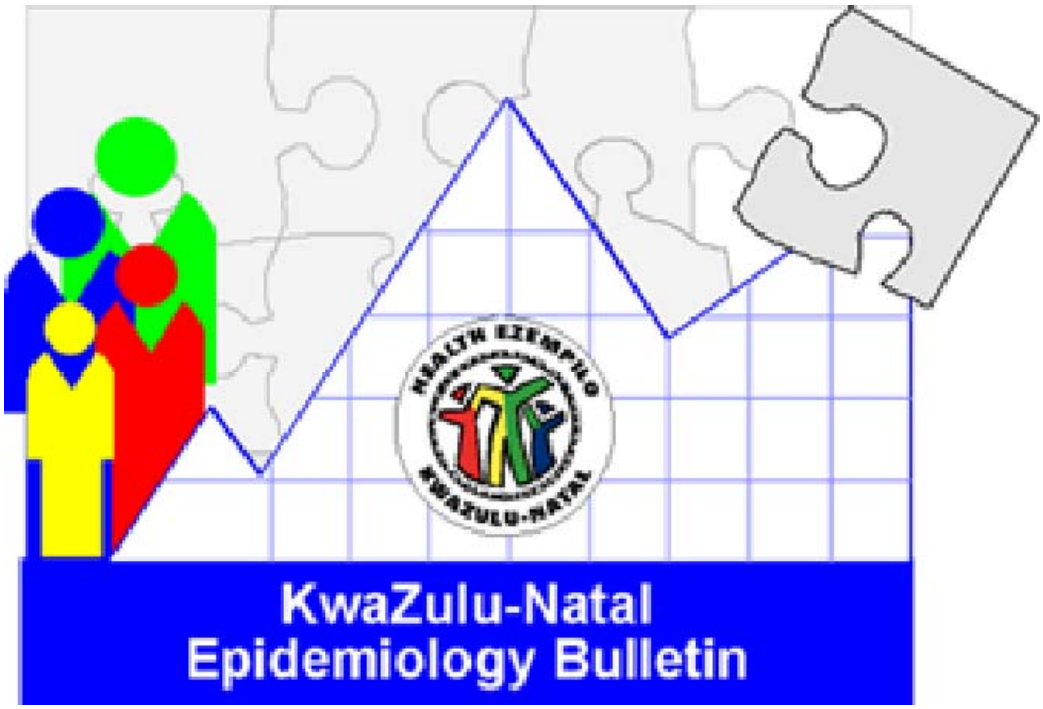

Issue 6

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An analysis of the hospital admissions in Kwazulu-Natal between 1998 and 2002

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EDITORIAL

The research team, the Epi Unit and the Italian Cooperation must be congratulated for a study that has been well conducted and that will contribute tremendously to the efficient and effective management of the health services within the Province.

This issue of the Epi Bulletin marks a significant step in the right direction towards policy formulation and rational planning of health services in the Province that takes into cognisance the mortality and morbidity profiles of patients presenting at hospitals. It is encouraging to note that anecdotal information can now be replaced by firm epidemiological evidence to guide the development of the departments' strategic objectives and the resource allocation to impact positively on the health status of communities. For the hospital service sector, an excellent opportunity is now provided to review its current and develop future service delivery plans that are aligned to the mortality and morbidity profiles.

This study confirms the experiences of the hospital service sector of the HIV/AIDS/TB epidemic on hospital service provision. The rising proportion of admissions for HIV/AIDS over 2 years (12.5% to 14.9%) has and will continue to put an increasing strain on the human and financial resources on hospitals. It would be interesting to monitor and evaluate the impact of the anti-retroviral programme on hospital services in the South African setting. The hospitals are challenged with the service provision for the triple burden of disease – those of poverty, life style and injuries. Resource allocation therefore between the competing demands for the services at the institutional level requires skilful balance that ensures best clinical outcomes within the available resources and simultaneously patient satisfaction.

The study has highlighted disease patterns, which are clearly amenable to changes through an integrated approach focusing on primary care, health promotion and prevention, intersectoral collaboration and community participation. This approach is essential in reducing the burden on the hospitals and for the provision of cost–effective health services. It is also encouraging to find that the admission patterns of the various levels of hospital (central, regional, district) are in keeping with the expected patterns for these levels. This may therefore imply that there are efficiency gains that have been achieved by the hospital service sector but this can only be confirmed once an appropriateness of care evaluation has been conducted.

The timeous, accurate collection and use of statistics at all levels of management cannot be emphasised enough in terms of the benefits accrued for targeting the most appropriate cost-effective interventions to reduce the burden of preventable diseases as shown in this study. The need to ensure the availability and integrity of the medical records; the accurate recording of clinical information by the clinicians and a robust data management system for clinical information that informs planning, resource allocation and monitoring, are challenges that need be addressed with more rigor. A strong management imperative that compels all management levels to embark on evidence based decision making could enhance the culture of and begin to address the systemic issues of information use.

Finally this directorate fully supports the recommendations for this study to be repeated periodically over the next few years and the need for epidemiological modelling to augment the planning and the management capacity within the Department.

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ACRONYMS & DEFINITION OF TERMS

BOD	Burden of Disease
CFR	The Case Fatality Rate is the proportion of patients admitted for a disease dying from it
DHS	1998 Demographic and Health Survey
Disease Groups	Group I was composed of communicable diseases, pathological conditions affecting the maternal[1] and perinatal period, and the nutritional conditions. Group II and Group III were respectively composed of non-communicable diseases and injuries.
Disease categories	Each Group was disaggregated into categories such as respiratory infections under Group I.
DOH	Department of Health
HIS	Health Information System
FY	Fiscal Year
KZN	Kwazulu-Natal
IHD	Ischaemic Heart Diseases
Incomplete Abortion	Incomplete expulsion of the products of conception, with part of it remaining in the uterus
ICD10	International Classification of Diseases No. 10.
PID	Pelvic Inflammatory Disease

[1] Normal deliveries are excluded from the analysis

ACKNOWLEDGEMENT

This issue is based on the results of a survey on the hospital admissions in Kwazulu-Natal. The survey was a joint product of the Kwazulu-Natal Department of Health (DOH) and the Italian Cooperation, which financed it and provided technical support. Dr. Thilo Govender, Principal Epidemiologist of the DOH has provided her technical inputs during the survey and as coordinator of the Epidemiological Bulletin. Dr. Sibongile M. Zungu, Director of the Institutional Support Services, DOH, gave her approval and sent a letter asking for the collaboration of the hospital managers. The hospital managers took their time to meet with the survey team and gave access to the medical records. Dr. Venanzio Vella, epidemiologist of the Italian Cooperation, co-ordinated the survey, analysed the data and is the main author of this issue, but he has benefited from the inputs of the people mentioned in this acknowledgement. Dr Dario Mariani, public health specialist of the Italian Cooperation cross-validated the discharge diagnoses. Dr. Antonio Silvestri, Project Leader of the Italian Cooperation followed up the financial aspects of the survey. The survey team was composed of Mr. Nkosinathi E. Mthethwa (supervisor), Mr. Bongani P. Kubheka, Mr. Smilo Mzolo and Miss. Pamela P. Mkhize, who were commendable for their hard work and professionalism. The archivists helped the team in tracing the registers and the medical records. Bisnath Reshma and Imam Rogany, from the Italian Cooperation, contacted the hospital managers to set up the schedule and entered the data. The Epidemiology Bulletin Committee was instrumental for the finalisation of this issue.

ABSTRACT

Introduction

This issue presents provincial estimates of the causes of hospitalisation in Kwazulu-Natal (KZN) between 1998 and 2002. While the Health Information System (HIS) provides indicators on the patient throughput, such as the number of admissions and discharges, the causes of hospitalisation are not included. A routine data collection system on the discharge diagnosis would be too costly, because it would require extra staff and an effective supervision to ensure the reliability of the diagnostic coding. For this reason, the Department of Health (DOH) of KZN assisted by the Italian Cooperation conducted a survey on the hospital discharges for the period 1998-02. This issue is an executive summary of the full report, which can be obtained from the Epidemiology Unit of the DOH.

Methodology

The survey was based on a representative sample of medical records for the years 1998, 2000 and 2002. The survey team visited the 67 hospitals funded by the DOH and conducted a systematic random sampling of the medical records stored in the archives. The years covered by the survey provided the basis for the average annual estimates for the period 1998-02.

Results

According to the Burden of Disease methodology the results are presented by disease group, categories and specific causes. Group I includes AIDS and other communicable diseases, maternal and perinatal conditions, and nutritional deficiencies; while Group II includes non-communicable diseases and Group III includes injuries. These groups are then divided into disease categories, such as respiratory infections under Group I, and each category is further disaggregated into specific causes.

The results show that AIDS is the primary cause of admission. Of 100 admissions during the period 1998-02, 47 were due to Group I, 31 were due to Group II, 18 were due to Group III and 4 were undetermined. When the main groups were disaggregated into disease categories, the primary cause of hospitalisation was AIDS, followed by unintentional injuries and TB. Males were more admitted for TB and injuries, and females were more admitted for AIDS, diabetes and genitourinary conditions.

AIDS was the first cause of mortality. The highest case fatality rate was among patients affected by AIDS, malignant neoplasms and perinatal conditions. The first three causes of hospital mortality were AIDS, TB and cardiovascular diseases, which contributed to 39%, 12% and 10% of total mortality.

The main change in the admission profile between 2000 and 2002 was an increase in AIDS. Between 2000 and 2002, the proportion of admissions due to AIDS increased from 12.5% to 14.9%, TB and respiratory infections increased as well but at a slower pace, while there were no significant changes for the other diseases.

Conclusions

The DOH will have to face complex decisions in the next few years. AIDS is the first cause of admission and its burden is even higher because HIV causes other communicable diseases as well. Non-communicable diseases and injuries are also producing a sizable burden. The epidemiological transition, characterized by the presence of old and new diseases, increases the complexity of the policy and planning process. Decisions will have to be based on priority diseases, cost-effective interventions and feasibility within available human and financial resources.

This survey can be used as a planning tool to establish priorities and as a baseline against which to measure the impact of the strategies derived from the planning process. The survey has identified priorities, which could be addressed through effective interventions. A clear example is AIDS, which is the primary cause of admission and which could be tackled through antiretroviral therapy. If effectively implemented, such intervention is expected to reduce the number of admissions and deaths due to AIDS. Therefore, this first survey has indicated the planning path to be followed and it is providing a baseline against which to measure progress by conducting follow-up surveys in the next few years.

Introduction

Although the information on the causes of hospitalisation is essential to plan a better use of resources, the KZN DOH does not have provincial estimates on the discharges and deaths by cause. The Department of Informatics of the DOH collects several indicators related to the hospital throughput such as the number of admissions and discharges, but no information is available on discharge diagnosis by cause. A few hospitals produce some statistics on the discharge diagnosis, but this is done more because of the interest of individual managers than as a concerted effort from the DOH to get representative statistics for the whole province. There is no routinary system to extract and process the information from all the medical records of all the hospitals because it would require extra staff, training and supervision, and a high quality check on the reliability of diagnosis. Implementing a routine data processing of discharge diagnoses would have prohibitive costs, would take too long and would not be the best use of scarce resources. The only way to get a representative picture at the moment is to conduct regular surveys on the medical records that are stored in the archives of the hospitals.

To describe the burden on AIDS and other diseases on the health system, the DOH and the Italian Cooperation decided to conduct a survey on the hospital admissions in KZN. The objective was to estimate the number of admissions; the case fatality rates and the average length of stay by cause to provide a sound basis for better planning. This information is essential to quantify the burden of hospitalisation, rank problems in order of priority and identify interventions to reduce the burden. Another product of the survey was to provide material for epidemiological modelling to estimate the population incidence and mortality rates for key diseases. The information will therefore also provide the basis for expanding the epidemiological database for the estimation of the Burden of Disease (BOD).

Methodology

The survey was based on a representative sample of the medical records stored in the archives of the public hospitals of KZN. The survey was carried out between May and September 2003 in 67 hospitals funded by the DOH, where a systematic random sampling of 1 every 500 medical records stored in the archives was applied. The initial objective was to get a representative sample of the medical records for patients who were admitted between the 1st of January and the 31st of December of 1998, 2000 and 2002. However, approximately a third of the hospitals did not have records for 1998 and the following available year was sampled instead. Nonetheless, three years worth of admission records were sampled in each hospital and the results are presented as annual averages of the period 1998-02.

The medical records were coded and the final diagnosis was assigned according to the underlying medical condition causing each admission. Two medical doctors at the DOH reviewed independently each survey form and decided the final diagnosis according to the International Classification of Diseases No. 10 (ICD10). The inconsistent diagnoses were discussed to achieve consensus and when this was not reached, the diagnoses were considered undetermined, which was the case in about 4% of medical records.

As for the other diseases, the diagnosis of AIDS was based on the medical history. An admission was considered due to AIDS in case a positive HIV test was recorded or there were clear statements supportive of a clinical diagnosis of AIDS. Examples of such statements included “clinical retroviral disease” and “terminal stage of AIDS”. The medical records related to clinical AIDS cases were also searched for the major and minor signs of AIDS, suggested by the World Health Organisation. These records were also checked for the presence of diseases that are highly correlated with AIDS such as generalised Kaposi's sarcoma, pneumocystis carinii pneumonia or cryptococcal meningitis. Because of the conservative criteria applied for the diagnosis of AIDS, it is likely that the number of admissions due to AIDS is an under-estimate.

The medical records provided the estimates of the average annual burden of hospitalisation for the period 1998-02. Because all the public hospitals were included in the survey and a systematic random sampling was used, the sample was self-weighted. The data was inflated by the reciprocal of the sampling interval and it was divided by the number of years covered by the survey to produce the average provincial annual estimates. This produced a reliable profile of the annual burden of hospitalisation for most diseases for the period 1998-02. For AIDS and a few associated diseases, the latest year covered by the survey (2002) provides a more reliable estimate of the burden. Both the annual estimates based on the period 1998-02 and the estimates for 2002 are provided.

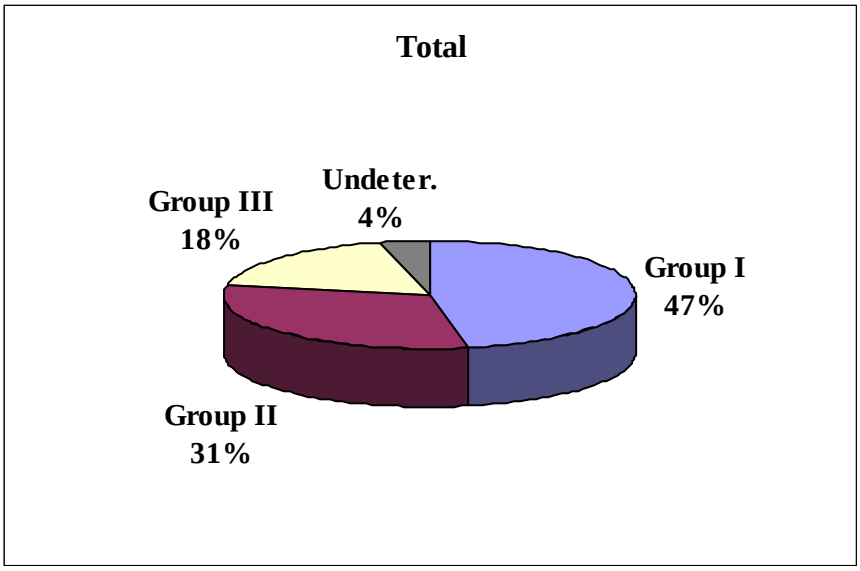
Results

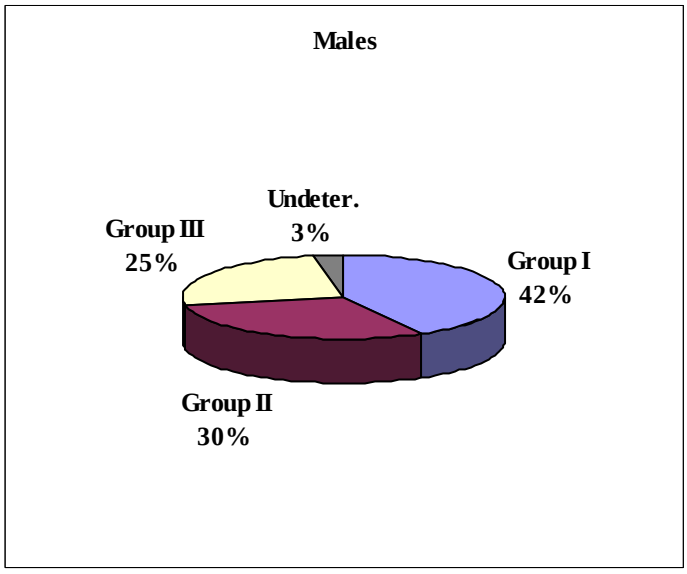
The results are presented by disease Groups, disease categories and specific causes. The estimates are related to the underline causes that started the train of events leading to hospitalisation. The diagnoses, based on the International Classification of Diseases No 10 (ICD10), were aggregated in accordance with the Burden of Disease (BOD) methodology. Group I was composed of communicable diseases, maternal conditions with the exclusion of normal deliveries, perinatal conditions and nutritional deficiencies. Group II and Group III were respectively composed of non-communicable diseases and injuries. Each group was disaggregated into disease categories such as respiratory infections for Group I, cardiovascular diseases for Group II and intentional injuries for Group III. Each category was further disaggregated into specific causes such as stroke for the cardiovascular category. The table on the subdivision of the ICD10 codes into groups, disease categories and specific causes is in the Annex of the full report. The discharge diagnoses are presented as annual average estimates for the period 1998-02, except for the last figure that is related to the changes in the admission profile between 2000 and 2002.

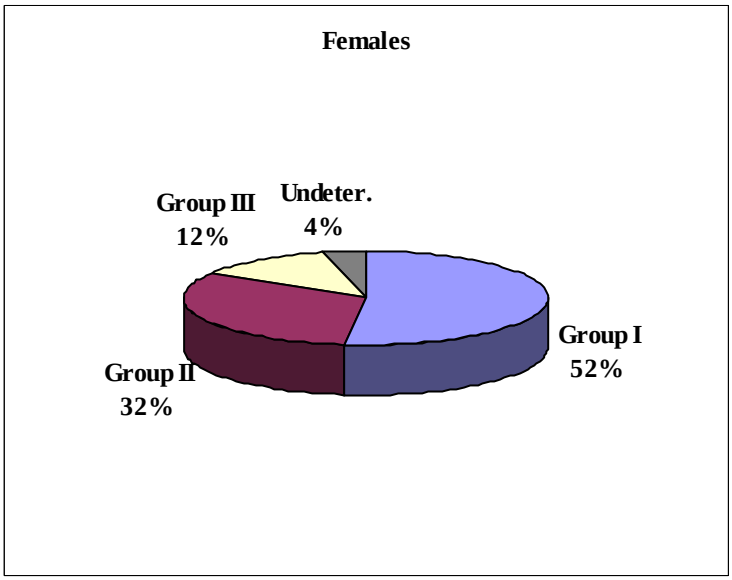
Disease groups

Groups I, II and III caused about half, one third and one fifth of all the admissions respectively. There were an estimated 679,500 annual admissions for the period 1998-02; 489,000 of which were related to pathological conditions, including maternal conditions, and the rest were normal delivery. Of these 489,000 admissions, about 231,000 (47%) were males and 258,000 (53%) were females. Groups I, II and III contributed respectively to about 47%, 31% and 18% of these admissions and 4% of the causes remained undetermined (Figures 1-3). The main gender difference was a higher proportion of Group III among males, and of Group I and II among females.

Figures 1-3 Distribution of disease groups, KZN, 1998-02



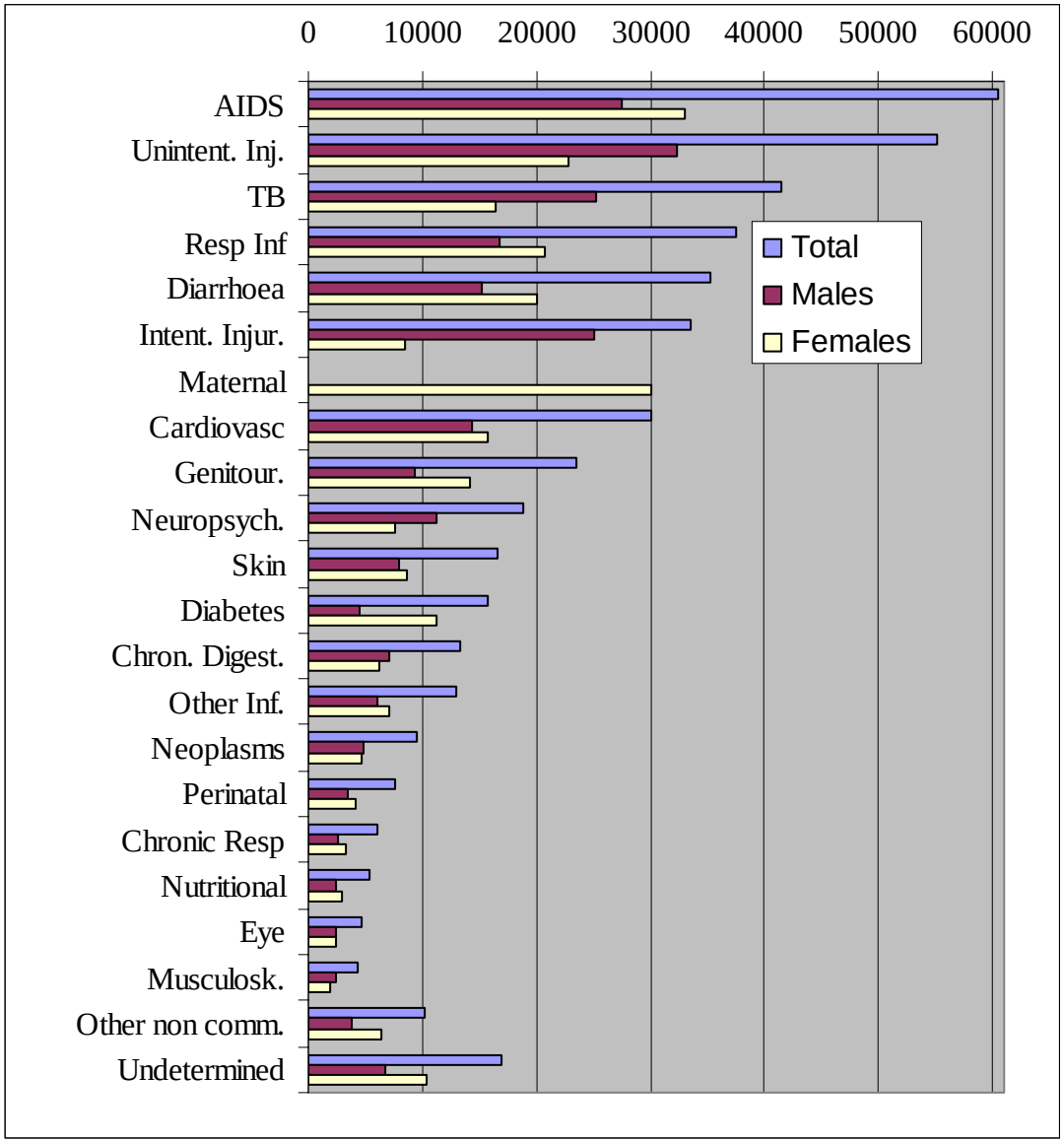




Disease category

When the three main groups were disaggregated into disease categories, the primary cause of admission was AIDS, followed by unintentional injuries. According to the BOD criteria, the three Groups were further disaggregated into categories, as explained in the methodology. Between 1998 and 2002, AIDS and unintentional injuries (i.e. trauma) are estimated to have caused respectively about 60,500 and 55,000 admissions per year (Figure 4). TB, respiratory infections, diarrhoea and intentional injuries followed next, with about 41,500; 37,500; 35,000 and 33,500 admissions per year; while each of the other categories caused between 30,000 and 4,000 admissions per year.

Figure 4 Annual admissions by disease category, KZN, 1998-02

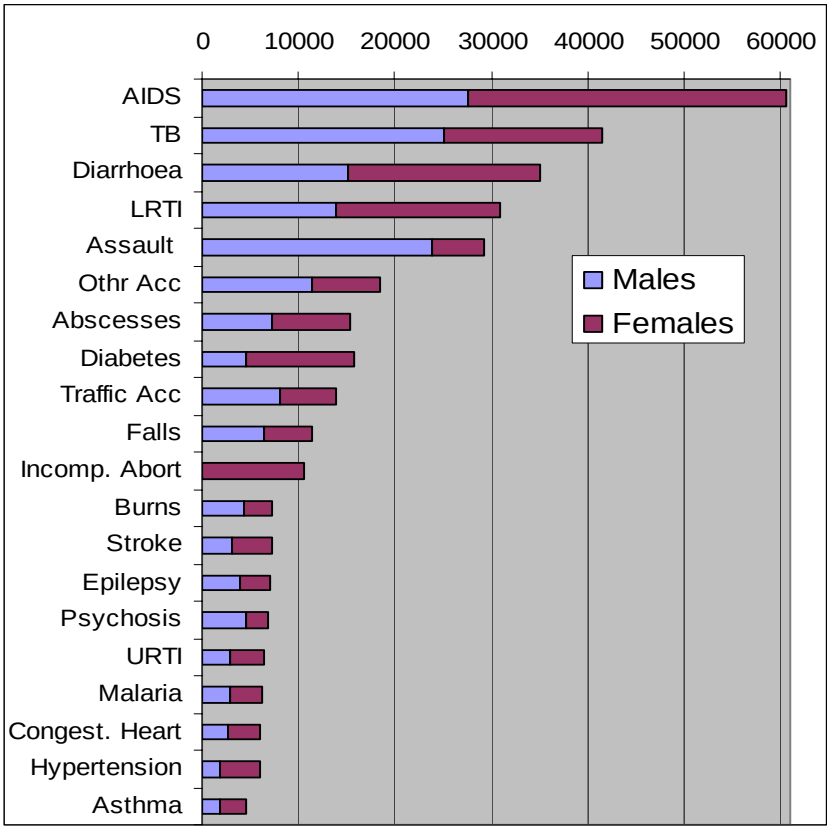


Therefore, of the 489,000 annual admissions expected for the period 1998-02, about 12% were due to AIDS. The 95% confidence interval (CI) of the proportion of admissions due to AIDS was 11.2%-13.6%. However, this should be considered as the minimal burden of HIV, because the diagnostic criteria were conservative and a certain proportion of the admissions categorized under other communicable diseases are due to HIV. If all the admissions, including normal deliveries are considered, of the 679,500 expected annual admissions, 8.9% (8%-9.8%, 95% CI) would be due to AIDS. This lower proportion is due to the denominator being inflated by the number of normal deliveries. The results of this analysis are based on the 489,000 pathological conditions; including maternal conditions, but excluding normal deliveries.

Specific causes

Each category was disaggregated into more specific causes such as lower respiratory tract infections (LRTI) and upper respiratory tract infections (URTI) for the 'respiratory infections' category. The first five causes were AIDS, TB, diarrhoea, LRTI and assault. Abscesses, diabetes, traffic accidents, falls, incomplete abortion, burns, stroke, epilepsy, psychosis, malaria, congestive heart failure, upper respiratory tract infections, asthma and hypertension ranked between the 5th and the 20th cause of admission (Figure 5).

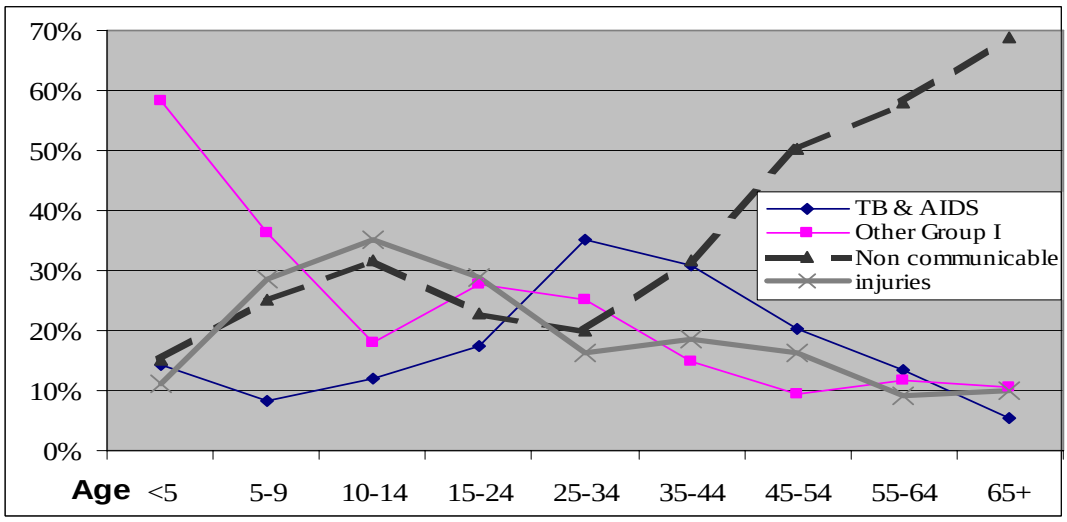
Figure 5 Annual admissions of the first 20 causes, KZN, 1998-02



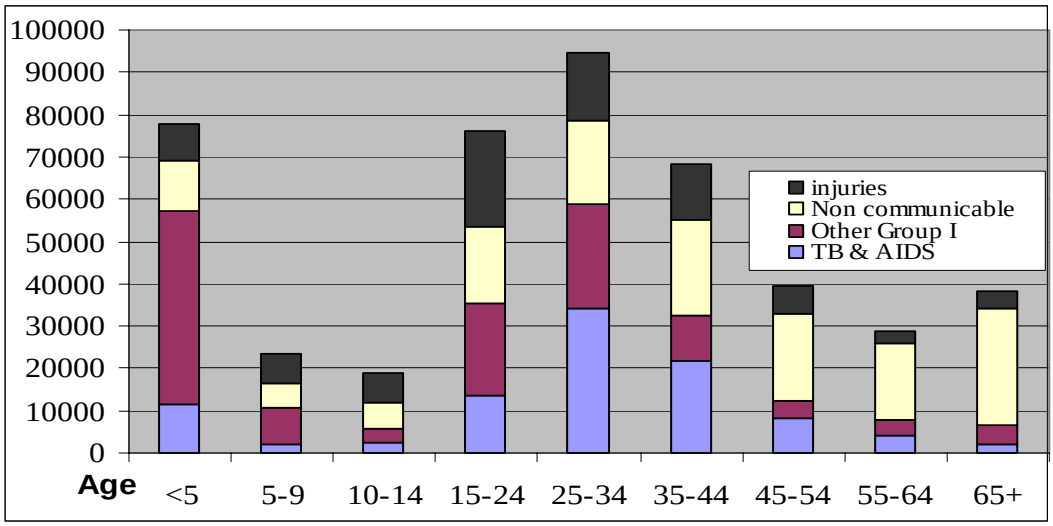
Age profile

The age profile was informative about the burden affecting each age group. The most frequent causes of admission were TB, AIDS and other diseases of Group I among preschoolers. Injuries were the first cause of admission between 10 and 14 years of age, while AIDS and TB increased after the age of 14 and peaked between 25 and 34 years of age. Non-communicable diseases increased after the age of 44 and gradually became the primary cause of admission in the older age groups (Figure 6). The highest numbers of admission were under 5 years of age and between 15 and 44 years of age (Figure 7).

Figures 6 Proportion of admissions by cause and age, KZN 1998-02



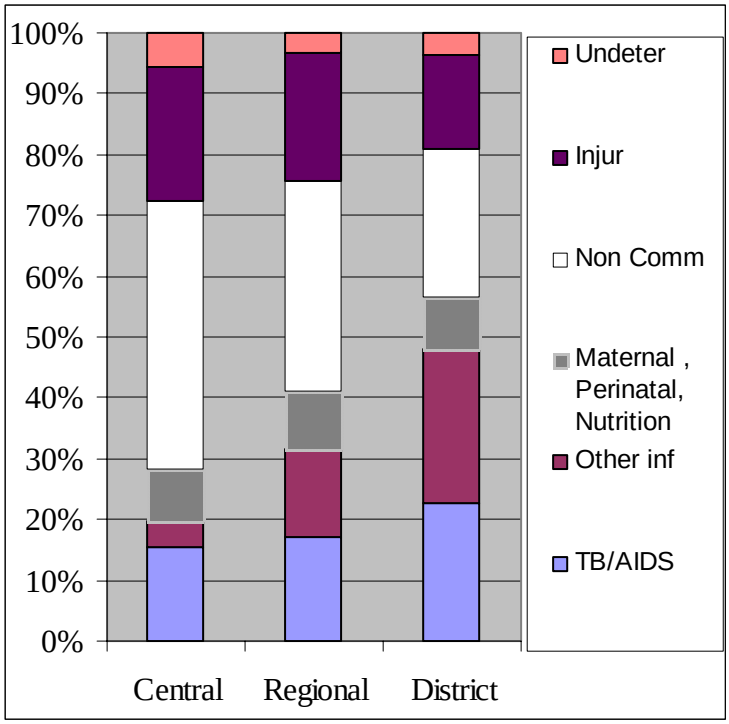
Figures 7 Expected annual number of admissions by cause and by age, KZN 1998-02



Type of hospitals

The admission pattern differed by type of hospital. The proportion of admissions due to non-communicable diseases and injuries was higher in central hospitals and declined gradually in regional and district hospitals (Figure 8). TB and AIDS were more frequent in district hospitals and gradually declined in regional and central hospitals. District hospitals had a relatively balanced representation of all diseases and injuries.

Figure 8 Admission profile by type of hospital, KZN, 1998-02



Average length of stay

The average longest and shortest length of stay was respectively for TB and eye conditions. The average length of stay was 18 days for TB; while the average stay was between 10 and 15 days for malignant neoplasms, musculoskeletal disorders, unintentional injuries, neuropsychiatric conditions and AIDS (Figure 9). Most of the other patients were spending between 5 and 10 days, while less than 5 days was the average length of stay for diarrhoea, maternal conditions and eye diseases. The period spent in hospital increased with age and was higher for males and in specialized hospitals (Table 1).

Figure 9 Average number of days spent in hospital, KZN, 1998-02

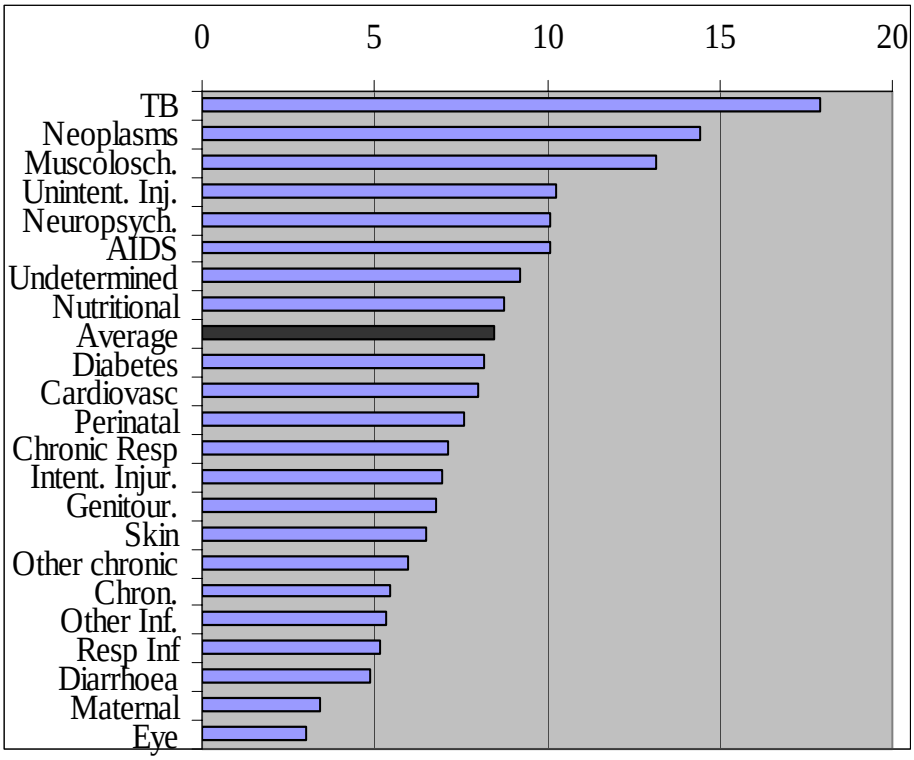


Table 1 Average length of stay*, KZN, 1998-02

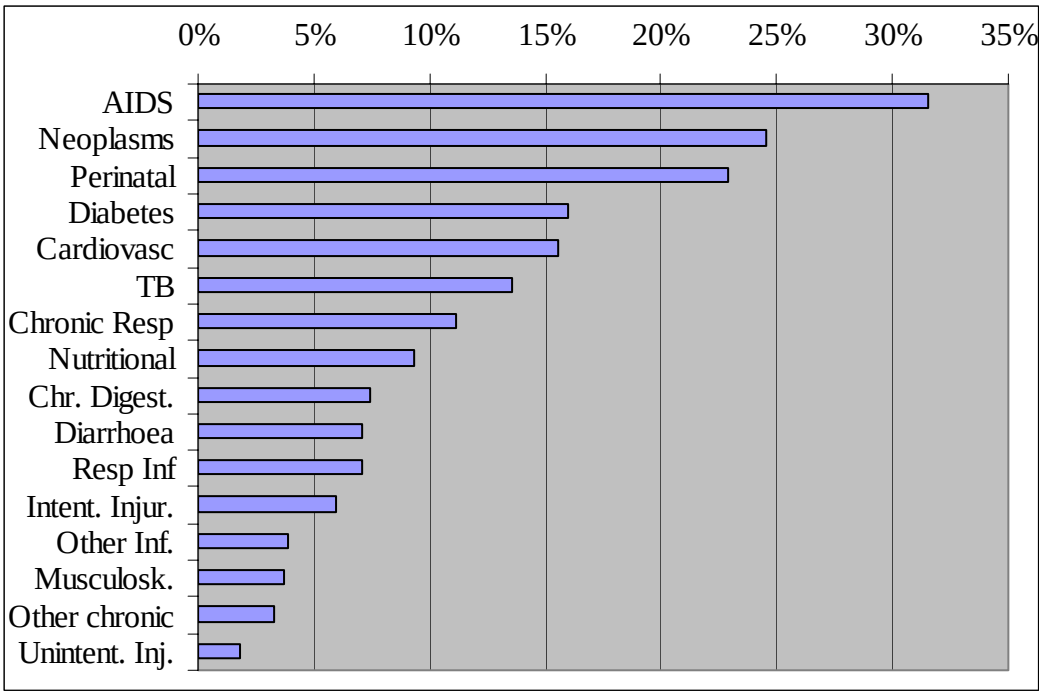
	Mean	95% Confidence Interval (CI)	
		low CI	high CI
Age Groups			
<5	7.0	6.2	7.7
5-14	8.3	7.8	8.9
15-44	8.5	8.0	8.9
45-59	10.1	8.8	11.3
>=60	8.9	8.4	9.4
Gender			
Males	9.3	8.6	10.1
Females	7.7	7.1	8.3
Type of Hospital			
Central	9.7	8.4	11.1
Regional	6.9	6.3	7.5
District	7.9	7.3	8.5
Special.	36.4	29.1	43.6
Total average	8.5	8.0	8.9

* For all conditions, including maternal, and excluding normal deliveries

Mortality

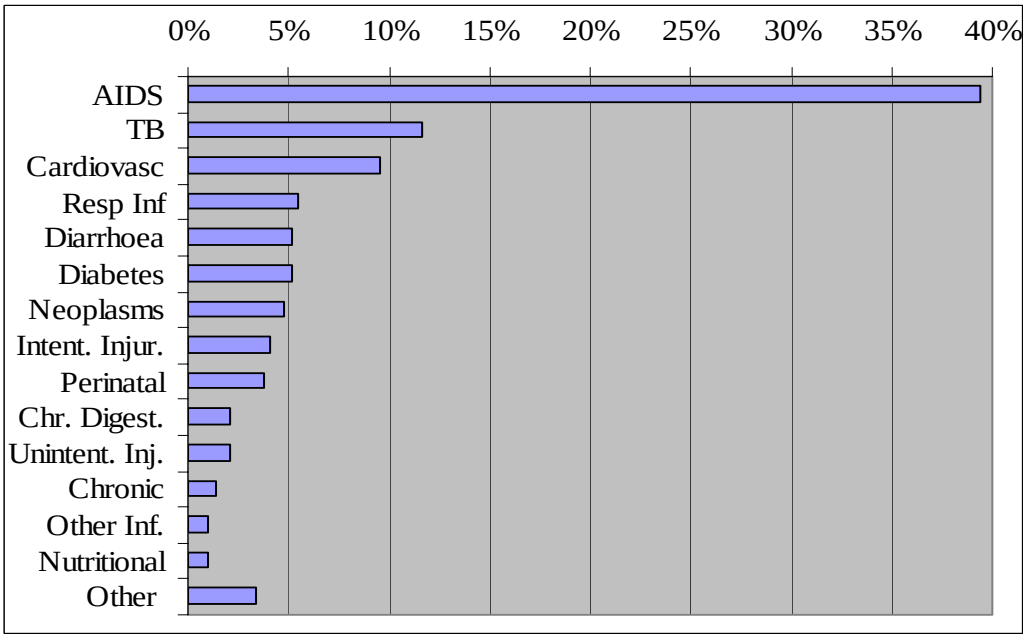
AIDS had the highest case fatality rate (CFR). About one third of patients with AIDS and slightly less than one fourth of patients with malignant neoplasms and perinatal conditions died (Figure 10). Diabetes and cardiovascular diseases had a CFR of about 16%; TB and chronic respiratory conditions had a CFR of respectively 14% and 11%. Nutritional deficiencies, chronic digestive conditions, diarrhoea, respiratory infections and intentional injuries had a CFR between 5% and 10%; and the rest had a CFR lower than 5%.

Figure 10 Case Fatality Rate by category, KZN, 1998-02



More than half of total hospital mortality was due to AIDS and TB. Because of their high case fatality rate and high frequency of admission, AIDS and TB caused respectively about 39% and 12% of total hospital mortality (Figure 11). Cardiovascular conditions caused about 10% of mortality; respiratory infections, diarrhoea, diabetes and malignant neoplasms caused about 5% of mortality each; while each of the other conditions caused less than 5% of total mortality. Although unintentional injuries were the second cause of admission they caused a small fraction of the total mortality because of their low CFR. This may be due to a tendency to over admit injuries that are not serious enough to require admission and to the fact that the most serious injuries end up in death before reaching the hospitals.

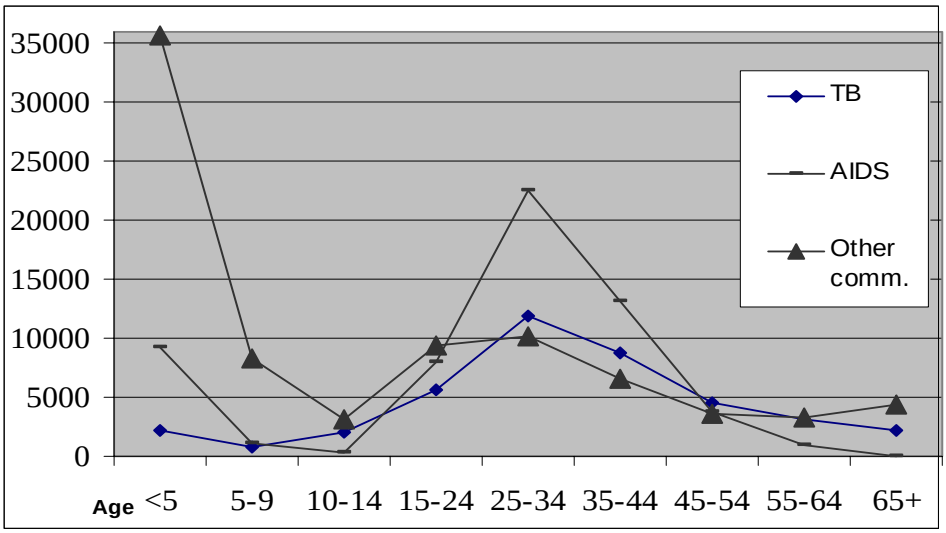
Figure 11 Proportion of hospital mortality by categories, KZN, 1998-02



Disease profile within each category

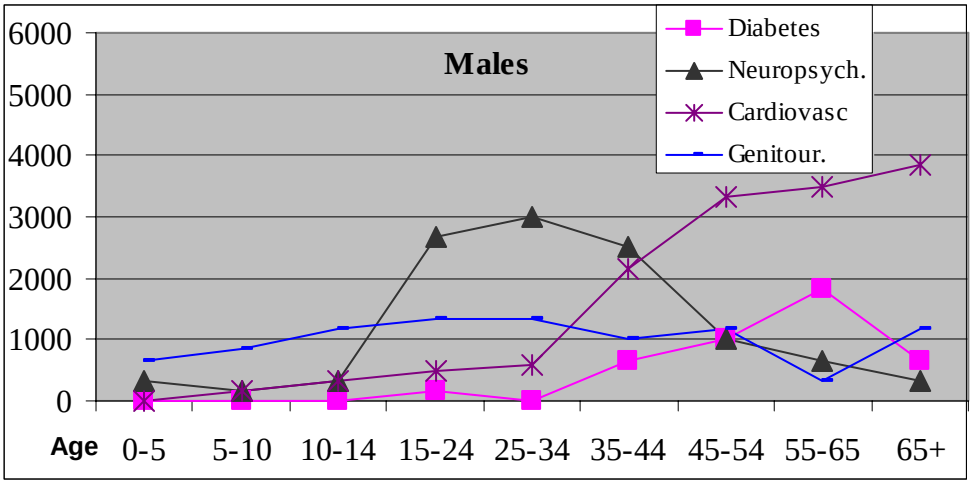
The presentation of the results continues with a description of the profile of the most important diseases within each category. In group I, communicable diseases declined after 5 years of age, increased between 15 and 34 years of age and declined again after the age of 34 (Figure 12). AIDS and TB accounted for more than half of the communicable diseases, diarrhoea and respiratory infections contributed for another 40%, and the rest of communicable diseases accounted for about 7%. Most of the rest of Group I was composed of maternal conditions, half of which was due to incomplete, spontaneous and threatened abortion.

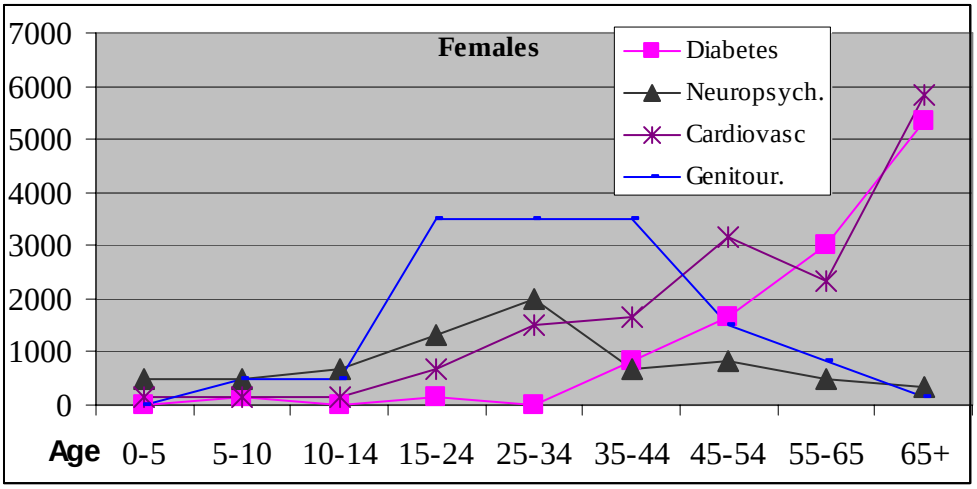
Figure 12 Annual admissions due to communicable diseases by age, KZN, 1998-02



In Group II, cardiovascular diseases were the first non-communicable diseases, followed by genitourinary conditions. Cardiovascular diseases and diabetes increased after 34 years of age, genitourinary conditions increased sharply among females of reproductive age and neuropsychiatric conditions peaked between 25 and 34 years of age (Figures 13 and 14). In terms of specific causes within each disease category, stroke and hypertension accounted for more than 40% of the admissions in the cardiovascular category. Nephritis and nephrosis were the first causes of admission among males and pelvic inflammatory disease was the first cause among females in the genitourinary category. Psychosis and substance abuse were more frequent among males while females were more admitted for depression in the neuropsychiatric category. Diabetes was affecting disproportionately more females and around 37% of the admissions for this condition were due to poor control ending in ketoacidosis and hyperglycaemia. Another half of the admissions among diabetics were due to ulcers and cardiovascular complications. The first cause of malignant neoplasms was cancer of the oesophagus among males and cancer of the cervix among females.

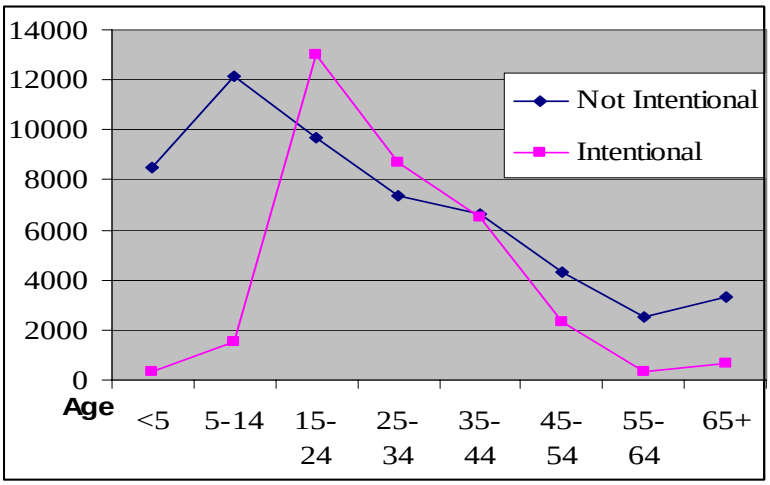
Figures 13 & 14 Annual admissions for non communicable diseases, KZN, 1998-02





Injuries affected more males than females and they were concentrated in the most active age groups. The most frequent injuries were not intentional, they peaked between 5 and 14 years of age, gradually declining afterwards (Figure 15). Intentional injuries were mainly due to assaults, which accounted for one third of all types of injuries, and increased sharply between 15 and 24 years of age and declined afterwards. Two thirds of the admissions for all types of injuries were among males, but females contributed 72% of attempted suicides.

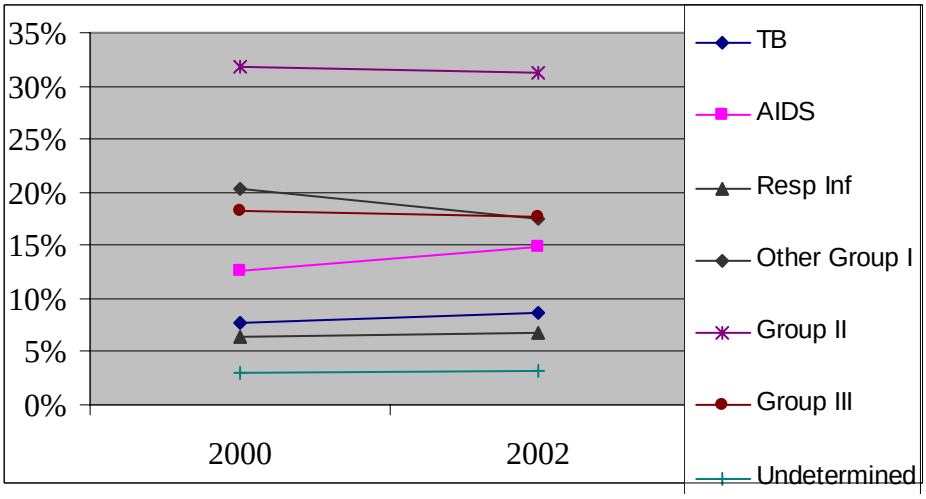
Figure 15 Age distribution of injuries, KZN, 1998-02



Trends

The admissions due to AIDS increased between 2000 and 2002. Because 1998 was available for only two thirds of the sample, it was only possible to measure changes between 2000 and 2002. The proportion of admissions due to AIDS increased from 12.5% to 14.9% between 2000 and 2002. TB and respiratory infections increased as well in the same period but at a lower rate, while the other diseases remained relatively stable (Figure 16). These changes, although based on a short time period, suggest that AIDS is steadily increasing as a cause of admission.

Figure 16 Proportional admissions by cause in 2000 and 2002



Discussion

This survey is the first of its kind to provide provincial estimates for the admissions in public hospitals of KZN. This includes the estimation of the expected annual admissions, the case fatality rate and the length of stay by cause. Considering that at the moment medical records are destroyed every five years and there is no system to process them, this survey has provided the only way to extract statistics that otherwise would have been lost. This effort could be repeated once every three years to measure trends and update the epidemiological database.

Admission profile and BOD

The admission rates cannot be directly used to estimate the burden of disease in the population. The probability of being admitted varies across diseases and it is influenced by the severity of symptoms, admission criteria, access to hospitals and other variables. For example, the results suggest that the profile of injuries in the population may differ from that seen in the hospitals because the most serious injuries end up in death outside the hospitals. Because of these limitations, further work is needed to derive population rates by using these and other data sources through epidemiological modelling.

Use of the information

There are several messages on the policy and planning side. Communicable diseases, followed by non-communicable diseases and injuries, characterize the burden of hospitalisation. The results confirm that KZN is in the process of the epidemiological transition, which is characterized by the permanence of communicable diseases and the insurgence of non-communicable diseases. Because of the co-existence of diseases of poverty and affluence, complex decisions need to be made on the basis of priority diseases, cost-effectiveness of interventions and feasibility allowed by available human and financial resources.

Group I

While primary prevention on risk factors can reduce the incidence in the long term, curative interventions can reduce the hospitalisation in the short term by preventing the complications of those already affected. The survey has estimated that AIDS caused slightly less than 15% of the admissions in 2002 but the burden of HIV is higher because it is the underline cause of other communicable diseases as well. The number of AIDS cases is rising because those who were infected by HIV years ago are approaching the clinical stage of AIDS. While preventive strategies to decrease the spread of HIV will continue to be a priority, AIDS patients will overburden the hospitals in increasing numbers in the next coming years. Antiretroviral therapy may partly reduce this burden by preventing the deterioration of AIDS, TB and other communicable diseases, which are associated with HIV.

Group II

Non-communicable diseases accounted for about one third of the admissions, with cardiovascular and genitourinary conditions being the first two non-communicable disease categories. Prevention to reduce the risk factors causing cardiovascular diseases requires a long time to produce an impact because of the difficulty involved in changing risky behaviours. Costs and feasibility of preventive and treatment strategies need to be assessed so that interventions can be ranked in order of priority.

Group III

Injuries affect disproportionately more males and unintentional injuries are more frequent than intentional ones. Traffic accidents are the most frequent unintentional injuries followed by falls, burns, accidental poisoning and other unintentional injuries. Four out of ten injuries among males and two out of ten injuries among females are due to assault. The rest of the intentional injuries are due to attempted suicides, which are the only injuries affecting more females than males. Prevention of traffic accidents can produce an impact faster than other preventive strategies, if compliance with traffic regulations is enforced. Reducing interpersonal violence is much more difficult because it is deeply routed in socio-economic and cultural causes.

Conclusions and recommendations

The results of the survey could be used to improve planning and to measure the impact of intervention strategies. On the planning side, the survey has allowed to estimate the burden of hospitalisation and the causes of admission in order of priority. This information can be used to rationalise admission policies and as a baseline to monitor the impact of health strategies.

The policy debate should strike a balance between competing priorities and feasibility of interventions within available resources. Medical doctors and patients would argue that there is no need to set priorities because each and every patient should be covered whatever the costs may be. However, covering all needs is impossible due to budget constraints and some ranking should be done according to BOD, cost effectiveness and feasibility.

Having identified priority interventions is not enough if feasible strategies are not in place. Although hypertension and diabetes are priority diseases and treatment guidelines are available, most patients affected by these conditions continue to be hospitalised because they are poorly treated at primary care level. The present challenge for the DOH is to check why this is so and how this situation could be improved within feasible implementation criteria and the limited available resources. Once strategies are more in line with what is possible to do within the capacity of the health system, a follow up survey could be conducted once every three years to measure changes and to assess if health strategies are making a dent in the admission rates for target diseases.

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