	289	202	**922**	712	1133	**8**	3	13	**4**	2	6	**7**	2	12	**93**	66	46	**10**	8	12
Epilepsy	**191**	43	340	**618**	447	788	**193**	107	279	**48**	7	227	**1050**	825	1274	**6**	1	10	**14**	10	17	**16**	9	24	**11**	2	52	**11**	9	14
Genitour. Othet	**33**	**	**	**151**	66	235	**36**	**	**	**131**	64	86	**351**	221	482	**1**	**	**	**3**	1	5	**3**	0	6	**30**	15	20	**4**	2	5
Renal Failure	**108**	**	**	**751**	563	938	**532**	390	674	**695**	541	428	**2085**	1770	2400	**3**	0	7	**17**	12	21	**45**	33	57	**159**	124	98	**22**	19	25
Congenital Malf	**979**	647	1311	**45**	**	**	**24**	**	**	**12**	-8	229	**1060**	834	1286	**30**	20	40	**1**	0	2	**2**	**	**	**3**	-2	53	**11**	9	14
Other Group II	**223**	63	383	**766**	577	956	**182**	98	265	**132**	64	277	**1303**	1053	1552	**7**	2	12	**17**	13	21	**15**	8	22	**30**	15	63	**14**	11	16
GROUP III																														
Injuries Unint. & Int.	**3500**	2899	4101	**9555**	8934	10176	**1944**	1681	2208	**851**	681	2976	**15850**	15022	16678	**107**	89	125	**211**	197	225	**164**	142	186	**195**	156	681	**168**	159	177
TOTAL	**32135**			**64255**			**27410**			**26892**			**150692**			**982**			**1418**			**2312**			**6155**			**1599**		

*** HIV as underline < 45 years of age ** Unreliable due to small sample**

Annex BOD Classification GROUP I communicable diseases, perinatal, maternal & Nutritional; GROUP II Chronic Degenerative: GROUP III Intentional & Unintentional Injuries

Infectious & parasitic		Respiratory Infections	Perinatal	Maternal	Nutritional
TB	Other infect. & parasitosis	J02	P00	O00	E40
		J03	P01	O03	E41
A16		J04	P02	O05	E42
A17	A00	J05	P03	O06	E43
A18	A01	J11	P05	O07	E46
A19	A02	J13	P07	O12	E51
B90	A03	J15	P08	O13	E52
J86	A04	J16	P10	O14	E53
J90	A06	J18	P11	O15	E66
J93	A08	J20	P20	O16	
J94	A30	J21	P21	O29	
	A35	J22	P22	O30	
AIDS	A37		P23	O36	
	A39		P24	O44	
B20	A41		P25	O45	
B21	A48		P26	O46	
B22	A49		P27	O63	
B23	A50		P28	O64	
B24	A52		P29	O71	
B45	A53		P36	O72	
B59	A54		P37	O75	
C46	A86		P39	O85	
	A87		P51	O86	
Diarrhoea	A99		P52	O88	
	B00		P53	O95	
A09	B01		P54	O98	
	B02		P55	O99	
	B05		P57		
Meningitis	B15		P59		
	B16		P60		
G00	B18		P61		
G03	B19		P70		
G04	B27		P74		
	B34		P77		
	B37		P78		
	B46		P80		
	B49		P81		
	B50		P91		
	B54		P92		
	B55		P94		
	B58		P95		
	B65		P96		
	B69				
	B71				
	B77				
	B83				
	B91				

Malignant Neoplasms		Diabetes	Cardiovascular		Respiratory	Digestive	Genitourinary	Congenital Malformations
Malig. Aesoph+Stomac	Other Malignant Neoplasms		Isch. heart	Other Circulatory		Cyrrosis & pancreatitis	Renal Failure	Q00
C15	C02	E10	I20		J32			Q01
C16	C04	E11	I21	I00	J36	K70	N17	Q02
	C05	E12	I22	I05	J38	K72	N18	Q03
Malign.	C06	E14	I24	I08	J39	K73	N19	Q04
Liver+pancreas	C07		I25	I09	J40	K74		Q05
C22	C09		Stroke	I26	J42	K75	Other	Q07
C23	C10	**Endocrine & Dismetabolic**		I27	J43	K76	Genitourinary	Q21
C24	C11	I60		I30	J44	K85		Q22
C25	C12	I61		I31	J45		N00	Q23
	C14	E05	I62	I33	J46		N03	Q24
	C17	E15	I63	I34	J47	Digestive	N04	Q25
Malign Resp	C18	E16	I64	I35	J64	Other	N05	Q27
	C20	E23	I67	I38	J67		N10	Q28
C32	C26	E86	I69	I40	J69	K09	N11	Q33
C34	C31	E87		I42	J80	K12	N12	Q34
	C38	E88	Hypertensive	I44	J81	K20	N13	Q41
	C39			I45	J84	K21	N15	Q43
Malign Breast	C40		I10	I46	J85	K22	N28	Q44
	C41	**Nervous System**	I11	I47	J96	K25	N30	Q61
C50	C43		I12	I48	J98	K26	N32	Q63
	C44	Epilepsy	I13	I49		K27	N39	Q67
	C45			I70		K28	N40	Q77
Malign. Cervix	C47	G40		I71		K29	N42	Q79
	C49	G41		I72		K31	N48	Q81
C53	C51			I73		K35	N49	Q89
	C52			I74		K37	N61	Q90
	C54	Neurolog. Other		I77		K40	N73	Q91
Malign.Prost	C55			I80		K42	N76	Q93
	C56	G06		I82		K43	N82	Q97
C61	C57	G08		I83		K44	N83	Q99
	C58	G10		I84		K45		
	C60	G11		I85		K46		
	C62	G12		I87		K51		
	C64	G20		I88		K52		
	C66	G30		I95		K55		
	C67	G31				K56		
	C69	G35				K57		
	C70	G61				K60		
	C71	G70				K61		
	C73	G71				K62		
	C74	G72				K63		
	C75	G80				K65		
	C76	G81				K66		
	C80	G82				K80		
	C81	G83				K81		
	C82	G91				K83		
	C83	G93				K86		
	C85	G95				K90		
	C90					K92		
	C91							
	C92							
	C95							
	C96							
	C97							
	D18							
	D25							
	D33							
	D37							
	D38							
	D39							
	D41							
	D43							
	D44							
	D46							
	D47							
	D48							

Unintentional Injuries		Intentional Injuries	Injuries of Undetermined Intent
V03	W79	X61	Y14
V05	W80	X64	Y15
V09	W84	X70	Y16
V29	W87	X71	Y17
V45	X00	X74	Y19
V49	X09	X76	Y20
V79	X11	X84	Y21
V81	X17	X91	Y23
V84	X20	X92	Y24
V87	X30	X93	Y26
V89	X31	X94	Y27
V98	X33	X95	Y28
W10	X36	X99	Y29
W14	X38	Y00	Y30
W15	X39	Y06	Y31
W17	X46	Y09	Y33
W19	X49		Y34
W20	X53		Y37
W31	X58		
W34	X59		
W49	Y45		
W54	Y67		
W55	Y68		
W58	Y70		
W69	Y83		
W73	Y86		
W74	Y87		
W76	Y89		
W78			