HEALTH STATUS IN SOUTH AFRICA

Input paper for Health Roadmap

SEPTEMBER 2008

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1. INTRODUCTION

The essential role of health in development and reducing poverty has been increasingly acknowledged. The report of the WHO's Commission on Macroeconomics and Health reviewed the evidence on the relationship between poverty and health and highlighted the need to invest in health (WHO, 2001). This has clearly been recognised in the development of the Millennium Development Goals (MDGs), with 3 of the 8 goals having a specific health focus. Murray (2007) highlights how these have brought into sharp focus the need for reliable health statistics that have a credible audit trail so as to reduce areas of controversy.

Statistics on the health status of South Africans have improved considerably since 1994. However, there are still gaps and quality concerns that leave a degree of uncertainty on the exact levels and rates of disease and mortality. Vital statistics form the cornerstone of information on health status but household surveys such as the South African Demographic and Health Survey (SADHS) and health facility data such as the District Health Information System (DHIS) together with disease surveillance data provide important additional information.

Globally there has been a focus in the improving health information systems, particularly in low and middle income countries. The WHO has set up and initiative, the Health Metrics Network, as a collaborative network to focus on making improvements in the ability of countries to capture reliable and timely health information. Launched by the WHO in 2005, they have developed a framework and tools that can be used to assess a national health information system (HMN, 2007). They advocate that countries use this process to develop a strategic plan to improve the information system. Statistics South Africa is about to initiate such a process for South Africa and will set up a team to review the progress that it has made in health information and identify a coherent plan.

The series of articles "Who Counts?" published in the *Lancet* has highlighted the absence of reliable data for births, deaths and causes of death, and the need to count and account for these deaths in order to speed up and track progress for the MDGs (Lopez *et al*., 2007). South Africa has made great progress in improving vital registration. The Department of Home Affairs in collaboration with the Department of Health revised the death notification form in 1998 and provincial task teams were established to facilitate death registration. It is estimated that adult death registration has improved from about 50% coverage to more than 85% (Dorrington, Moultrie and Timaeus, 2004). Statistics South Africa has made great progress in processing the causes of death data and has overcome the previous backlog in data processing. However, there is a need to improve the quality of cause of death certification (Groenewald and Pieterse, 2007).

The purposes of this document are twofold:

- review trends in health status using the MDG framework (within the data constraints),
- identify priority health interventions based upon the findings from the health status data, and
- review the health information system needed to monitor the MDG's.

2. HEALTH STATUS

2.1 Trend in health status

South Africa has undergone a profound change in health status. The number of deaths by age and sex reported by Stats SA have increased from 213 279 in 1994 to 591 213 in 2005 (Stats SA, 2007). However, some of this increase has been a result of increased registration making it necessary to interpret the data carefully.

Figure 1 shows the age pattern of the deaths by year, indicating a relentless increase in the young adult and child deaths during the period 1997-2005. The increase in young adult deaths is particularly pronounced in young women with the numbers in the 30-34 year age group being 4 times higher in 2005 than in 1997. The increase has been in natural causes, mostly infectious disease.
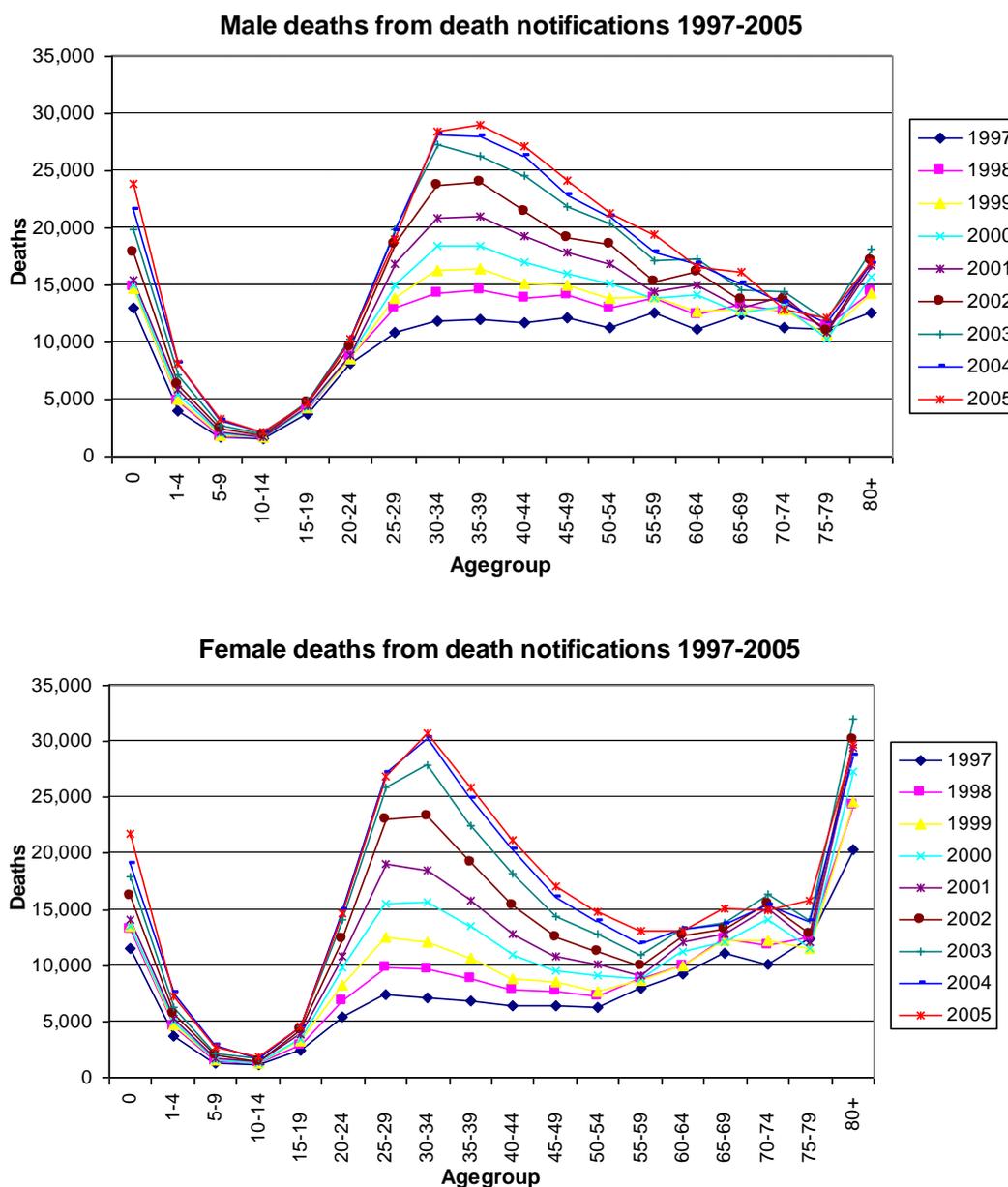
Figure 1: Trend in number of death notifications, 1997-2005
Source: Stats SA, 2005

Figure 2 shows the proportion of deaths due to leading causes, as reported on the death notifications. Injuries declined from 17% in 1997 to 9% in 2005 and are no longer the leading category of death. However, the actual number of injury deaths has remained fairly constant from year to year, indicating that the drop in proportion is related to an increase in the natural causes rather than a drop in injuries.

Deaths in South Africa 1997-2005
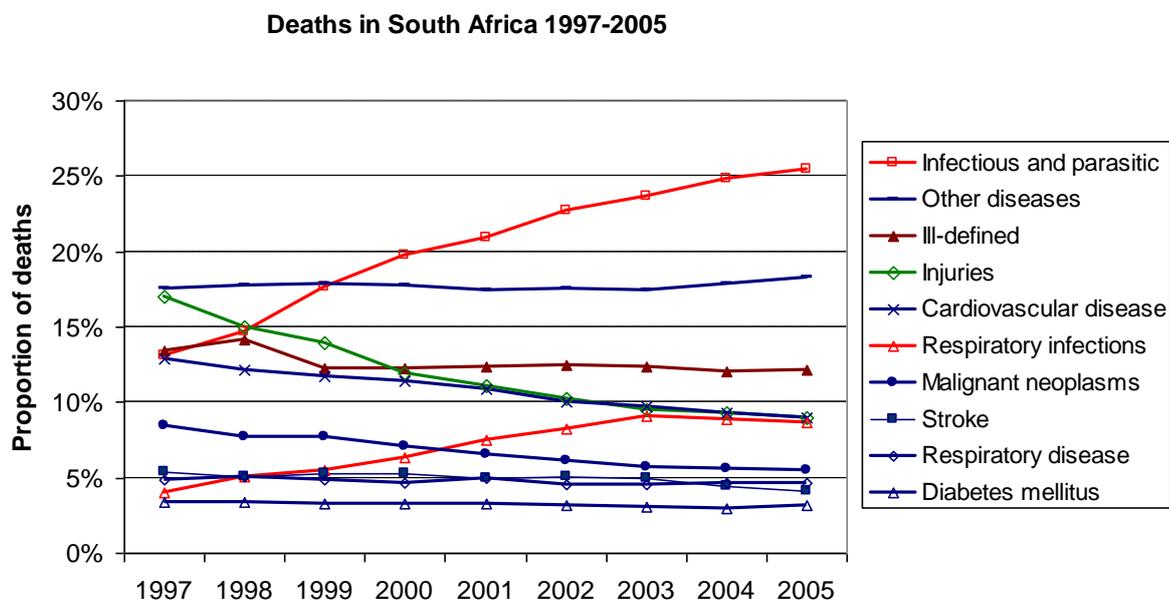
Figure 2: Trend in proportions of leading categories of causes of death, 1997-2005
Source: Stats SA, 2005

Infectious diseases, particularly TB, increased the proportion of the deaths due to infectious and parasitic causes from 13.1% to 25.5% and pneumonia has increased the proportion of deaths due to respiratory diseases from 4.8% to 8.7%.

Discerning the actual trends in death rates by cause from the Stats SA data alone is difficult as both the under-registration of deaths and the mis-classification need to be taken into account. HIV was certified as the underlying cause for only about 2% of the deaths across the period. However, given the distinct age and cause pattern of the increase, together with other epidemiological data, it is evident that the major increase during this period has resulted from AIDS, affecting young adults, babies and children. Making use of multiple sources of data, the ASSA2003 model estimates that in 1994 the proportion of deaths that were due to AIDS was about 3%. The model estimates that this increased to about 28% in the year 2000 and that by 2005, 46% of the deaths were due to AIDS.

The AIDS epidemic has had a profound impact on life expectancy. Estimates of life expectancy during this period have shown a decline from 54.5 years in 2000 to 50.0 years in 2007 (Stats SA, 2007). Estimates produced by the ASSA2003 model are very similar and indicate that the life expectancy had dropped from 62.1 in 1994 (ASSA2003, 2007).

2.2 **Child nutrition and mortality**

MDG 4 is to reduce child mortality. The target is to reduce the under-5 mortality rate by two-thirds, between 1990 and 2015. The indicators for this goal are the under-5 mortality, the infant mortality rate and the measles immunisation rate. Closely related to this goal is nutritional status of children (which is also an indicator for target 2 related to eradication of hunger).

The number of registered deaths of children under-5 years has increased from 33,000 in 1997 to 62,000 in 2005 (Stats SA, 2007). However, as indicated previously, this increase is difficult to assess as it coincides with an improvement in the vital registration systems and may therefore be explained by improvements in the completeness of registration. Furthermore, concerns about the quality of the child mortality data from the 2003 South African Demographic and Health Survey and the 2001 census have been highlighted making it necessary to resort to model based estimates (Bradshaw and Dorrington, 2007).

A recent review by the Every Death Counts writing group (Lancet, 2008) noted that all national, international and UN model based on data using national survey and adjusted vital registration data indicate a reversal in the previous downward trend in child mortality since the early 1990's (Figure 3). While there is no consensus on the exact mortality rate in recent years, there is general consensus that South Africa is not on track to achieve the MDG4. Plausible estimates of the under-5 mortality rate in 2005 range from 69 to 76 per 1000 rather than the target of 31 per 1000. This would indicate that about 60 000 child deaths per annum.
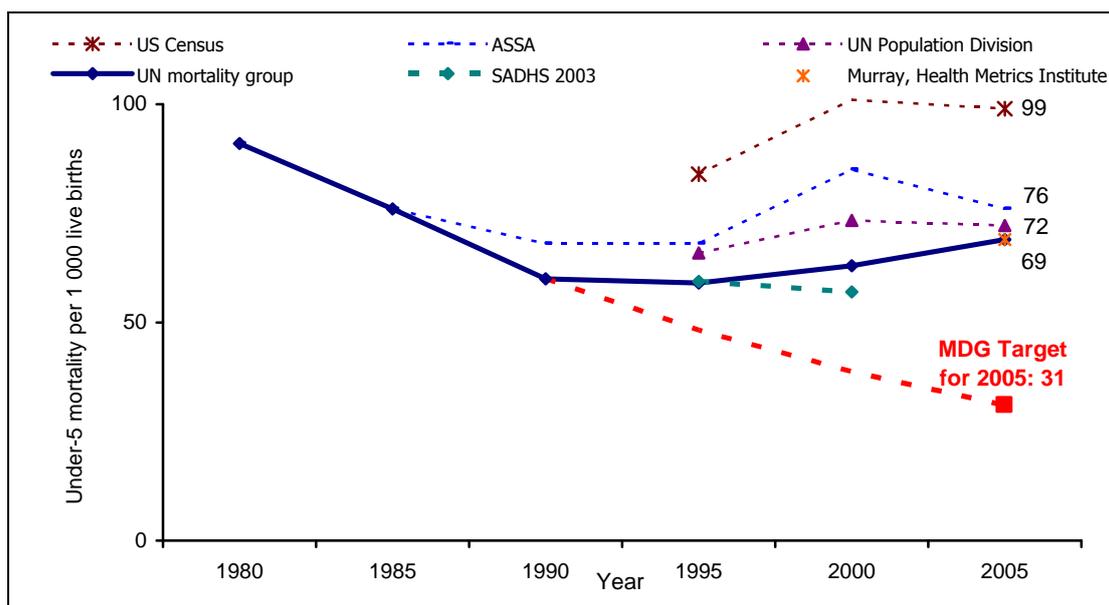
Figure 3: Estimates of trends of child mortality in South Africa
Source: Adapted from Every death counts writing group, 2008

According to a recent UNICEF report, there are some countries that had similar mortality rates to South Africa in 1990, that are well on track to meet the MDG 4 (UNICEF, 2007). Such countries include Brazil, Mexico and Egypt. Conversely, South Africa is among a handful of countries where the child mortality rate has actually increased since 1990, and South Africa would now

have to achieve an average annual rate of reduction of 14% until 2015 in order to meet MDG 4.

The national mortality audit reports, Saving Babies (2007) and Saving Children (2007), provide valuable information about the direct causes of child deaths, and importantly the avoidable causes of death and quality of care. Such information is extremely valuable to the facilities participating in the audit, but cannot be extrapolated to give a national perspective of the causes of child deaths as not all facilities participate and not all child deaths occur in facilities.

The cause of death data presented here is based on South Africa's National Burden of Disease study using population-based proportionate cause of death data from 1996, updated for 2000 and adapted to show the causes of death in the neonatal period (Norman *et al.,* 2006; Every Death Counts Writing Group, 2008). There are three major killers of children under age 5 in South Africa. HIV/AIDS, neonatal causes and childhood infections such as pneumonia and diarrhoea, each account for about a third of all deaths (Figure 4).

Figure 2c: Why do children and newborns die?
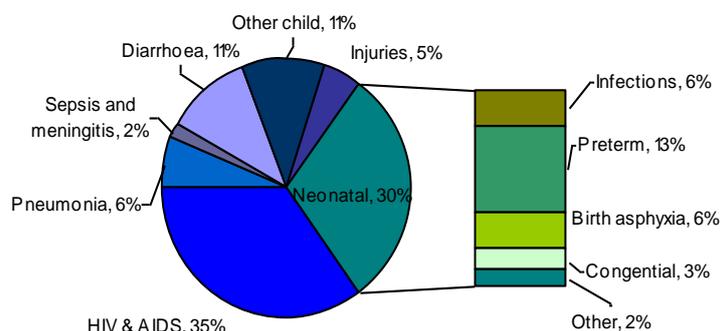
Figure 4: Estimated cause of death profile for children under-5 years
Source: Derived from the 2000 South Africa National Burden of Disease Study (Norman *et al.,* 2006)

Malnutrition and access to clean water are important risk factors for child mortality, as they increase the risk of dying from infections. It has been estimated that underweight accounted for 12% of childhood deaths (Nannan *et al*., 2007) and that unsafe water and sanitation accounted for 9.3% of deaths in this age group (Nannan *et al.,* 2007). It is also clear that the distribution and pattern of morbidity and mortality in South Africa are shaped by persisting inequalities in the major immediate risk factors.

According to the 1993 Living standards survey (PSLSD, 1996), rates of undernutrition show a marked gradient according to socio-economic status with stunting rates six times higher in the poorest quintile compared with the richest (38% vs. 6%). More recently, the 2003 National Food Consumption Survey has found that children residing in the predominantly rural and African provinces, such as the Eastern Cape, have much higher rates of stunting than children living in the more urbanized and racially mixed provinces such as the Western Cape (20% vs 14%) and are 9 times more likely not to have any skilled

attendant during birth (18% vs. 2%). Their families are also 2.5 times (83% vs 31%) to be food insecure15, 4 times (31% vs 7.5%) less likely to have access to safe sanitation and 10 times (35% vs 3%) more likely to be using indoor pollutants such as firewood for cooking and heating.

The 2003 SADHS measured children under-5 years of age and found 12% were underweight but a much higher proportion of children were stunted (27%). The NCFS-FB found that underweight among children 1-9 years of age had reduced was 9% in 2005 compared with 10% in 1999 (Labadarious, 2007). However, the prevalence of stunting had decreased from 22% in 1999 to 18% in 2005. While the prevalence has not changed in urban areas, the prevalence had dropped in rural areas from 27% to 20%.

According to the District Health Information System (DHIS), the number of severely malnourished children under-5 years of age treated in the public health care facilities declined markedly between 2001 and 2005. By 2005 there were about 30 000 children treated compared to the nearly 90 000 in 2001. Anthropometric data from national surveys do not appear to confirm such a trend and it is not clear whether this reflects a problem in the collection of the statistics or whether it reflects a changed policy in the health service. This needs further investigation.

2.3 Maternal mortality

MDG 5 is to improve maternal health. The target is to reduce the Maternal Mortality Ratio by three-quarters, between 1990 and 2015.

In 1997, the Minister of Health appointed the National Committee for Confidential Enquiry into Maternal Deaths. A system was established to collect information on all maternal deaths through a facility based audit that assesses the cause, avoidable factors and issues related to care. Provincial assessors analyse each case with respect to primary and final causes of death, and suboptimal care received. Reports are then sent to the national committee for collation and analysis.

Figure 5 shows the number of maternal deaths from the Confidential Enquiries compared with two series of numbers from the death notifications reported by Stats SA. The lower number shows the number of deaths with a maternal cause specified as the underlying cause of death. The higher number includes the underlying maternal causes as well as the deceased women who were pregnant or had given birth in the preceding 42 days, irrespective of the cause provided that it was a natural cause ie external causes were not included.

It can be seen from Figure 5 that the Confidential Enquiry numbers are higher than the number of registered deaths with a maternal cause as the underlying cause. However, the number is lower than the number of registered deaths where the underlying cause was maternal or woman had been pregnant or had given birth in the past 42 days. The registered number of deaths during from maternal causes or during pregnancy and the post-partum period reach 2200 deaths in 2005. However, since there is under-registration of deaths, and a proportion of the deaths are classified to ill-defined causes due to lack of information on the underlying cause, it is likely that the number of maternal and deaths during pregnancy and the post-partum period is actually higher.
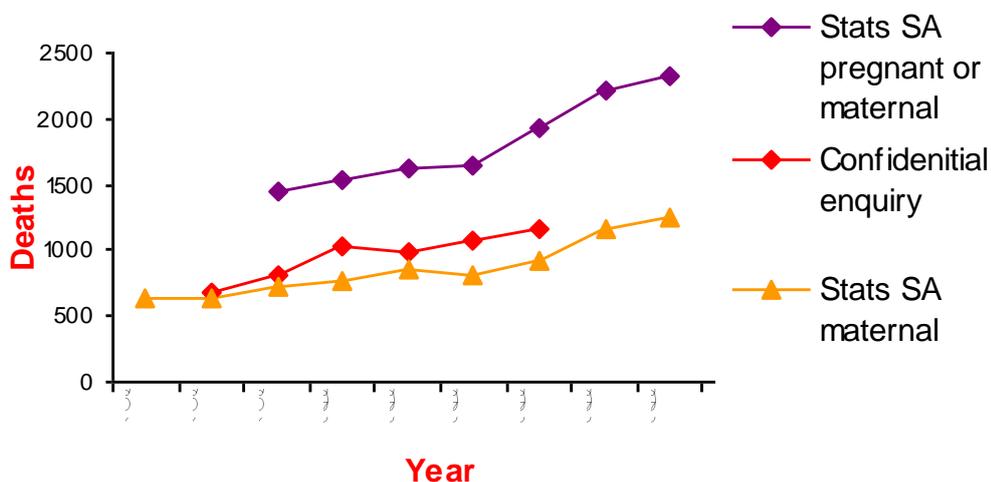
Figure 5: Number of maternal deaths from vital registration and Confidential Enquiry
Source: DOH and Stats SA

The last reliable population based assessment of Maternal Mortality Ratio was from the 1998 SADHS using the sibling methodology. From this survey, it was estimated that the MMR was 150 per 100 000 births for the period 1989-1998. Figure 6 shows the trend in the MMR based on the deaths shown in Figure 4 using an estimated number of births based on the ASSA2003 model and in the case of the Confidential Enquiry, the number of births in health facilities in the DHIS. In addition, the rates reported by Stats SA for 2003 and 2004 are shown as well as the MMR observed in the 1998 SADHS. It can be seen that the ratio from the 1998 SADHS was substantially higher than the ratio based on the Stats SA maternal cause data and the confidential enquiry in the early period suggesting that both the series understated the extent of the MMR. However, all the rates show an increasing trend in the MMR since that period.
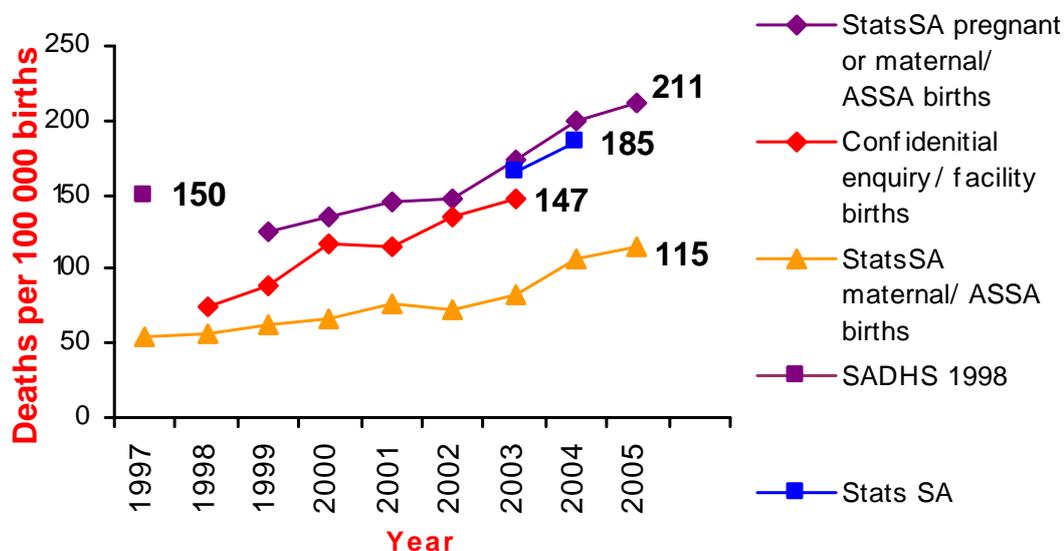
Figure 6: MMR from the South African Demographic and Health Survey, vital registration and Confidential Enquiry
Source: DOH and Stats SA

In the face of incomplete death registration data, modelling approaches have been developed to estimate the MMR. The WHO and UNICEF developed a model to estimate the MMR based on the GDP, the fertility rate, access to health care during delivery and the prevalence of HIV - factors that are known to be associated with MMR (United Nations, 2000). The estimates for South Africa were 230 per 100 000 in 2000 and 400 per 100 000 in the year 2005 (Hill et *al.*, 2007).

Another approach to estimate the MMR has been to include questions in the census or large national household surveys on the deaths in a household in the preceding 12 months. Cause of death information is also obtained, using broad cause groups including maternal deaths. South Africa included such questions in 2001 census and from this data and estimate of 575 per 100 000 was derived (Dorrington, Moultrie and Timaeus, 2004) and Stats SA provided a figure of 623 per 100 000 based on the 2007 Community Survey (unpublished data). This methodology appears to give high estimates of the MMR and may possibly reflect the inclusion of deaths of women during pregnancy or birth that are neither directly nor indirectly related to the pregnancy. Further investigation of this methodology is required.

Figure 7 shows the range of available estimates including the trend based on the Confidential Enquiry. These estimates indicate a large margin of uncertainty in the actual level of the MMR. However, they clearly indicate that South Africa is not making progress on reducing the maternal mortality and may not meet the MDG target of 38 per 100 000 births.
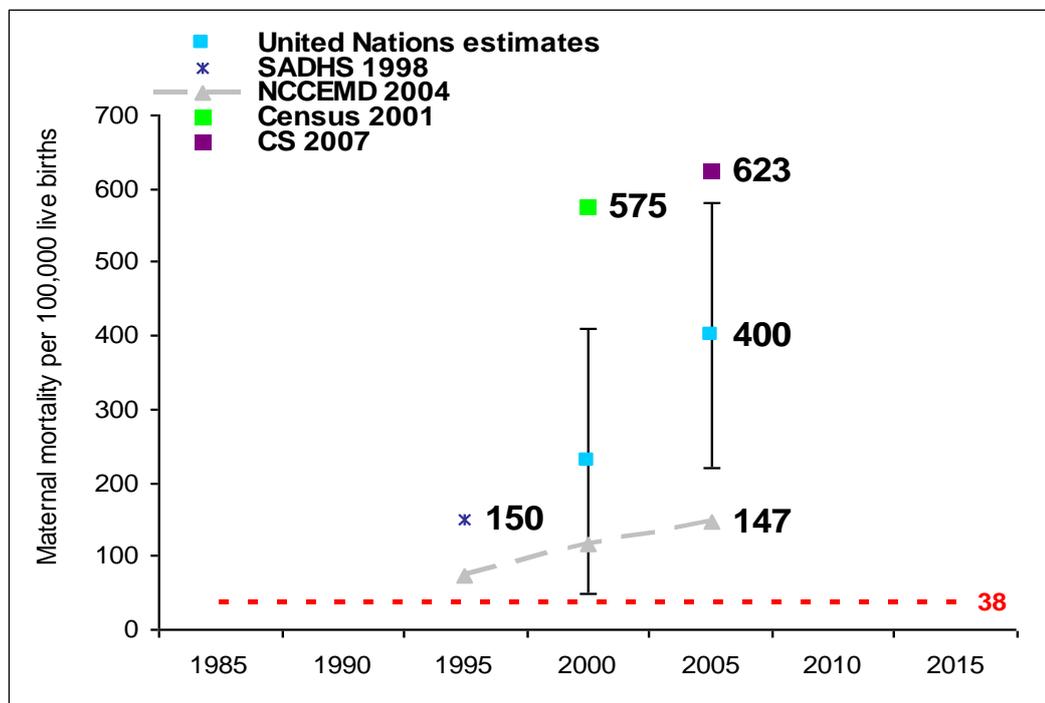
Figure 7: Estimates of the Maternal Mortality Ratio
Source: Multiple

Hypertension and haemorrhage are major causes of maternal death (Figure 8). Both of these conditions are preventable with good care before and during delivery. According to maternal death data collected by the Confidential Enquiry into Maternal Deaths, the dominant cause of maternal death is 'non-pregnancy related infections,' primarily HIV/AIDS and pneumonia. These accounted for at least 38% of all maternal deaths (Figure 8). The role of HIV

may be under-represented in these data. The audit found that only 46% women who died were tested for HIV and among those tested, 78% were HIV-positive.

Why do mothers die?
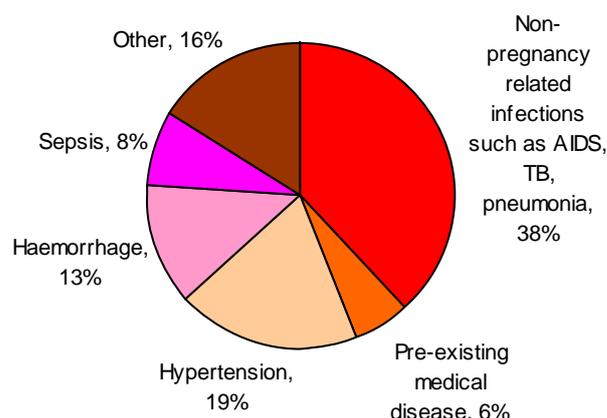
Figure 8: Causes of maternal deaths, South Africa
Source: Confidential Enquiry 2003-2005

Stillbirths are an extremely important indicator of maternal health. Based on the facilities participating in the PIP audit programme a stillbirth rate of about 25 per 1000 deliveries (500g plus) was reported. No changes in the rate were observed during the period 2000-2006 (Saving Babies, 2007).

Examining the causes of stillbirths, the data from the PIP programme indicate that while around one third of stillbirths remain unexplained, for those with a known cause, at least 3,500 babies each year die due to intrapartum asphyxia and birth trauma, underlining the need for better care during childbirth. Other stillbirths are due to infections and hypertension, requiring quality care in pregnancy (Figure 9).

Figure 2b: Why are babies stillborn?
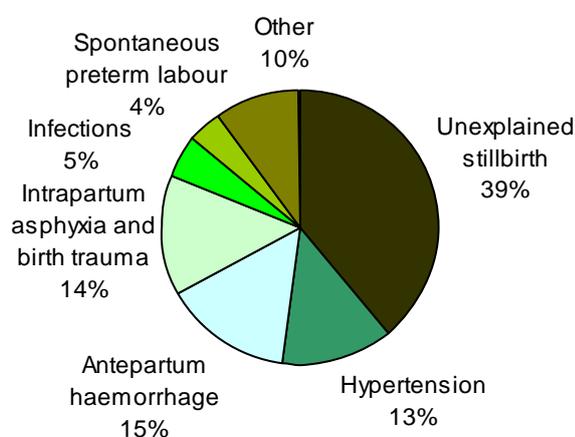
Figure 9: Causes of stillbirths, South Africa
Source: Saving Babies 2003-2006

2.4 **Major burdens**

MDG 6 is to combat HIV/AIDS, malaria and other major diseases. Specific targets are to halt and begin to reverse the spread of HIV and AIDS by 2015. Secondly, by 2015, to halt and begin to reverse the incidence of malaria and other major diseases. While it is quite clear that South Africa needs to address HIV/AIDS, it is important to assess the overall burden of disease to identify the other major burdens that should be targeted in our setting.

The 2000 South African National Burden of Disease Study and the Comparative Risk Assessment provide estimates of both the underlying causes of disease burden as well as the major modifiable risk factors. In these studies, disability adjusted life years (DALYs) were estimated to give a comprehensive measure of disease burden including both the loss from premature mortality as well as the time lived in illness or disability (Bradshaw *et al.,* 2007). Compared to the use of mortality as a measure of disease burden, DALYs also capture the contributions that have a large disability component relative to the number of deaths.

Figure 10 shows the breakdown of the causes and Table 1 shows the leading causes of DALYs in 2000 as well as the DALYs attributed to the 17 selected risk factors assessed in the Comparative Risk Assessment. It is clear that the South African population has a range of conditions and related risk factors that need to be addressed if the health of the nation is to be improved. From Table 1, it can be seen that HIV/AIDS, interpersonal violence, TB and road traffic injuries were the leading causes of burden in 2000.

Person DALYs, 2000
N=14 782 220
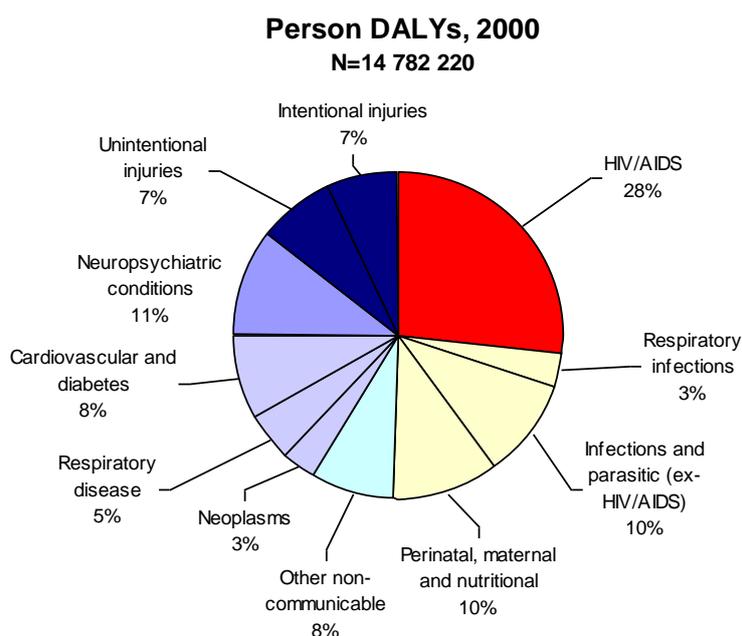
Figure 10: Estimated DALYs for South Africa, 2000
Source: Adapted from Norman *et al*., 2006

Table 1. Leading causes of compared with the DALYs attributed to selected risk factors, South Africa 2000

Rank	Disease, injury or condition	% total DALYs	Rank	Risk factor	% total DALYs
1	HIV/AIDS	30.9	1	Unsafe sex/STIs	31.5
2	Interpersonal violence injury	6.5	2	Interpersonal violence (risk factor)	8.4
3	Tuberculosis	3.7	3	Alcohol harm	7.0
4	Road traffic injury	3.0	4	Tobacco smoking	4.0
5	Diarrhoeal diseases	2.9	5	High BMI (excess bodyweight)	2.9
6	Lower respiratory infections	2.8	6	Childhood and maternal underweight	2.7
7	Low birth weight	2.6	7	Unsafe water sanitation and hygiene	2.6
8	Asthma	2.2	8	High blood pressure	2.4
9	Stroke	2.2	9	Diabetes (risk factor)	1.6
10	Unipolar depressive disorders	2.0	10	High cholesterol	1.4
11	Ischaemic heart disease	1.8	11	Low fruit and vegetable intake	1.1
12	Protein-energy malnutrition	1.3	12	Physical inactivity	1.1
13	Birth asphyxia and birth trauma	1.2	13	Iron deficiency anaemia	1.1
14	Diabetes mellitus	1.1	14	Vitamin A deficiency	0.7
15	Alcohol dependence	1.0	15	Indoor air pollution	0.4
16	Hearing loss, adult onset	1.0	16	Lead exposure	0.4
17	Cataracts	0.9	17	Urban air pollution	0.3

Source: Norman *et al.*, 2007

The 2000 burden of disease estimates also point to the fact that South Africa is undergoing a health transition and that non-communicable diseases such as stroke, asthma and diabetes feature among the leading causes of DALYs. Non-communicable diseases accounted for 33% of the DALYs in 2000. This includes neuropsychiatric conditions (11%), cardiovascular and diabetes (8%), respiratory diseases (5%) and cancers (3%). Such conditions can be expected to grow as the population of South Africa ages and as the lifestyles change. The WHO has highlighted the need to include non-communicable diseases in the MDG's and has proposed an additional target to reduce chronic disease death rates by 2% annually which would avert 36 million deaths globally by 2015 (Strong *et al.,* 2005).

South Africa needs to act swiftly to make use of the unique demographic moment of a declining number of births, and before the numbers of older persons grows too big, to be able to minimise the impact of cardiovascular diseases and diabetes, in particular, and the consequent demand on health services that is occurring in middle income countries (Leeder *et al.,* 2004).

Injuries too, account for a high burden in South Africa (Norman *et al.*, 2007). Given the age pattern of injuries, they result in a high number of years of life lost.

2.4.1 HIV/AIDS

HIV prevalence has been consistently monitored in South Africa through annual public sector antenatal HIV and syphilis prevalence surveys which have been conducted since 1990 by the Department of Health.

Figure 11 illustrates the antenatal HIV prevalence trends from 1990 to 2007 based on the public sector surveys. These indicate a rapid increase in the prevalence during the 1990's. The prevalence was highest in 2005 at a level of 30%. Subsequent surveys have shown a downward trend. However, the change in the survey protocol between 2005 and 2006 through expansion of the number of sampled clinics and between 2006 and 2007 through the method of analysis, makes it difficult to interpret the trend in recent years (Dorrington and Bourne, 2008).

Prevalence of HIV from antenatal survey

Prevalence (%)	0.8	1.4	2.4	4.3	7.6	10.4	14.2	17.0	22.8	22.4	24.5	24.8	26.5	27.9	29.5	30.2	29.1	28.0
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007

*Note that the estimates for 2006 and 2007 each based on a different methods to the previous year
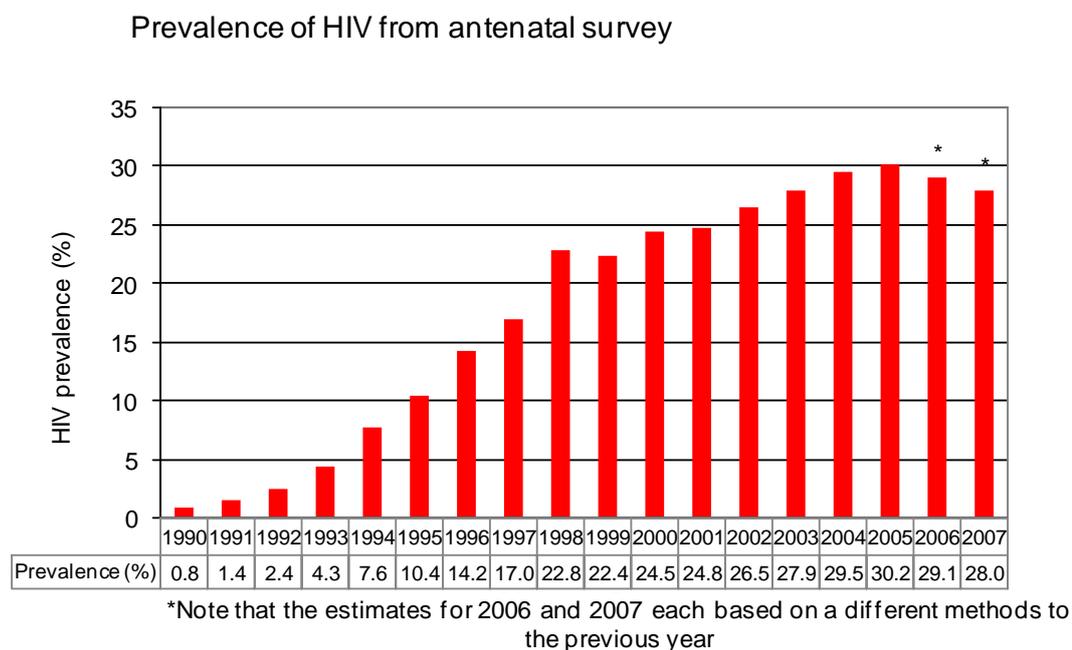
Figure 11: Antenatal prevalence of HIV
Source: Department of Health, 2008 and earlier

Trends in HIV prevalence differ by age group. Figure 12 illustrates antenatal HIV prevalence trends by age group since 1991. The prevalence appears to be falling for women in the age groups under 30 and could be evidence that interventions are having an impact. However, prevalence continues to increase in those aged 30 and over. This needs further investigation, but to some extent the increase in recent years might be the result of the roll-out of the provision of antiretroviral therapy.
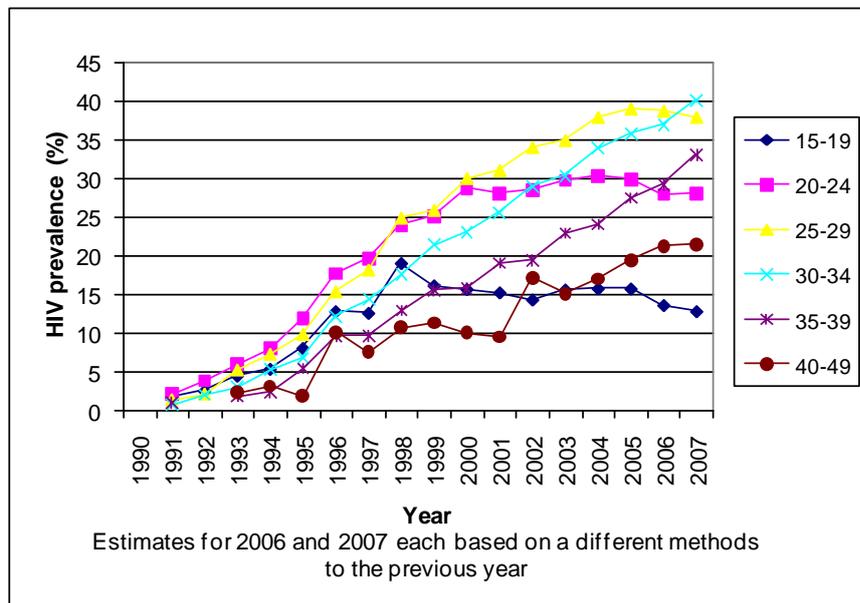
Figure 12: HIV prevalence of antenatal clinic attendees by age group, 1991 – 2007

Source: Department of Health, 2008 and earlier

HIV prevalence varies considerably throughout South Africa. Some provinces are more severely affected than others, with the highest antenatal prevalence in 2007 being in KwaZulu-Natal (37.4%) and the lowest in the Western Cape (12.6%). Figure 13 shows the trend by province.
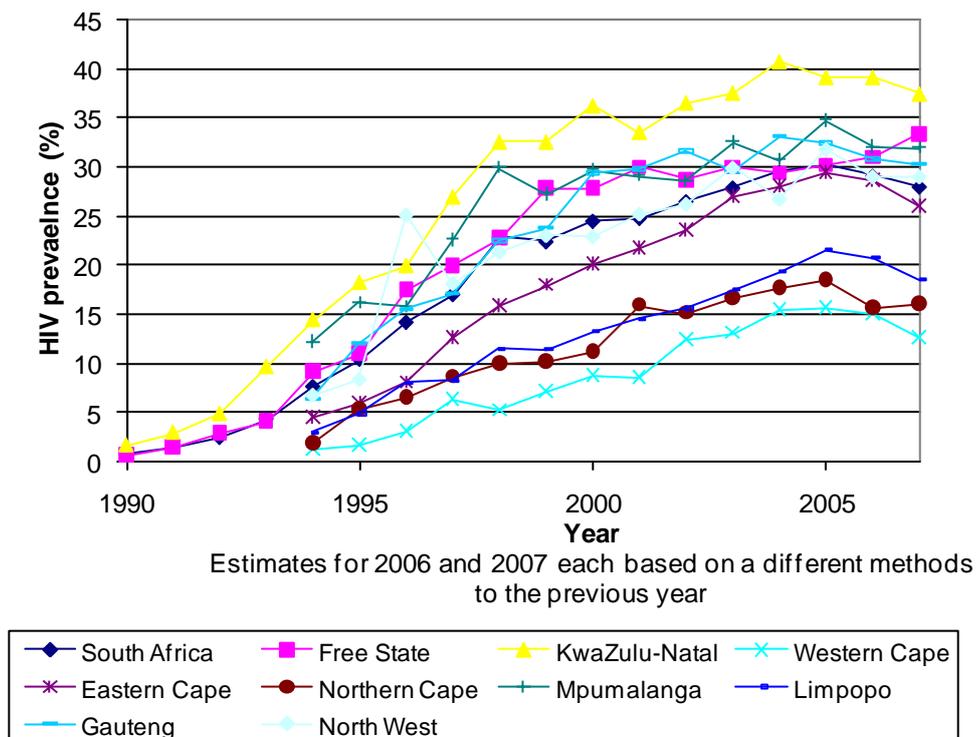
Figure 13: HIV prevalence of antenatal attendees by province, 1990 – 2005

Source: Department of Health, 2008 and earlier

However, even with a province there is much variation. The antenatal survey in the Western Cape was extended to district level in 2001. Analysis of the data illustrated a high degree of heterogeneity within the province, but also varying growth patterns in the various districts (Shaikh *et al.*, 2007). During the period 2001-2004, districts comprising predominantly informal urban areas had highest overall prevalence. The map of the HIV prevalence in 2007 is shown in Figure 14.
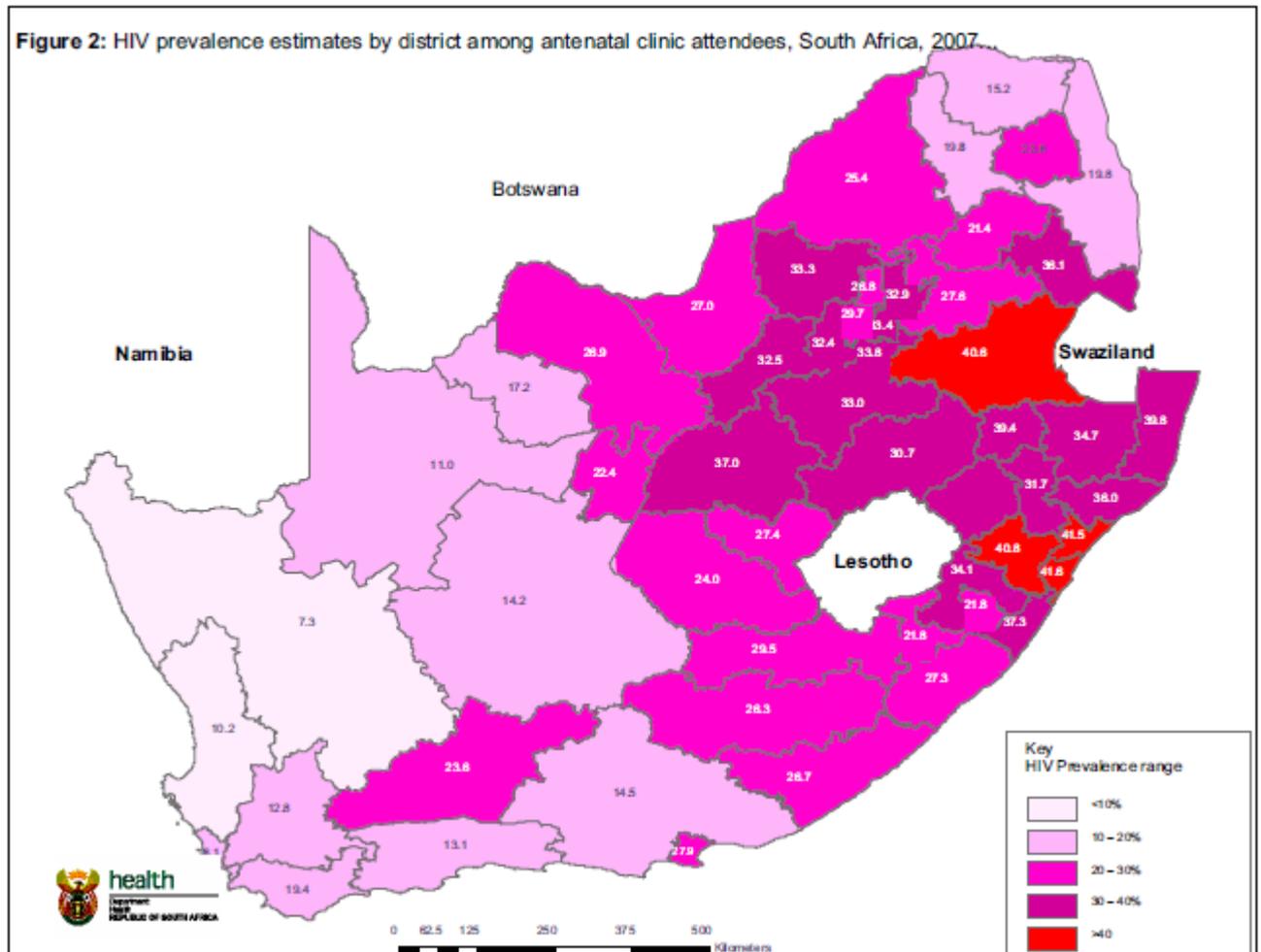
Figure 14: HIV prevalence estimates among clinic attendees, 2007
Source: Department of Health, 2008

Monitoring the trend in the epidemic based on the prevalence of antenatal attendees in the public sector has important limitations. In the mature stage of the epidemic, it becomes critical to have a measure of the incidence (ie new infections). The measurement of incidence has previously required observational studies of large cohorts with ongoing testing. However, new techniques for measuring incidence in a cross-sectional study are being developed.

Another limitation of the antenatal survey is that it does not provide the prevalence among men and among women in the general population. Two national population-based surveys conducted in 2002 and 2005 (Shisana *et al.*, 2002; Shisana *et al.*, 2005) and a national prevalence survey of youth that was conducted in 2003/4 (Pettifor *et al.*, 2004) have provided important data in this regard.

The prevalence of HIV has a distinct age pattern. Figure 15 shows the prevalence by age and sex from the most recent national household survey conducted in 2005 (Shisana *et al*., 2005). National-level HIV prevalence also varies markedly by population group, sex and age group. In 2005, Black Africans were found to be most affected (of the order of six to seven times higher than non-Africans), whilst females aged 15-29 were three to four times more likely to be HIV positive than males in the same age group. HIV was around 3% amongst children aged 2-14, much higher in those aged 15-59 and nearly 4% for people in their sixties.

Age group	2-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+
Males	3.2%	3.2%	6.0%	12.1%	23.3%	23.3%	17.5%	10.3%	14.2%	6.4%	4.0%
Females	3.5%	9.4%	23.9%	33.3%	26.0%	19.3%	12.4%	8.7%	6.4%	4.0%	3.7%
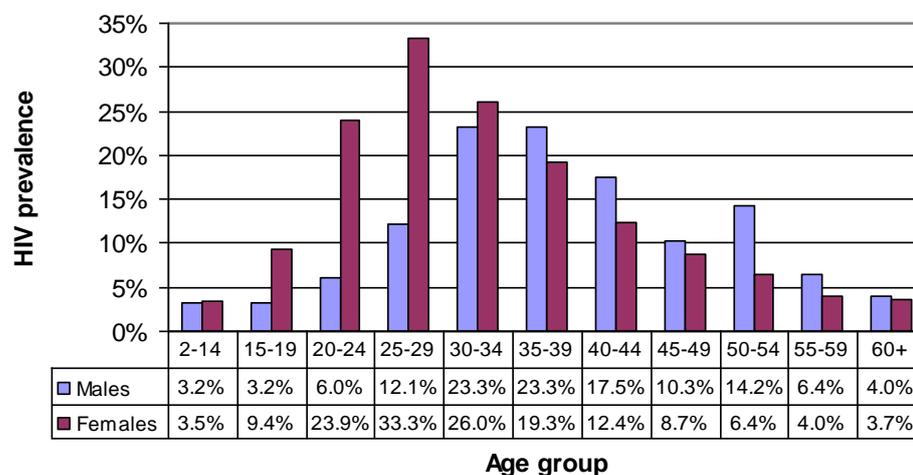
Figure 15: National prevalence by age and sex, 2005
Source: Shisana *et al*., 2005

The household survey conducted by the HSRC shows that prevalence varies by 'geotype' of residence (Shisana *et al*., 2005). The population-level HIV prevalence (for persons two years and older) in informal urban areas was nearly twice as high as in formal urban areas (17.6% vs 9.1%) in 2005. Levels in informal rural areas were 11.6% and in formal rural areas, 9.9%.

A number of national and sub-national studies have been conducted among sub-populations including employees, the military, health workers, educators (Shisana *et al*., 2005), health care workers and hospital patients (Shisana *et al*., 2002), amongst children attending health care facilities (Shisana *et al*., 2004), and in various other communities and sectors. Many, but not all, of these data are available in the public domain, and thus it is not possible to paint a comprehensive picture of the epidemic in different sectors in South Africa.

The reasonably comprehensive data that are available have allowed HIV prevalence, incidence and AIDS mortality to be estimated using demographic modelling as shown in Table 2, showing an estimated 5.4 million people living with HIV or AIDS in South Africa in 2006, of which a total of 294 000 were children aged 0-14 (Dorrington *et al*., 2006). These estimates are consistent with those of the Department of Health and UNAIDS of 5.5 million people living with HIV or AIDS of which 235 000 are children for 2005 but not consistent with the Department of Health's estimate that 5.27 million were infected in 2007 (Department of Health, 2008).

The annual number of new HIV infections in South Africa peaked in the late 1990s (Dorrington *et al*., 2006; Shisana and Rehle, 2007), but the number of

deaths per annum due to AIDS is expected to continue rising for the foreseeable future and as a result the number of maternal orphans is expected to rise from around 1.5 million in 2006 to a peak of around 2.5 million around 2020.

Table 2: HIV and AIDS Indicators at mid-2006

Births	
Uninfected births (over calendar year)	1 057 000
HIV+ births (over calendar year)	38 000
Infected through breastfeeding	26 000
People living with HIV/AIDS	
Total HIV infected	5 372 000
Adults (20-64)	4 880 000
Adult men (20-64)	2 179 000
Adult women (20-64)	2 702 000
Adults (15-49)	4 756 000
Adult men (15-49)	1 946 000
Adult women (15-49)	2 810 000
Youth (15-24)	1 012 000
Male youth (15-24)	181 000
Female youth (15-24)	831 000
Children (0-14)	294 000
New infections	527 000
Prevalence	
Total HIV infected	11.2%
Adults (20-64)	19.2%
Adult men (20-64)	17.8%
Adult women (20-64)	20.4%
Adults (15-49)	18.3%
Adult men (15-49)	15.4%
Adult women (15-49)	21.2%
Youth (15-24)	10.4%
Male youth (15-24)	3.7%
Female youth (15-24)	16.9%
Children (0-14)	1.9%
Incidence	
Total population	1.3%
Adults (20-64)	1.7%
Adult men (20-64)	1.9%
Adult women (20-64)	1.5%
At or before birth (of births)	3.5%
Breastfeeding (no. infected through breastfeeding in year/uninfected births in that year)	2.4%
Number adults (14+) infected by stage	
Stage 1	1 451 000
Stage 2	1 084 000
Stage 3	1 813 000
Stage 4 (not on treatment)	511 000
Receiving antiretroviral treatment	200 000
Discontinued antiretroviral treatment	18 900
Number children (<14) infected by stage	
Pre-AIDS	240 000
Stage 4 (not on treatment)	27 000
Receiving antiretroviral treatment	25 300
Discontinued antiretroviral treatment	1 500
AIDS sick	
New AIDS sick during 2006	479 000
Total AIDS sick mid-year	599 000

Note: Numbers rounded to nearest thousand to avoid spurious accuracy.

Source: Dorrington *et al.*, 2006

Major causes and Determinants of the Epidemic in South Africa

A comprehensive review of the major causes and determinants of HIV was undertaken in preparation of the new 5-year National Strategic Plan (NSP) on HIV & AIDS and STI, for the period 2007-2011 (Department of Health, 2007a). Careful consideration was given to the driver's of the epidemic so as to plan the country's multi-sectoral response to the HIV and AIDS epidemic. Many factors influence the heterogeneity and overall high levels of HIV prevalence in South Africa. These include biological, individual and social/contextual factors:

Sexual HIV transmission and biological risk

The likelihood that an individual will become infected with HIV through sexual contact depends on the mechanism of sexual contact, the viral load of the HIV positive person and the susceptibility of the individual. Whilst the probability of HIV transmission through a single coital act is relatively low, risk increases through repeat exposure and higher risk is strongly associated with higher viral load in the infected partner, co-infection with sexually transmitted infection(s), genital ulceration, genital maturity, and anal sex, amongst other factors.

Prevalence data and various studies have illustrated the higher biological vulnerability of women, younger women and girls in particular. Biological factors include underdevelopment of the genital tract in young women and girls, a greater surface contact area within the vagina, retention of fluids for a longer period, and the higher possibility of undetected STIs. Both males and females are biologically more vulnerable in the case of receptive anal intercourse, and uncircumcised males are also more vulnerable.

Concurrent sexual partnerships increase the likelihood of exposure of sexual partners to high viral load and consequently, higher likelihood of infection. High viral load in the late phases of HIV is reduced through antiretroviral therapy.

Epidemiological analyses have demonstrated correlations between circumcision and HIV prevalence, and protective effects have been shown in a randomized controlled trial in South Africa and elsewhere. Although male circumcision reduces the risk of HIV infection of males through female-to-male transmission, it is not clear whether it reduces male-to-female transmission, although there are likely to be long-term epidemiological benefits, as fewer infected men lead to fewer women being infected.

Sexual transmission and individual risk factors

Earlier sexual debut is significantly associated with increased risk of HIV infection. Risks of earlier sexual debut also include higher likelihood of having multiple partners, lower likelihood of condom use at first sex and higher overall numbers of sexual partners, not to mention higher biological susceptibility to infection of adolescent and young girls. Shifts towards later sexual debut have been correlated with prevalence declines in a number of African countries.

For young people, particularly girls under 20, having older partners is a significant risk factor for HIV infection as it exposes them to a pool of higher HIV prevalence. Both young males and females are more likely to be HIV positive if they have sexual partners five or more years older than themselves.

Transactional sex (sex in exchange for material gain) involves disempowerment which may include a reduced ability to negotiate safer sex – particularly condom use.

Having a higher overall number of sexual partners, having a high turnover of sexual partners and having concurrent sexual partners (or having a partner who has concurrent sexual partners) are all risk factors for HIV infection. People settle into permanent sexual relationships and marry at relatively older ages in South Africa. This results in a higher likelihood of having numerous life-time sexual partners. The length of the period of risky sexual activity prior to marriage has been shown to be closely correlated with HIV prevalence in a country and declines in HIV prevalence have been associated with declines in number of sexual partners in the past year.

When used consistently and correctly, male and female condoms prevent HIV infection (not to mention other STIs). Consistent, but not necessarily correct condom use is estimated to provide 80% protection in comparison to non-use, whilst inconsistent use is not significantly protective. Male latex condoms are widely distributed in South Africa including via the public sector, social marketing programmes and commercial sales, with over 350-million condoms annually being distributed on a demand basis in recent years. Female condoms are distributed to selected sites.

Reported levels of male condom use at last sex are high in South Africa, particularly amongst youth at 72.8% for males and 55.7% for females aged 15-24, and over 30% for males and females aged 25-49. However, high levels of reported use have not translated into reductions in antenatal HIV prevalence over the past five years. Increases in condom use with non-regular partners have however been associated with prevalence declines in other African countries.

Alcohol and drug use have a disinhibiting effect on safer sex as a product of diminishing rational decision-making. Alcohol use has been associated with higher risk of HIV infection, with heavy alcohol consumption being linked to higher likelihoods of having unprotected sex with a non-monogamous partner, having multiple sexual partners, and paying for or selling sex .

Knowledge of HIV status appears not to lead to increased adoption of HIV prevention practices amongst people who tested HIV negative, but has been linked to increased prevention behaviours amongst those who test HIV positive. Interventions focusing on people living with HIV who know their status – sometimes referred to as positive prevention – have also shown increases in the adoption of preventive practices. Around 30% of those aged 15 years and older report ever having tested for HIV in 2005, with a significant proportion having tested for HIV in the past year (eg. 49.5% of 15-24 year olds).

Contextual Factors

There are a range of contextual factors which facilitate the spreading of the epidemic in South Africa. Without going into detail or being exhaustive the main factors are:

- Poverty
- Mobility and labour migration
- Cultural attitudes and practices
- Gender-based violence and rape
- Stigma, denial, exclusion and discrimination

Whilst HIV is spread predominantly through unprotected sexual intercourse, other modes of infection remain important and are summarised below.

- Mother to child HIV transmission: HIV is transmitted to approximately one third of babies of HIV positive mothers if there is no medical intervention. Use of antiretroviral drugs, obstetric practices including caesarean delivery, and management of breastfeeding can reduce transmission to very low levels.

- Blood transfusion: The risk of HIV transmission via infected donor blood is high. However, donor and biological screening procedures allow for risk of HIV transmission through blood donation to be contained. Such procedures are followed in South Africa and risk is estimated to be very low – 1:400 000.

- Exposure to blood: In healthcare settings HIV can be transmitted between patients and health care workers in both directions via blood on sharp instruments, and may also be transmitted between patients through re-use of contaminated instruments. This too accounts for a minute of all infections.

- Intravenous drug use (IDU): IDU has long been recognised as a high risk practice for HIV transmission, as needles and syringes may be shared between users. The extent of intravenous drug use in South Africa is under-researched, but again IDU does not account for a high proportion of infections in South Africa.

Implications

With regard to the primary sexual epidemic, HIV prevalence declines in other African countries illustrate prevalence declines associated with delayed sexual debut amongst young people, reduced partner turnover and condom use with casual partners. Emphasis on these aspects are necessary, and although on the surface, similar to concepts of Abstain, Be faithful, Condomise (ABC), an orientation towards the specific behaviours of delay, limit partner numbers and turnover and use condoms consistently and correctly with casual partners is required.

In South Africa, further close attention is required around a number of other identified factors in heightened risk of sexual transmission. These include:

- Taking into account the heterogeneity of the epidemic, and focusing intensively on geographic areas and contexts where higher levels of vulnerability and incidence have been identified. Over and above geographic contexts such as higher prevalence provinces, and residence types such as informal settlements, attention should be given to mobility, migration, commercial sex work, prisoners, men who have sex with men and monitoring of injecting drug use.

- Recognising the disproportionate impact on girls and women and intensifying research to understand vulnerability alongside intensifying reduction in vulnerability amongst girls and women. This includes concertedly addressing violence against women and providing support to women who have experienced sexual violence.

- Communicating and addressing the increased HIV infection risks to young people, particularly young women, who have sexual partners who are five or more years older than themselves.

- Communicating the risks of transactional sex.

- Communicating the elevated risks of transmission to others as a consequence of having overlapping and concurrent sexual partners.

- Promoting correct and consistent condom use.

Sexually transmitted infections should continue to be addressed, with attention being given to the management of incurable STIs such as HSV-2. The interaction between TB and HIV is well understood and integrated management of these diseases should be sustained and intensified as necessary.

Prevention of mother to child transmission requires intensified communication and promotion. Attention should also be given to intensifying focus on the application of universal precautions in health-care and other settings.

SANAC provides and important multi-sectoral platform to support the implementation of the NSP but the plan needs to be adequately resourced if it is to achieve its goals. A comprehensive monitoring and evaluation framework has been developed (Department of Health, 2007b) which also needs to be resourced and implemented.

2.4.2 **TB**

The Global Tuberculosis Control report (WHO, 2008) places South Africa as currently having the highest TB incidence rate, the highest TB prevalence rate, the highest mortality rate and the among the 5 leading countries with the highest number of TB cases (Figure 16). The report notes that "[t]reatment success rates in South Africa remain low, with death and default the most common negative outcomes." The report however recorded that the 70% case detection rate target was reached for the first time in 2006. On the negative side, the point was made that, in 2005 at least, only one third of patients with TB were tested for HIV, and that no information was available on the proportion tested for multi-drug resistance.

World Tuberculosis Burden
TB Burden, Incidence, Prevalence and Mortality

Note: Figures refer to all forms of TB (Smear positive & negative), Estimated epidemiological burden, *Health Systems Trust Data
Source: WHO, Global Tuberculosis Control, Surveillance, planning, financing
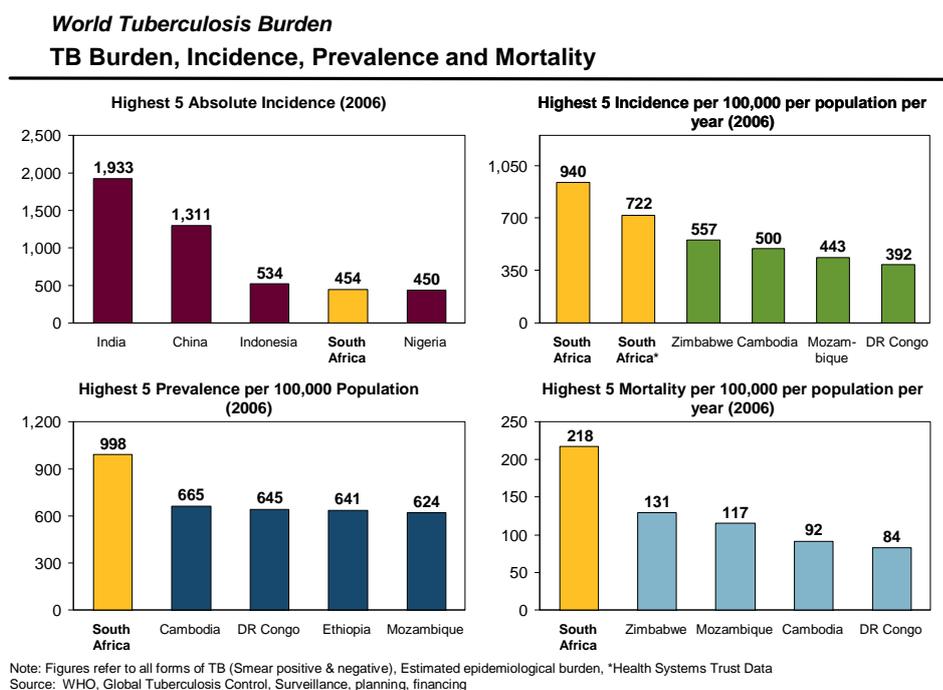
Figure 16. TB Burden, incidence, prevalence and mortality

Source: WHO, 2008

TB has always been an important health problem in South Africa, particularly affecting miners and working class. However, the HIV epidemic has exacerbated the spread of TB. People living with HIV are at increased risk of developing TB because the damage to their immune system interferes with the body's ability to fight TB. While the HIV epidemic has exacerbated the spread of TB, there are strong indications that the TB control programme is not working as well as it should be. The Draft Tuberculosis Strategic Plan for South Africa 2007-2011 is an extensive document and a useful source of data on the disease (Department of Health, 2007c), it highlights some important issues *inter alia*:

- commenting on the smear conversion rates for 2006, it is noted that "close on one in three patients (28%) do not have results available" (with MP, EC KZN and NC at more than 35%);

- while death and defaulter rates during the intensive phase are described as "low" (1.7-5.7% and 1-3.4% respectively), it is noted that 7% of patients remained smear positive at the end of the intensive phase (and thus likely to have drug-resistant disease);

- in particular, since this high positivity rate at the end of the intensive phase does not correlate with the reported low failure rate at the end of treatment, this casts doubt on the "quality of the laboratory results or the quality of data".

According to the draft TB Plan of the Department of Health, the number of identified MDR-TB increased from 3 278 cases in 2004 to 6 716 cases in 2006, and 2 140 cases in the first quarter of 2007 only. However, 36% of these were reported in the Western Cape which "has arguably the best TB control programme in the country." The TB Plan notes that the proportion of MDR cases remained "fairly constant at 2.6%." The explanation offered is that the Western Cape "has a higher degree of suspicion of MDR-TB and that it is being relatively under-diagnosed in other provinces". In contrast, it is noted that Mpumalanga, "where the TB control programme has not been functioning optimally", has seen a decrease in the proportion of MDR-TB over the same time period (from 1.99% to 0.7%). The most likely explanation is that "many patients with MDR-TB are not being diagnosed".

Time trends in relation to XDR-TB are also provided, but these are even more difficult to interpret. The cases noted were retrospectively diagnosed on the basis of laboratory records. A total of 898 cases were noted from 2004 until the end of the first quarter of 2007, but 221 of these were detected in that last quarter alone. KZN accounted for 65% of all XDR-TB cases, but again, the best that could be said of MP and LP was that their figures represented "gross under detection because of poor access to the culture and DST services".

Some data on the integration of TB and HIV services were also presented. It was reported that, by the end of the 2006/07 year, 211 sub-districts were implementing TB and HIV activities. It was claimed that 58% of TB patients were offered HIV counselling and testing and that 68% agreed to be tested. Conversely, "systematic TB screening" amongst people living with HIV had been "low", but it was reported that 29% of the HIV patients screened were found to have TB disease. It was also noted that the TB preventive therapy policy was "not implemented widely at this stage and the reasons for this will be investigated further this year".

2.4.3 **Injuries**

The injury profile in South Africa is dominated by interpersonal violence which accounted for 47% of all injury deaths in the year 2000. Road traffic injuries accounted for 27% of all injury deaths while self-inflicted violence accounted for 9% of the injury mortality in the year 2000. When the burden of disease estimates of the injury rates in South Africa were contrasted with those of the WHO regions, it was observed that the rates in South Africa were exceptionally high (Norman *et al.*, 2007).

There is limited data to assess the trends in the injury burden since 1994, but there are strong indications that homicide rates have decreased. The murder rate reported by the South African Police in Figure 17 shows a drop from levels of 70 per 100 000 population to about 40 per 100 000 (SAPS, 2008).

Murder Rate, Apr 1994 - Mar 2008

Figure 17: Annual murder, robbery and rape rates per 100 000 population, 1994-2008
Source: SAPS, 2008

Analysis of data from the National Injury Mortality Surveillance System provides city-specific homicide rates from 2001-2005. Although the data shows a general decreasing trend for Johannesburg, Pretoria, Durban and Cape Town, the rates in the latter two cities were higher than the national figure from SAPA at 54 and 60 per 100 000 population respectively (Prinsloo, 2007). Those at highest risk of homicide have been identified as being men among the ages of 15-44 years. Firearm homicide rates decreased in all four cities from 2001-2005. Durban's firearm homicide rate was highest of the four cities at 28 per 100 000 population, with Johannesburg and Cape Town having similar firearm homicide rates at approximately 20 per 100 000 population. Of the four cities, Pretoria's firearm homicide rates were generally lower, having decreased from approximately 18 to 10 per 100 000 over the 5-year period.

Matzopoulos *et al*. (2007a) examined the literature to identify the risk factors associated with interpersonal violence as well as interventions that have been shown to be effective. Risk factors include biological, behavioural, societal and structural factors. A multi-sectoral approach that spans the criminal justice, health, infrastructure, and policy domains is needed to further reduce interpersonal violence.

In the same review exercise for the Western Cape Burden of Disease Reduction Project, Matzopoulos *et al*. (2007b) examined the literature on traffic injuries. They conclude that many of the strategies identified in the literature are being implemented but there is no data to indicate what effect they are having. They argue that the strategies to reduce traqffic injuries need to be underpinned by a rigorous information system to monitor and evaluate key process, output and outcome indicators.

2.4.4 **Non-communicable diseases**

Many con-communicable diseases develop during the life-course and emerge during adulthood. They become more prominent as a population adopts unhealthy lifestyles and undergoes demographic ageing. The 2001 Population Census found that 7.3% of the total population were ≥60 years. This proportion is among the highest in Africa, with the exception of the two island populations of Réunion (10%) and Mauritius (9.8%), and Tunisia (8.7%). While the number of the child population 0-14 years is expected to grow by 10% in the period 1985-2025, the population ≥60 is expected to increase almost three-fold, growing with 189% (Figure 18) and will clearly have implications on health and health care needs.
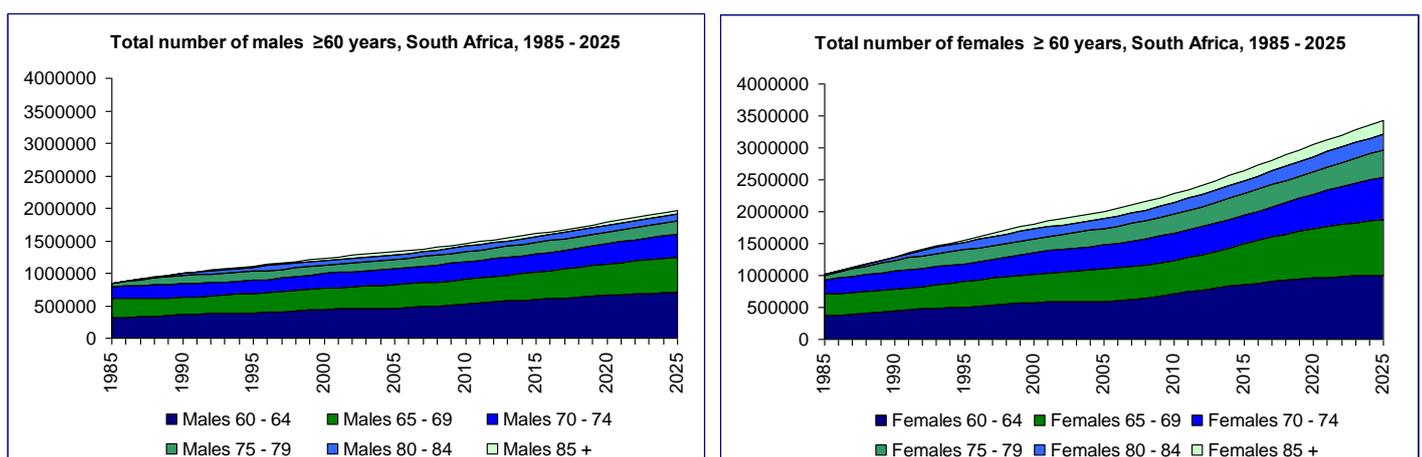
Figure 18: Total number of males and females ≥60 years, South Africa: 1985 – 2025
Source: ASSA2003

Cardiovascular diseases, diabetes, repiratory diseases and cancers together account for 16% of the DALYs in 2000 (Figure 10). Many of these chronic conditions share several common risk factors related to unhealthy lifestyles ie tobacco use, physical inactivity and diet that translate in excess body weight, high cholesterol, high blood glucose levels and high blood pressure, all of which are associated with poor health outcomes. As the population ages, such conditions will certainly become more prominent.

The South African adult population currently displays high levels of these risk factors (Table 3) albeit with distinct gender differences: higher proportion of men use tobacco while higher proportions of women are overweight or obese.

Chronic diseases have received much more attention in the public sector since 1994. The diagnosis and management of diabetes and hypertension were identified in the ANC health plan. Progress includes the formulation of national and provincial strategies as well as practical tools, such as therapeutic guidelines for the care of patients with chronic diseases and their risk factors. Guidelines are available for the prevention and management of diabetes, hypertension, hyperlipidaemia, and overweight (Steyn, 2006a).

Table 3: Prevalence of risk factors among adult men and women

Risk Factor	Men	Women	Data Source
Tobacco smoking (15+ years)	44%	11%	1998 SADHS
Physical inactivity (30+ years)	43%	49%	2003 World Health Survey
Low fruit and vegetable intake (30+ years)	80%	80%	Schneider *et al.*, 2007
Excess bodyweight (30+ years)	38%	68%	1998 SADHS
High cholesterol (30+ years)	45%	50%	Norman *et al.* 2007
Diabetes (30+ years)	5%	6%	Bradshaw *et al.*, 2007
High blood pressure (30+ years)	34%	36%	1998 SADHS

However, data reported by Steyn (2006a) shows that chronic diseases and their risk factors are infrequently diagnosed and inadequately treated in the country. Figure 19 shows data from the 1998 SADHS that illustrates concerns about the quality of care for hypertension in South Africa. It shows the proportion of hypertensive South Africans that are aware of having the condition, the proportion that are taking anti-hypertension medication, and the proportion with blood pressure levels below the accepted target level of $\geq 140/90$ mmHg. Only 38% of women and 26% of men who were hypertensive had adequately controlled blood pressure. This was related to only 55% of women and 39% of men being on anti-hypertensive medication and only marginally higher proportions knowing that they had high blood pressure.

Similar national data are not available for other chronic conditions. However, it is likely that the primary care management of other chronic conditions similarly needs much improvement. The inadequacy of the current model of care currently results in high levels of uncontrolled hypertension, diabetes, high cholesterol and chronic respiratory disease such as asthma.

South Africa needs to respond to chronic diseases using a two-fold approach. A population approach is needed to reduce the risk factors and promote healthy ageing. Secondly, the primary care diagnosis and management of chronic conditions and their risk factors needs to be strengthened.
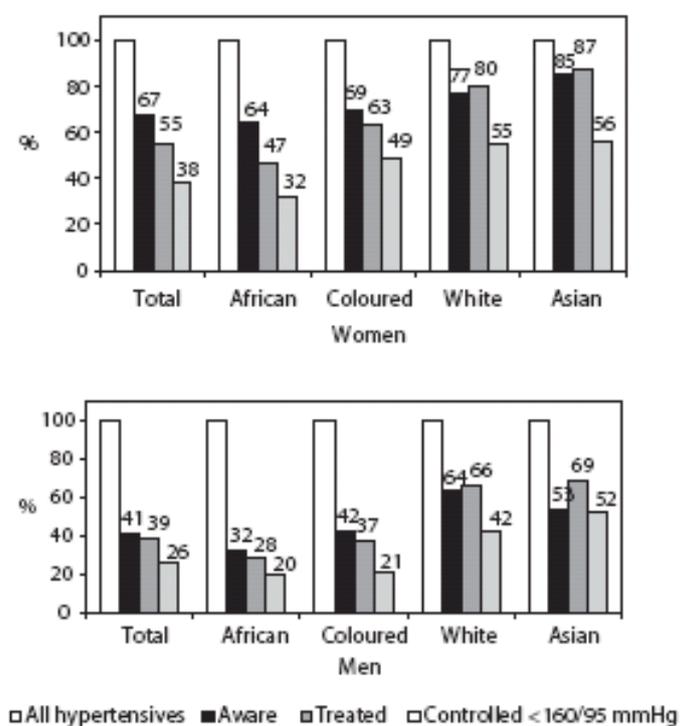
Figure 19: Treatment status of hypertensive men and women (≥140/90 mmHg and/on treatment) and controlled hypertensive (<140/90 mmHg) men and women, South Africa, 1998
Source: Steyn, 2006b

Neuropsychiatric conditions accounted for 11% of the DALYs in 2000 (Figure 19). This comprises mental illnesses such as schizophrenia and bipolar depression on the one hand, and neurological conditions such as epilepsy and dementia on the other. Some of the conditions can also be expected to increase with the ageing of the population.

Lund and colleagues (2008) argue that the burden of mental illness in South Africa has largely been unrecognised as a result of the scarcity of population based data. The South African Stress and Health (SASH) survey conducted in 1999 has provided the first nationally representative data for common mental disorders and revealed that some 16.5% of South Africans report having suffered from a common mental disorder in the last year (Williams *et al*., 2007).

The Mental Health Care Act of 2002 emphasises the rights of those with mental illness to equitable and accessible care, the SASH data show that only 28% of people with severe or moderate common mental disorders accessed mental health professionals in the last 12 months (Williams *et al.,* 2007). Lund and colleagues (2008) point out that common mental disorders can now be reliable diagnosed, and that several cost-efficient treatments are available even in low and middle-income countries. Lund and colleagues call for the scale-up of such evidence-based interventions, as well as further research to find ways to address this burden.

2.5 Inequities in health

South Africa has extreme wealth inequalities. Despite the socio-economic rights being enshrined in constitution, and many pro-poor policies being in place, deep inequalities exist. There is, however, little data or analysis

available on the differentials in health status by levels of wealth or other indicators of social position.

Insight into provincial variations can be obtained from the provincial estimates of mortality that were derived for the year 2000 as part of the National Burden of Disease Study. Age standardized mortality rates per 100 000 population shows that Western Cape, Northern Cape and Gauteng have while KwaZulu-Natal, Mpumalanga and Eastern Cape have much higher mortality (Figure 20). The geographic variations are strongly influenced by the variations in the prevalence of HIV by province. The pre-transitional Type I causes of death were more pronounced in the poorer and more rural provinces. In contrast, the overall level of non-communicable disease mortality was similar across all provinces, but the causes differed. For example, ischaemic heart disease and lung cancer had high death rates in the more developed province of Western Cape, while hypertensive heart disease and inflammatory heart disease had high rates in Limpopo. Analysis of the 1996 cause of death data has illustrated that non-communicable causes also contribute to the mortality experienced in the poor magisterial areas of South Africa (Bradshaw and Steyn, 2002).
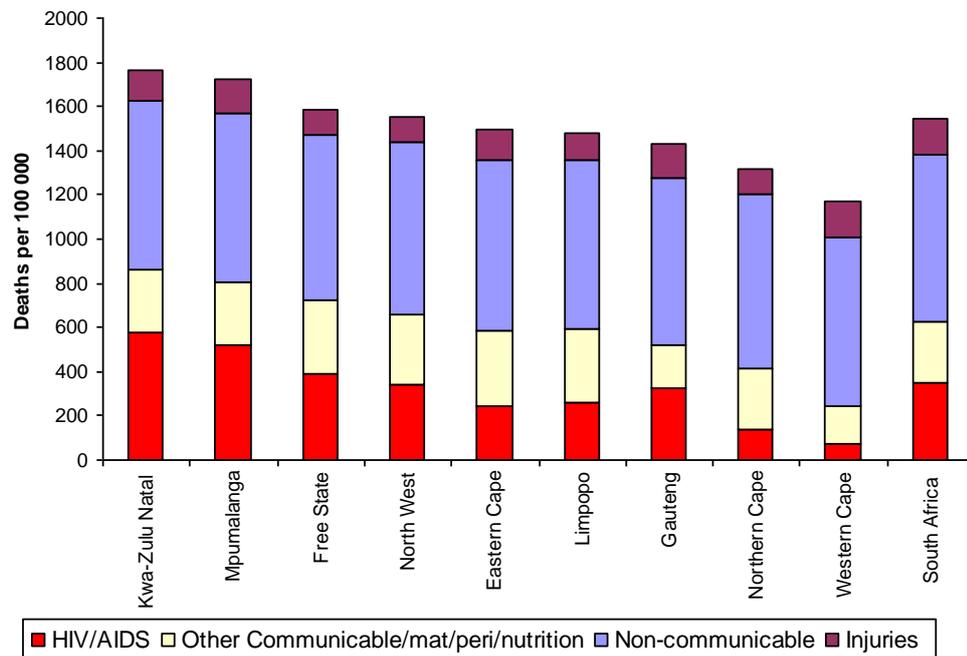
Figure 20: Age-standardised death rates per 100 000 population by broad cause group by province, 2000
Source: Bradshaw *et al*., 2003

The inequalities in health status seen between the provinces can also be seen at a local level in the City of Cape where a local mortality surveillance system has been established to track mortality at sub-district level. Figure 21 shows the mortality rates for 2006 and demonstrates a two-fold variation between sub-districts.
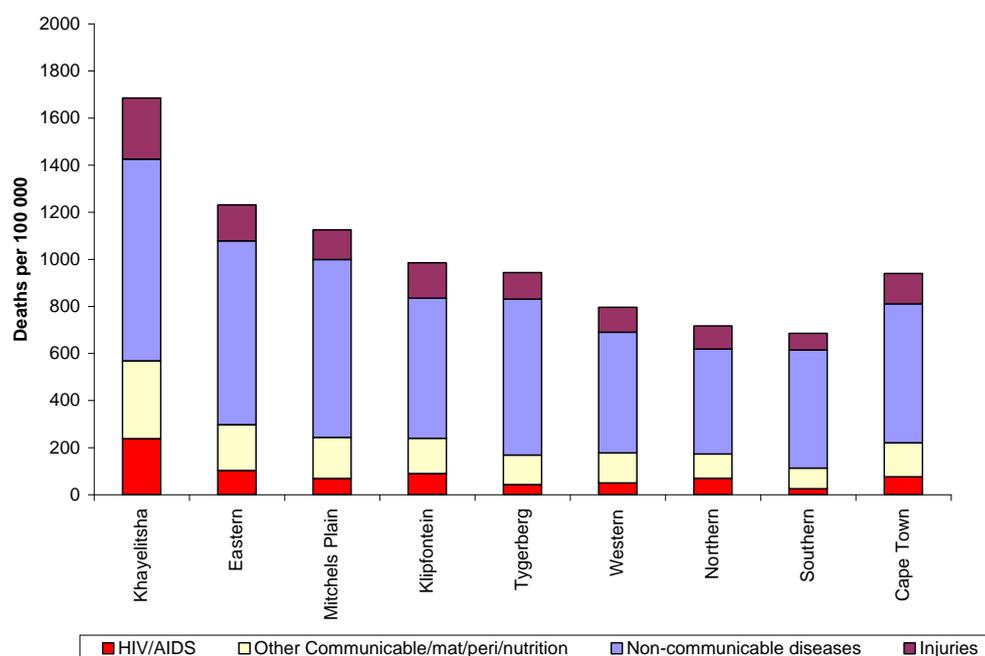
Figure 21: Age-standardised death rates per 100 000 population by broad cause group for the sub-districts of Cape Town
Source: Groenewald *et al.*, 2008

2.6   Priority areas for intervention

2.6.1   Reduce poverty and malnutrition

The Every Death Counts group that focused on maternal and child health identified the need to address the determinants of poor maternal and child health outside of the health sector. In particular these include poverty and malnutrition and will require a multi-sectoral response.

After reviewing public sector programmes aimed to alleviate income poverty, Friedman and Bhengu (2008) highlighted the need for an overarching poverty policy to underpin and guarantee the human rights of the poor. They also identified the need to intensify anti-poverty efforts and highlighted some guiding principles. They consider that the most immediate way to alleviate poverty will be to extend social transfers and scale up the Expanded Public Works Programme and learnership programmes. Issues of capability poverty and some aspects of asset poverty could be tackled in the medium term and in the longer term, the structure of the economy, establishing robust methods of social insurance and developing smaller enterprises in the service sector are offered as potential approaches to maintain the redistributive element of the economy and ensure sustainability.

Nutrition programmes have been on the policy agenda since 1994. The Integrated Nutrition Programme was comprehensive and included 7 elements including community based nutrition efforts to improve household food security through food-based income generation projects. Steyn and Labadarios (2003) noted that the planned piloting of such programmes was not fully implemented and that the programme had been dropped by 2001. Friedman and Bhengu (2008) note that the school feeding programme has been more successful and imply that by 2006/7

the programme reached about 6 million learners in 18,039 schools with a midday meal.

While other sectors have an important role to play in food security and development, the health sector needs to identify appropriate programmes that will improve nutritional status of children. These must include the promotion of exclusive breast feeding up to six months and continued breast feeding up to at least 12 months, improved complementary feeding in terms of composition, frequency and hygiene, including fortification and/or supplementation with key micronutrients and improved growth monitoring.

2.6.2 Improve quality of maternal and child care and ensure continuity of care

The Every Death Counts noted that there are highly efficacious and cost-effective interventions that can sharply reduce the persistently high levels of maternal and child mortality seen in South Africa. The district health system in South Africa is comprised of healthcare packages that are used to deliver essential interventions throughout the lifecycle of mother, baby and child at the various levels of care as shown in Figure 22.
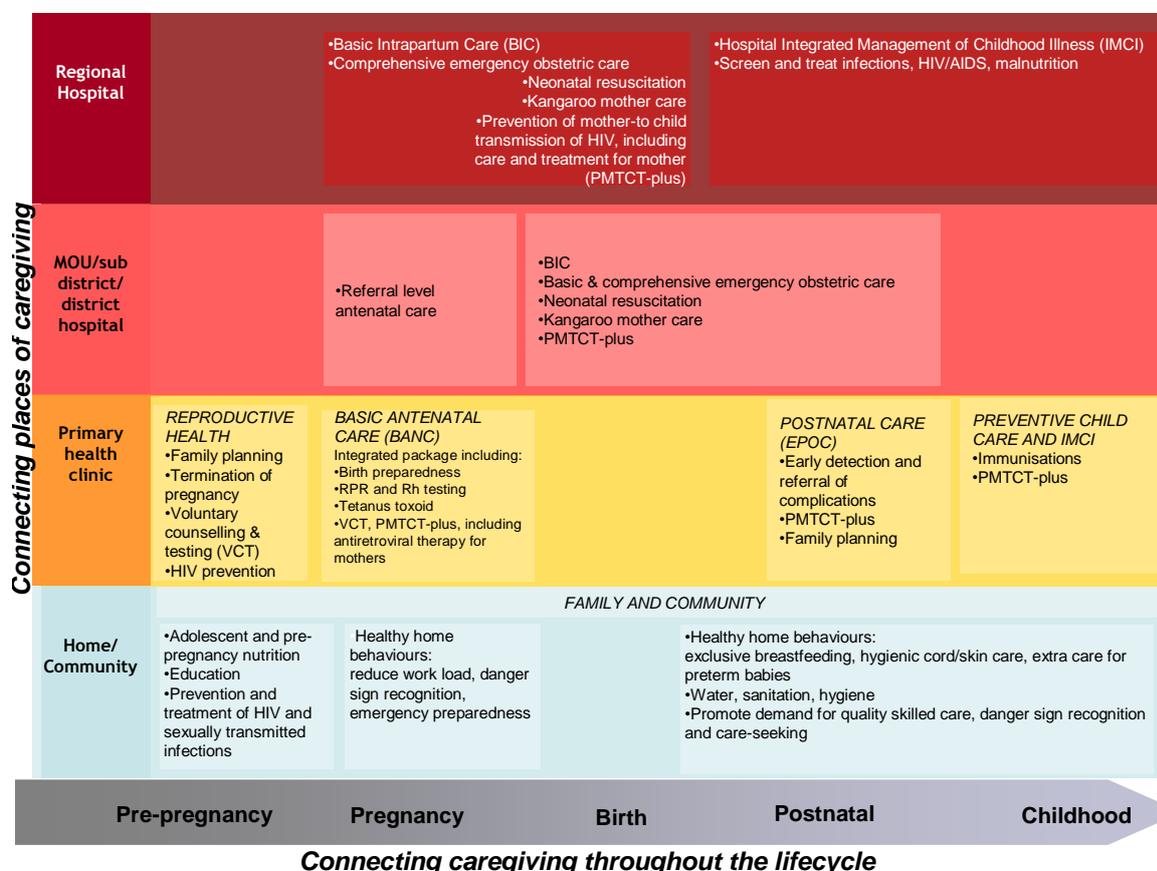
Figure 22: Maternal, newborn and child health continuum of care with packages according to when and where care is provided
Source: Every death counts, 2008

The lives of mothers, babies and children could be saved with existing healthcare packages along this continuum of care. The continuum of care approach encourages quality improvement at primary health clinics as well as

promoting referral by strengthening access to and improving services at peripheral and district level facilities. The Every Death Counts group identified three crucial gaps in care that prevented such a comprehensive package having an impact in South Africa:

Coverage gaps

Coverage is relatively high for the minimum package of antenatal care, intrapartum care and childhood immunisation. Lack of routine postnatal care contributes to a disconnect between maternal and child health packages as well missed opportunities for prevention of mother-to-child transmission, and care for HIV positive mothers and babies, including support for appropriate feeding choices.

Equity gaps

There appears to be less inequity for some primary health interventions such as immunisation, but access to care must be systematically improved to reach the poorest families with more complex care, particularly during childbirth and the neonatal period. However, skilled attendance during childbirth is a third lower among the poorest families compared to richer families. These national averages also hide disparities in coverage between provinces, and among rural, urban, and peri-urban populations.

Quality gaps

While health services reach families, there are key missed opportunities to provide essential care in each of the key packages including antenatal, childbirth and childhood care, as well as HIV interventions. Quality care is particularly important during childbirth, which is the riskiest time for mothers and babies. Saving Mothers has recommended an approach for tracking quality of intrapartum care but this has yet to be fully implemented.

In terms of saving lives of mothers, babies and children, there are at least five priority intervention areas:

1. Invest in the implementation of the national HIV/AIDS and STI Strategic Plan for South Africa, 2007-2011, concentrating on provider-initiated testing, dual therapy in PMTCT and universal coverage of antiretroviral therapy.

2. Support integration of HIV/AIDS and nutrition programmes with maternal, newborn and child healthcare packages, ensuring equitable and accessible healthcare services, prioritising single-parent families and orphans and vulnerable children.

3. Ensure an enabling environment through defined norms and standards for staffing and equipment, defined referral routes, providing resources for training and support to strengthen the capacity of provincial and district managers to operationalise national policies, so that equal and appropriate access for all mothers, babies and children to all levels of care is ensured.

4. Improve monitoring and evaluation efforts through the completion of maternal, perinatal and child mortality audits at all hospitals and request quarterly reports for management at the district and provincial level.

5. Develop and widely promote an agreed set of family health messages to save the lives of mothers, newborns and children. For example, exclusive breast feeding has been shown to have an important role in reducing child mortality. According to the 2003 SADHS, only 8% of babies are

exclusively breast-fed to the age of 6 months. The Department of Health (2007) has recently issued a clear feeding policy for infants and young children recommending exclusive breast-feeding for the first 6 months followed by sustained breast-feeding for 2 years or longer. HIV infected women should receive counselling on the infant feeding options to enable them to make an informed decision. Mixed feeding has been shown to be the worst option. Exclusive breastfeeding should be recommended unless replacement feeding is acceptable, feasible, affordable, sustainable and safe.

2.6.3 **Reduce the number of new HIV infections - especially among young people 15–24 years**

Prevention is one of the major components of the National Strategic Plan. Four goals have been identified in this respect. These include the reduction of vulnerability to HIV infection and the impacts of AIDS and the reduction of the transmission of HIV: sexual transmission, mother-to-child transmission, and transmission through blood and blood products.

In a review of HIV and society, Rehle *et al*. (2008) consider the strategic response needed to turn the tide of the epidemic and argue that it will depend largely on changing the social norms, attitudes and behaviours. According to Coates *et al.* (2008), "radical and sustained behavioural changes in a sufficient number of individuals potentially at risk is needed for successful reductions in HIV transmission". "Know your status" was identified by the 3rd AIDS conference in 2007 as an important strategy and requires a major scale-up and promotion of HIV counseling and testing services.

Based on the available evidence of the effectiveness of interventions, Johnson *et al*. (2007) identified the need to:

• strengthen the prevention of mother-to-child transmission programme;

• strengthen population-based interventions that target risky sexual behaviour, particularly among youth;

• maintain promotion and distribution of condoms;

• promote voluntary counselling and testing and provider-initiated testing and counselling for HIV;

• strengthen STI control by promoting syndromic management, including the private sector (and review guideline); and

• consider the promotion of male circumcision.

In terms of male circumcision, while there is clear evidence of the effectiveness of male circumcision in reducing the spread of HIV, Rehle *et al.* (2008) identify the need to culturally contextualize the issue and undertake some action research that would promote male circumcision as a male sexual health issue.

There is an urgency to create an enabling environment for HIV prevention. The approach needs to be multileveled and include a combination of behavioural, structural, and biomedical interventions. Strategies should be based on scientifically derived evidence together with the wisdom and ownership of communities (Merson *et al*., 2008). Prevention must be accompanied by the provision of treatment and care and political leadership has been identified as an essential ingredient.

2.6.4 Expand access to appropriate treatment, care and support for HIV and AIDS

The second major component of the National Strategic Plan is to reduce the impact of HIV and AIDS. Four goals in the plan are ti improve HIV screening and diagnosis rates through VCT for the 15–49 age group, improve health outcomes for asymptomatic HIV positive children and adults, improve health outcomes for symptomatic HIV positive children and adults, and mitigate the impact of HIV and AIDS on individuals, families and communities.

As a minimum, there is clearly need to:

* improve access to highly active antiretroviral treatment, placing particular emphasis on the current lack of human resources and infrastructure, and

* improve access to cotrimoxazole in adults and children with HIV.

As highlighted in the section on TB control, it is important to start TB patients early on antiretroviral treatment.

Research is needed:

* support research into microbicide and vaccine development; and

* better understand underlying determinants to develop more effective interventions.

2.6.5 Strengthen TB control

The Draft Tuberculosis Strategic Plan for South Africa 2007-2011 has identified that the "major deficiencies" relate to the quantity and quality of human resources, TB-HIV collaboration, access to diagnostic services and the proper use of the reporting and recording system. This will require a concerted effort to strengthen the programme through training and supervision.

A recent study conducted by CAPRISA shows that TB patients who are HIV positive need ARV's early. In a randomised trial, the survival of the patients who were given ARV's before they had completed their TB medication was better than those who were given ARV's once they had completed their TB medication. These findings need consideration to assess whether current clinical guidelines should be changed.

2.6.6 Develop appropriate model of primary health care for chronic conditions

In a review of chronic diseases in South Africa, Steyn (2006a) identified an urgent need to reform the primary-care services to cater for the ever-growing need of the many patients with chronic conditions. Beaglehole *et al.* (2008) argue that integrated primary health-care approaches need to be developed as the management of chronic diseases in primary health care is fundamentally different from that for acute care.

The WHO has developed a model for 'Innovative Care for Chronic Conditions' (ICCC). The model is multi-leveled incorporating patient care, health-care organisation and community participation, as well as at the macro-level of policy and financing requirements. The model is premised on the productive interaction between informed, motivated and prepared patients, families, community partners and a prepared proactive and equipped practice teams (Figure 23). The ICCC model also implies continuity and coordination

of services between primary, secondary and tertiary care. In particular, it will require re-orientatation of healthcare providers with an extension of their competencies to include, for example, skills in diet counselling, advice on exercise and smoking cessation are needed. Appropriate information systems need to be developed to improve decision making at the clinical level as well as programme management level. Relationships with private providers will also need to be strengthened.

Research is needed to support the appropriate development of such a model, particularly scale-up efforts which should be embedded in large-scale delivery programmes for chronic diseases with a strong emphasis on assessment.
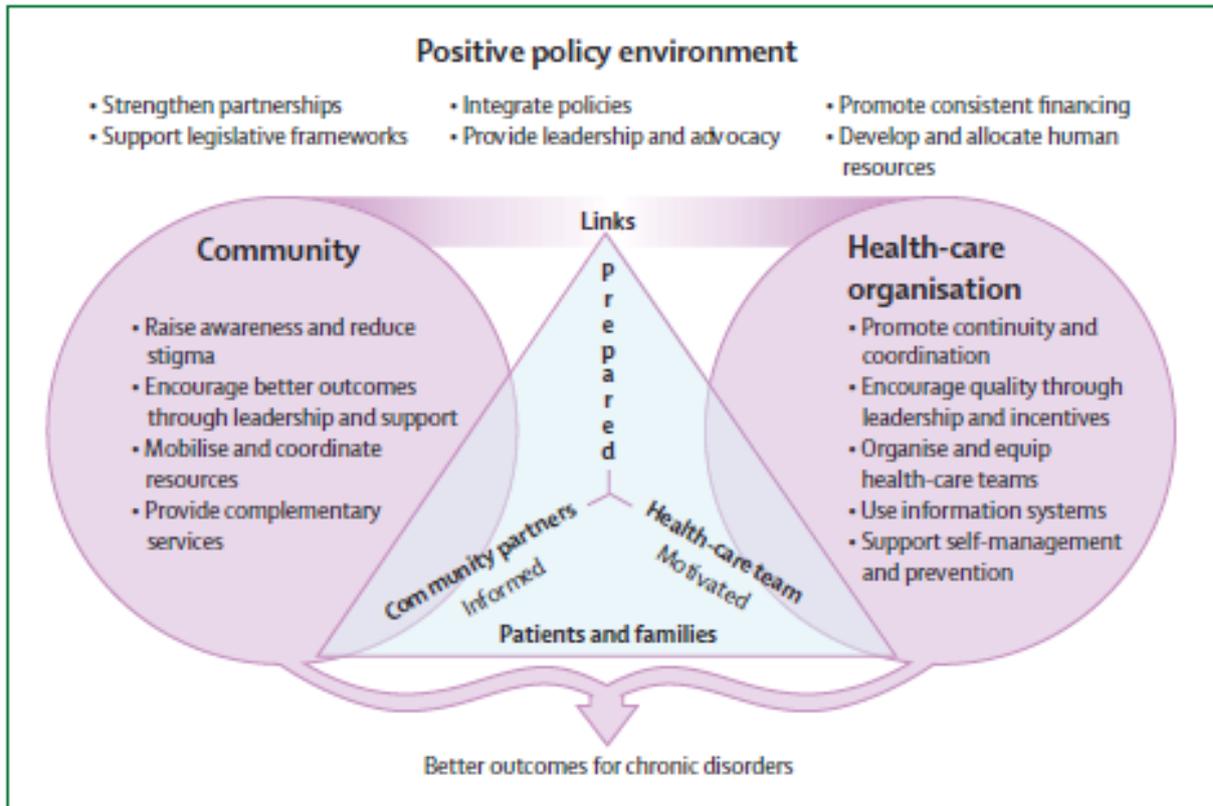
Figure 23: Innovative Care for Chronic Conditions (ICCC) Model
Source: WHO, 2002

Steyn (2006a) proposed a model for a national chronic disease programme for South Africa. This is outlined in Figure 24 and combines primary prevention in the population and secondary prevention among people with risk factors and chronic diseases. Steyn (2006a) draws on international thinking and outlines the steps needed to develop a comprehensive response to chronic diseases. Such a plan needs to be developed strategically with careful assessment of the evidence to identify interventions that should be implemented. The Comparative Risk Assessment conducted a rapid review of potential interventions to reduce the cluster of risk factors associated with chronic diseases (Bradshaw *et* al., 2008). Figure 25 shows the multilevel approach that needs to be adopted.

1° Prevention Target Group: WHOLE POPULATION	• Promote Healthy Lifestyle: tobacco, exercise, nutrition • Motivate public to seek appropriate screening													
2° Prevention Target Group: PEOPLE WITH RISK FACTORS AND CHRONIC DISEASES Diagnosis and treatment	CONDITIONS INTER-RELATED AND OFTEN CO-EXIST											MULTIDISCIPLINARY RESEARCH	PARTNERSHIPS (including PUBLIC / PRIVATE)	QUALITY ASSURANCE
	TOBACCO & ALCOHOL ADDICTION	HYPERLIPIDAEMIA	OBESITY	HYPERTENSION	DIABETES	CVD, STROKE & HEART ATTACKS	CANCER	CHRONIC LUNG DISEASE	MENTAL HEALTH	DISABILITY & REHABILITATION	GERIATRICS / GERONTOLOGY			
HEALTH SERVICE DEVELOPMENT	• Organisational structure of primary health-care services to provide for both chronic and acute conditions • Adequate staffing levels • Staff training in chronic diseases care utilization of staff • Equipment • Cost-effective locally appropriate management guidelines • Drug delivery system • Compliance by activated patients and health-care team • Long-term care • Evaluation adult health indicators health information system													

Figure 24: Model for national chronic diseases programme for South Africa
Source: Steyn (2006a)

Physical inactivity, tobacco use, and diet-related risk factors for chronic diseases of lifestyle	
Macrolevel/ National	• *Policy makers can influence consumption patterns* through subsidies, taxes, regulations and policies, as well as concerted actions. These need to focus on the supply, availability, manufacturing, processing, marketing, advertising and pricing of food to ensure wide availability and affordability of healthy foods including fruit and vegetables; limit the salt content of manufactured foods and staples such as bread, reduce the saturated fat content of food; limit the promotion of unhealthy food to children. Food labeling has and important role to play. • South African tobacco legislation includes all recommendations of the WHO Framework Convention on Tobacco Control. However, there is a need to further tighten, enforce and monitor the impact of *tobacco regulation* • *Design the environment* to promote health: Modify town, road, building and environmental designs to promote physical activity through safe walking, cycling, and use of stairs, and improve access to public transportation. • Allocate *funds* for interventions and research.
Population/ Community	• Develop locally-suitable *health messages* about smoking, physical activity and diet as part of population wide campaigns to promote healthy lifestyles. Ensure consistent messages on television, radio, and the print media. • Promote workplace, health care provider, and community *healthy lifestyle programmes*. • Develop *school programmes* that integrate nutrition, physical activity, tobacco and alcohol use into core curricula and/or lifestyles programmes, and healthy nutrition into school food/snack services. • Improve *primary care* diagnosis and management of risk factors for chronic diseases including hypertension, raised blood sugar, raised cholesterol levels and excess bodyweight. Promote secondary prevention such as exercise after cardiovascular events or diagnosis of diabetes. • Implement *smoking cessation programmes* in primary care clinics. Target pregnant women – particularly coloured women who have amongst the highest female smoking prevalence in the world.
Individual	Balance dietary intake and energy expenditure to achieve and maintain a healthy weight. • Limit excessive caloric intake from any source. • Maintain daily physical activity • Limit consumption of sugar and sugar-based beverages. Eat a healthy diet • Eat 5 fruit and vegetable portions a day. • Reduce intake of salt. • Reduce intake of saturated and trans-fat content. Avoid tobacco use. Reduce alcohol intake. Check weight, blood pressure, blood sugar and cholesterol regularly.
Research	• Undertake research to identify cost-effective and sustainable interventions. Develop and evaluate healthy lifestyle programmes and social marketing strategies to promote improved diet, physical activity and non-smoking. • Develop and implement sustainable surveillance systems to monitor these risk factors and related health outcomes.

Figure 25: Multisectoral approach to promote healthy lifestyles related to chronic diseases
Source: Adapted from Bradshaw *et al.* (2007)

3. HEALTH INFORMATION TO GUIDE RESOURCE ALLOCATION

3.1 Overview

Responding to South Africa's health priorities requires the explicit use of indicators of socioeconomic and health status as well as information about the health interventions to effectively guide resource allocation.

In addition to the MDG indicators, there need to be indicators that inform about the coverage and effectiveness of programmes that are in place in order to achieve the MDG's. Such indicators need to be appropriate for the level of the health system ie national, provincial, district, sub-district or facility. Boerma and Stansfield (2007) warn that the focus on the MDGs is restricted. While South Africa has already made some progress in collecting a wider array of health statistics around chronic diseases and injuries, for example, these systems need further development.

An important issue raised by Boerma and Stansfield (2007) is the need for health statistics to be disaggregated by socioeconomic position. The challenge of providing small area information must also be addressed to facilitate decision making to be based on need.

Many of the necessary data platforms are in place but there are major capacity constraints at multiple levels. Capacity is needed

o   to ensure that the data collected are of good quality

o   to analyses the data and generate information relevant to monitoring and planning

o   to use information for monitoring and evaluation

o   to use information for planning and prioritising.

There is also a need to link data platforms more effectively. Dye *et al*., (2008) published a review of progress in monitoring tuberculosis control from a global perspective. The ultimate aim is for all countries to count tuberculosis cases (incidence) accurately through routine surveillance. However, many cases and deaths are missed by routine systems and it is recommended that disease prevalence surveys, although costly, give valuable measures of tuberculosis burden and trends. Dye *et al*. also point out the limitations of tracking of outcomes using DOTS cohorts. On the one hand, deaths during treatment which were not directly attributable to TB, would nevertheless be attributed to TB. On the other hand, a number of DOTS cohort members for whom outcomes were not known may well have died from TB. They therefore advocate "linking and cross-referencing between patient cohorts and vital registration." This would require that "each case and death must be uniquely identified in the recording system". This level of data linkage is not yet possible in South Africa, and should be considered in the longer term.

3.2 Potential indicators and data platforms

A selected set of indicators is shown in Table 4 with some brief commentary about the current data limitations. Ideally, these indicators should be available at sub-district level to facilitate district planning and monitoring as well addressing issues of equity. It should be noted that the indicators are not necessarily appropriate for facility level.

Table 4: Potential indicators and diagnostics information to monitor the health related MDG's

Health related MDG	Indicators and diagnostic information	Data platforms	Lowest level of reporting	Limitations and challenges
Socio-economic determinants	Water, sanitation, education, wealth	Census	Ward and Sub-district	Access to appropriate display of information at sub-district level
		CS	Sub-district	
		GHS and other surveys	District	Appropriate reporting for provincial management
Child mortality	U5MR IMR	Birth and death registration	Sub-district	Incomplete registration and timely reporting
		SADHS (alternate)	Provincial	Quality of data and timely reporting
	Cause of death	Death registration	District	Incomplete registration and timely reporting Improve quality of cause of death certification
		PIP and Child PIP (alternate)	Provincial	Encourage facilities to adopt mortality audit
	Programme coverage	SADHS	Provincial	Quality of data and timely reporting
		DHIS	Facility aggregated to sub-district	Quality of data Access to reliable sub-district population data Tools to enhance utilisation at district level
	Quality of care	PIP and Child PIP	Facility	Encourage facilities to adopt mortality audit
Child nutrition	% children underweight, % children stunted	NFCS-BF SADHS (alternate)	Provincial	Quality of data and timely reporting
	Socio-economic determinants	Same survey (to assess association)		
Maternal mortality	MMR	Death registration and birth registration	Provincial	Incomplete registration and timely reporting Improve quality of cause of death certification
	Cause of death	Confidential Enquiry	Provincial	Improve completeness and timely reporting
	Avoidable causes	Confidential Enquiry	Provincial	Improve completeness and timely reporting
	Programme coverage	SADHS	Provincial	Quality of data and timely reporting
	Quality of care	? Facility audit	Provincial	Needs to be developed

Premature adult mortality	45q15 (the probability of a 15 year old dying before age 60)	Death registration and census for population Census (alternate)	District	Data needs to be improved to be able to get district level
AIDS	Prevalence of HIV in key age groups among antenatal attendees and men and women in population	Antenatal survey HSRC survey	District Provincial	
	Incidence of HIV in key age groups among antenatal attendees and men and women in population	Antenatal survey HSRC survey	District Provincial	
	Number on ARV treatment	NSP monitoring	District	Need to develop cohort monitoring
	Number of maternal orphans under the age of 18	Birth and death registration Model (alternate)	District	Incomplete registration and timely reporting Improve quality of cause of death certification
	Sexual abstinence - median age at first sex - percentage of young women and men who had sexual intercourse before the age of 15 - difference between age of marriage and age of sexual debut	HSRC survey SADHS	Provincial	
	Concurrency of sexual partners - percentage of women and men who have had sexual intercourse with more than one partner in the last 12 months	HSRC survey SADHS	Provincial	
	Condom use - percentage of women and men aged 15-49 who had more than one sexual partner reporting the use of a condom at last sex and poportion of sexually active people always using condom			
	Sexually transmitted diseases - proportion of men and women with ulcers or genital discharge in the last 12 months			
	Proportion of males circumcised			

TB	Case detection rate	TB register relative to estimates	District	Quality of data and capacity to derive estimates for the denominator
	Cure rate	TB register	Facility	Training needed to improve quality and utilisation of data at facility and district level
	Treatment success rate	TB register	Facility	
	Smear conversion rate	TB register	Facility	
	Defaulter rate	TB register	Facility	
Injuries	Homicide death rate RTA death rate	Vital registration and census	District	Causes of fatal injuries need to be incorporated in vital registration
Chronic diseases	Stroke death rate Hypertensive heart disease death rate IHD death rate Diabetes death rate Cancer death rate	Vital registration and census	District	Incomplete registration and timely reporting Improve quality of cause of death certification
	$_{20}q_{40}$	Vital registration and census	District	Incomplete registration and timely reporting Improve quality of cause of death certification
	Quality of care: % of people with hypertension who are controlled	SADHS Health facility audit	Provincial District	To be developed
	Risk factors such as % BMI>30 % physical active % adolescent daily smokers	SADHS YRBS	Provincial	
	% adult daily smokers	SADHS	Provincial	
Mental health	Prevalence of common mental health problems	SADHS	Provincial	To be included in next SADHS
	Programme coverage	DHIS	District	To be developed
	Quality of care	Health facility audit	District	To be developed

4. THE HEALTH INFORMATION SYSTEM

4.1 Overview

In 1994, the Minister of Health established a committee to facilitate the development of a strategy for the implementation of a National Health Information System for South Africa (NHIS/SA; http://www.doh.gov.za/nhis).

In the first years of the committee, NHIS/SA developed a comprehensive framework for a national health information system. However, development and implementation of the systems that comprise the health information system has been challenged by a variety of factors and progress has been slow. A notable exception was the development of the District Health information System (DHIS) that has been implemented in eight provinces (the Western Cape uses an alternative application) and is used to produce a large part of the aggregate health facility data for the NDoH.

In terms of the National Health Act (2003), provinces are now required to set up their own information committees and the Directorate of Information Communications Technology in the National Department of Health (NDoH-DICT) has a role in coordinating the national health information system.

The NDoH-DICT has developed and implemented a limited functionality application for patient administration and billing (PAAB).

South Africa has a routine passive surveillance system for reporting notifiable medical conditions and a regulation has recently been issued to update the list of conditions that should be notified. However, the collection and collations of the information is not working well and trend statistics have not been produced for some years. The electronic TB register application that has been implemented throughout South Africa by the TB Directorate within the NDOH. However, there are also concerns about data quality and it is not clear that all facilities and districts are using the tool effectively to manage their TB control efforts.

There are examples where systems are lacking for example for HIV/AIDS patient and treatment monitoring and chronic conditions. In addition, the Ministry of Health has also been criticized for the lack of a health IT policy for South Africa.

The NDoH-DICT has recently developed a framework for an electronic health record system for South Africa (NDoH, 2007a) and awarded the implementation to a commercial consortium. The eHR application will collect cradle to grave electronic health information on South African citizens and will be implemented by the provincial Departments of Health. Successful implementation of the billion rand eHR project will hopefully result in a minimum essential data set for healthcare and core variables and indicators that will be managed centrally.

The NDOH-DIS has also drafted an e-Health strategy for South Africa (NDOH, 2007b) that provides the framework for the development of an e-Health policy for including health information management. However, there is the potential that the goals of the policy will not be achieved, not because of lack of political will, but because to the limited human capacity and skills in the state health care sector.

Facility based health information systems are not standardised. It is estimated that approximately 40% of provincial hospitals in South Africa have some form of computerized information management system but few systems are in

place at clinics. The nine Provinces use five different major hospital information systems and there are also multiple different systems in the private sector. Interoperability between applications is a key consideration where multiple disparate systems exist and is integrally related to the adoption and implementation of data coding and messaging standards.

Several standards are in use to promote interoperability and data interchange between systems. South Africa has adopted ICD-10 for coding diagnoses submitted to medical aid societies and, as a result, both public and private sectors use ICD-10 for diagnosis coding. The public sector uses UPFS for procedure coding and NSN for pharmaceutical coding while the private sector generally uses EDIFACT. HL7 version 2.4 is used as the messaging standard. South Africa is a member of ISO/TC 215 Health Informatics and the MRC is presently under consideration as a WHO Collaborating Center for the WHO Family of International Classifications. However, systems support interoperability standards to varying degrees and many of the smaller applications are particularly deficient in this regard.

In terms of monitoring the MDG's and the programmes to address them, South Africa has a considerable number of data platforms in place. These include censuses, national household surveys, vital registration, selected disease registers, disease notification (surveillance) system and other surveillance systems such as Termination of Pregnancy, HIV and Syphilis Antenatal Sero-prevalence Survey, Maternal Mortality, Injury Mortality, Birth defects and Genetic disorders and Sexually Transmitted Infections, the District Health Information System (DHIS) based on routine reporting from all public sector health facilities, National Health Accounts and reviews of health research expenditures.

Attempts to track the MDG's are, however, compromised by data quality concerns. These play out at all levels from sub-district to national. Furthermore, there are some critical gaps.

South Africa has a large shortage of health information officers and where they are exist, they are lacking in specialized training. There are also limited skills for analyzing and interpreting data.

Two universities currently offer training programs in medical informatics but there is a general lack of specialist courses in data and information management. Furthermore, many health workers do not have any computer training during their basic training and those from rural schools may never have used a computer. Poor basic numeracy skills make it difficult to build an information culture.

4.2 Legislation

South Africa has a wide ranging legal framework regarding the collection of health information. The most important Acts that relate to the collection of health statistics include:

The *Statistics Act* (No. 6 of 1999) mandates Stats SA to conduct a population census every five years, which was changed to a 10 year cycle by Cabinet in 2004. Aside from producing official statistics meant to assist organs of state, businesses, other organizations and the public, Stats SA is also mandated to promote coordination among statistical producers in South Africa in order to improve the quality, consistency, comparability and optimum use of official

statistics and thereby avoid unnecessary duplication; provide statistical advice to organs of states; and liaise with statistical agencies of other countries and international agencies.

The *Births and Deaths Registration Act* (Act 51 of 1992) requires that all births and deaths be registered with the Department of Home Affairs. In terms of the Act, no burial may take place unless authorised by way of a burial order (BI-14) that is issued by the Department of Home Affairs after being notified of the death. Information from the death notifications are provided to Statistics South Africa for the compilation of the national cause of death statistics. In addition, some provincial Departments of Health obtain the information from the Department of Home Affairs to compile district level mortality statistics.

The *National Health Act* (Act 61 of 2003) provides for the co-ordination of the National Health Information System (NatHIS) at the national level, and the establishment of provincial committees. The national Department of Health has a clear stewardship role and "must facilitate and co-ordinate the establishment, implementation and maintenance by provincial departments, district health councils, municipalities and the private health sector of health information systems at national, provincial and local levels in order to create a comprehensive national health information system."

The *Public Finance Management Act* (Act 1 of 1999) stipulates the requirements for planning, budgeting, monitoring and reporting by public institutions and together with the *Division of Revenue Act* (Act 2 of 2006) requires all health districts, provincial Departments of Health and the NDoH to prepare 3 year strategic plans as well as I year operational plans. These plans need to take into consideration the national strategic priorities and include baseline information as well as set targets based on objective indicators.

4.3   Evaluation of selected data platforms

1. Mortality and causes of death

This information is obtained from the Department of Home Affairs based on the deaths that occurred in a specific year and registered in the Department. A statistical release and unit records of data on mortality and causes of death are published annually. The aim of the release is to outline trends and differentials on mortality, to present statistics on causes of death and to provide contextual information on the data and methods used in order to support further specialist analysis.

Limitations / challenges:

- Data subject to content errors and omissions

- Under-registration of deaths

- Misreporting of the causes of death on the death notification form

- Information on causes of death not detailed with a particular problem with causes of injury related deaths

- Late registration of deaths

- Long time-lag between death, registration of death, publication of information on deaths

- District and sub-district reporting of cause of death statistics

2. *Recorded live births*

Information on live births is obtained from the National Population Register maintained by the Department of Home Affairs. It is based on the births registered at the Department of Home Affairs. Stats SA publishes a statistical release on recorded live births every year, providing information on birth registrations and birth occurrences.

Limitations / challenges:

- Under-registration of deaths
- Limited information for analysis
- Late birth registration

3. *Census*

The first census in a democratic South Africa took place in 1996, and then in 2001. In March 2004 the Cabinet decided that population censuses will hence be conducted in a ten-year cycle. The next population census is therefore scheduled to be carried out in 2011. The census collects information on population size, composition and distribution; migration, fertility and mortality; disability; school attendance and educational attainment; and labour force.

Limitations / challenges:

- Under-enumeration of certain sub-groups eg children <5 years
- Data content errors
- Small area intercensal population estimates

4. *Community survey*

The community survey, undertaken in 2007 by Stats SA, was the largest survey ever undertaken by Stats SA. The purpose of the survey was to collect information on the number of people who lived in selected areas and their living conditions. The survey collected information on population size, composition and distribution; migration, fertility and mortality; disability and social grants; school attendance and educational attainment; labour force; and income. Information on mortality in the last 12 months was also collected. This included date of death, sex and age of the deceased, cause of death (natural or non-natural), and pregnancy status of women of reproductive age at the time of death. Furthermore, there were questions on the survival status of the parents and on survivorship status of children ever born.

Limitations / challenges:

- Under-enumeration of certain sub-groups eg children <5 years
- Demographic analysis needs careful consideration
- Small area statistics not available from national sample

5. *South African Demographic and Health Survey*

The first South African Demographic and Health Survey was conducted by the Department of Health in 1998. Extensive use was made of the international

questionnaire which focussed on maternal and child health. In addition, an adult health module was developed to collect population based information on chronic diseases. The second survey was conducted in 2003 and a third is planned for 2009.

Limitations / challenges:

- Data quality

- Small area statistics not available from national sample

6. *District Health Information System (DHIS)*

A routine health facility information system has been developed. A review of this system has found that despite remarkable progress in the standardisation and implementation of the routine PHC information system over the last 7 years, there remains a number of challenges (Visser and Barron, 2005). Limited progress has been made in dealing the challenges identified:

- Data quality: data is often incomplete, inconsistent and incorrect.

- Feedback: little or no feedback is provided to facilities collecting the data from the district level. Similarly, national and provincial levels do also not provide feedback. (e.g. comparisons between different facilities, districts or provinces)

- Use of information: information is seldom used at facility level to monitor services and there is still a perception that data is collected purely to satisfy the needs of the higher levels of the health system.

- Knowledge and skills: managers at various levels of the health system need support to analyse and interpret routinely collected information in order to manage, plan, monitor and evaluate services and events.

- Infrastructure: Computer equipment is often outdated, a large proportion of Information Officers have no access to e-mail, and government networks are still experiencing problems with bandwidth and viruses.

- Access to routine information: managers at various levels of the health system still have problems in obtaining access to the information and indicators calculated from the routine PHC data and are often not aware of the information available.

- Private Service providers: a very limited number of private PHC service providers such as NGO's are submitting routine data.

7. *Confidential Enquiry (Maternal Deaths)*

The Confidential Enquiries system of recording and analysing maternal deaths has been in operation since 1 October 1997. Each maternal death in a facility is notified to the to the provincial office within 7 days of the maternal death for assessment. The assessor provides information on the primary, final and contributory causes of death and must also establish whether there were avoidable factors, missed opportunities or any other aspects of substandard care present in the maternal death. This system has not been evaluated but is has some structural limitations and is likely to share the challenges faced by similar systems in other countries:

Limitations / challenges:

- Private sector does not participate
- Deaths that occur outside of health facilities are not included
- Maternal deaths that occur in general wards rather than labour wards are often not recognised as maternal deaths and may be missed

8. *HIV prevalence and incidence*

The National Department of Health conducts an anonymous unlinked survey among antenatal attendees to monitor the prevalence of HIV in this sentinel group. In addition, the HSRC has conducted national household surveys on sexual behaviour and HIV prevalence. The 2007 survey has been expanded so as to be able to provide incidence estimates with acceptable bounds of uncertainty.

Limitations / challenges:

- Analysis of the antenatal survey data has become a concern in recent years
- Achieving adequate response rate for a household survey is exacerbated when blood samples are sought

9. *Injury mortality surveillance*

Information is collated from the routine investigative procedures in collaborating mortuaries and statistical reports are compiled on the manner and causes of injury deaths.

Limitations / Challenges

- Not all mortuaries participate and it is not clear whether there is any bias in the data

4.4 **Findings**

A major challenge is to make use of the data platforms at appropriate levels to facilitate informed decision making. This requires timely data collection, appropriate data flows, capacity to analyse, interpret and report data in a form for that can be used to inform decisions at the specific levels of the health care system.

Visser and Barron (2005) identified common problems across most of the data platforms:

- Lack of a culture of information management with the current generation of managers lacking the relevant training and experience to manage information.
- Inadequate data quality, in part due to the fact that there is inadequate monitoring and feedback of the data
- Inadequate investment in basic information systems at the expense of sophisticated systems for large hospitals.
- Lack of a comprehensive approach to data management resulting in duplicative systems which overlap and with individual programme managers driving "vertical" systems.

- Development of overly sophiscated information systems to cope with the difficulties of monitoring and evaluation.

4.5   **Recommendations**

In the context of generally increasing awareness of the importance of health information, Boerma and Stansfield (2007) highlight the need for developing countries to make systematic investments in data generation and analysis and avoid setting up indicator driven systems. While South Africa has made some progress in this area, there are many steps that are needed to facilitate the rightful return from such investments.

1. A priority area is to develop the demand, systems and capacity to implement evidence based management of health districts. The DHIS needs to be accompanied by appropriate population health surveillance and programme information that can be used for monitoring, evaluation and planning. Part of this information system must be access to reliable population estimates at the appropriate planning levels.

2. Capacity development is probably the greatest and most difficult challenge facing the national HIS. There is a profound lack of capacity at all levels of the system and training of existing and new health information officers is critically important for future progress in this key area. Training is also required for public health officials to improve information usage and also interpret data and reports. Undergraduate courses in medical informatics are also required as is training in monitoring and evaluation and data quality.

3. Policies and strategies have been formulated but there is a lack of delivery and little detail of the implementation plans. Elaboration on an implementation plan would go a long way to harmonizing the activities of the public and private sectors as well as promoting standardization and improving health data. For the significant existing infrastructure, the challenge is in adopting and harmonizing standards and achieving interoperability between systems, particularly between the public and private sectors. Agreement on standards and an open architecture supported by specific inputs and tools promoting interoperability would go a long way to improving the collection and quality of data. Routine health information systems should be implemented and integrated with systems for aggregate data collection and reporting to improve the use of data locally and also the efficiency of reporting. Information feedback systems will improve buy-in and appreciation of data by those responsible for data collection and have a positive effect on data quality. 4. An Agency for Health Statistics and Information with specific responsibility for the generation, analysis and reporting of health related data as well as harmonizing different systems across the public and private sector. Such an agency could play a role in strengthening health information systems and strengthening public health intelligence. It could play a lead role in establishing an open health architectural framework through the development and dissemination of core artifacts such as a national data dictionary and harmonized indicators. Such an agency would contribute to policy and

programme development and evaluation, leading to evidence-based decision-making.

5.   South Africa, including the NDOH, should develop a stronger working relationship with international agencies that deal with HIS and research in order to reap the benefits of their expertise and be in sync with international trends and developments elsewhere in Africa in this field. The StatsSA initative to lead an evaluation and development of a strategic plan with the support of the Health Metrics Network will provide such a mechanism.

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