



## 6 Current perspectives on suicidal behaviour in South Africa

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### SUICIDAL BEHAVIOUR WITHIN A GLOBAL CONTEXT

Suicidal behaviour remains a serious problem globally (Hawton & Van Heeringen, 2000; Lester, 2000; Wasserman, 2001; WHO, 1999a). The World Health Organisation (WHO) estimated that in the year 2000, approximately one million people worldwide would have died from suicide (WHO, 1999a). According to the same report (WHO, 1999a) there were about 10 to 20 times more non-fatal suicides estimated for that year, although in some regions non-fatal suicides could have been up to 40 times more frequent than fatal ones. The estimated fatal to non-fatal suicide ratio therefore ranged from 10:1 to 40:1. These figures represented one death every 40 seconds and one attempt every three seconds. On average, these statistics point to more people dying from suicide than from war, or in some instances than from other causes of death such as traffic accidents.

The WHO (1999a) figures further show that globally an increase has been observed in suicide rates, from 10.1 per 100 000 to 16 per 100 000 population between 1950 and 1995. This constitutes almost a 60% increase in 45 years, although researchers are alerted to the fact that the available data must be interpreted with caution because of variations in the reporting rates of the countries surveyed and the hidden burden of suicidal behaviour. Also, in countries with small populations a numerically small number of suicides can greatly modify reported rates, thus giving an inflated impression of increases or decreases in suicidal behaviour. Nevertheless, the trend reported in the increase of suicidal behaviour is not an artefact, and is observed in both 'developed' and 'developing' countries (Schlebusch & Bosch, 2000; WHO, 1999a, 1999b).

According to the WHO (1999a), during the 45 years noted above the highest fatal suicide rates have moved from the elderly towards younger people. Fifty-seven per cent of suicides are committed by people in the 35- to 44-year age group, for both males and females. This downward trend in the age of clinical populations in both absolute and relative terms has resulted in suicide being among the top five causes of death for both men and women in the younger age groups. During the same 45-year period the predominance of male over female suicide rates seems to have remained relatively constant, with only a minor increase from 3.2:1 (in 1950) to 3.6:1

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(in 1995). An exception to this is in rural China, where the female rates are on average 1.3 times higher than those in males.

The WHO (1999a) figures also show that the highest suicide prevalence rates (i.e. over 30/100 000 of the population) occur in countries in the Baltic region. This region has more than twice the average global suicide prevalence rate of 16/100 000. Furthermore, the highest rates in the regions of Africa, the Americas, South-East Asia and the West Pacific are found in island countries, namely Mauritius, Cuba, Sri Lanka and Japan respectively. The exact meaning of these findings is unclear and requires further research. Interestingly, according to the WHO (1999a) figures, it is striking that one-quarter of all suicides in the world are committed in two countries only, namely China and India. In China alone, 20% of all suicides in the world are committed. This probably also reflects the size of the respective populations of these two countries (WHO, 1999a).

## SUICIDAL BEHAVIOUR WITHIN THE SOUTH AFRICAN CONTEXT

Suicidal behaviour in South Africa is also inordinately high (Schlebusch & Bosch, 2000). Unfortunately, there are no past reliable data on the real dimension of the burden of suicidal behaviour in South Africa and indeed for the whole Africa region. The known figures may well record a bias because of under-reporting. Therefore, research-based limitations in terms of clinical and epidemiological trends prevent accurate analysis of such data (WHO, 1999b). As a result, in the Africa world region and in countries such as South Africa only general trend analyses are possible (Schlebusch, 2000a; WHO, 1999a).

Some research-based data on fatal suicides in South Africa are available from the South African National Injury Mortality Surveillance System (NIMSS). Information for this system is collated from existing investigative procedures at mortuaries, state forensic laboratories and courts. It is a collaborative effort between different research groups and government bodies in South Africa. The third NIMSS annual report was published recently (Matzopoulos, 2002), and contains information on deaths in 2001 which was gathered from 32 mortuaries in 6 provinces (Prinsloo, 2002a).

Earlier research (Schlebusch, 1988a, 1992a, 1995a) reveals remarkably divergent reported suicidal behaviour prevalence rates in South Africa. This is due to several reasons, including inconsistent and inadequate reporting of suicidal behaviour, as well as major historical socio-political and economic events that affected collection of accurate statistics on suicidal behaviour. This research included figures based on work influenced by pre-1994 apartheid policies (such as the legal segregation of ethnic groups). Nevertheless, available data do show that suicidal behaviour remains an area of significant public health concern in South Africa. As a result, research and service delivery in this area have attracted considerable interest for many decades. However, it needs to be emphasised that because of different sample sizes reported in research and for the years surveyed, results are not that readily comparable.





Schlebusch (2000a) noted that South African suicide rates have in the past been reported to range from 6/100 000 to 19/100 000 population, with an estimated non-fatal to fatal suicide ratio of between 8:1 and 20:1 (Schlebusch, 2000a), depending on when and where the sampling was done and which ethnic or other group was surveyed. In some groups the figures are higher - such as in the South African Police Services, with rates of 4/10 000. The South African ratio of fatal versus non-fatal suicides is thought to be 20:1 or higher, comparable to the WHO's (1999a) globally reported ratios.

Lerer, Knobel and Matzopoulos (1995) found that approximately 7% of all non-natural deaths in Cape Town in 1993/4 were due to suicide, which is consistent with present national figures. In this study the suicide rate for whites was 20/100 000, while rates in blacks and coloured people were below comparable American baseline rates of 13/100 000. About two-thirds of all suicide cases were younger than 34. In comparison, a study on suicide patterns in the Pietermaritzburg area (KwaZulu-Natal province) found suicide rates for black South Africans to be 14/100 000 population (Wassenaar, Pillay, Descoins, Goltman & Naidoo, 2000). This study also dispels the myth that suicide is rare among black South Africans, presenting data for this group which are considerably higher than earlier studies cited.

Studies quoted by the WHO (1999b) show that in South Africa in 1990 the overall suicide rate was 17.2/100 000 population, which is higher than the WHO's (1999a) reported world average of 16/100 000. This WHO report (1999b) also indicated that at the time in South Africa suicide accounted for about 8% of all non-natural deaths, whereas more recent NIMSS figures show that suicide accounted for about 10% of all non-natural deaths in South Africa (Prinsloo, 2002b). According to the above WHO report (1999b), at the time males predominated (79.2%) and the ethnic distribution was 43.3% blacks, 38.4% whites, 15.9% coloureds and 2% Asians (Indians). The average age of people who committed suicide was 36.3 years, consistent with the global situation of a shift from the elderly towards younger people (WHO, 1999a).

Research data extracted from the NIMSS for 1999-2000 (Burrows, Vaez, Butchart & Laflamme, 2003) shows that for Asians, blacks and coloureds, suicide was the third major contributor to deaths after homicide and unintentional causes, and that for whites suicide was the second leading cause of death after unintentional causes. The same study reports that during the period researched, suicide varied considerably across races and age groups; it was twice as high for whites as for Asians, and four times as high in whites as for coloureds and blacks. For all races suicides tended to occur in the younger age groups (15 to 34 years), except for in whites, who had fewer suicides in the 15- to 24-year age group and a fairly even spread across the rest of the age spectrum. A further breakdown by age is discussed in the section 'Methods used in suicidal behaviour in South Africa' below.

Available figures show that in South Africa whites are more likely to commit suicide than to be murdered. According to the NIMSS report (Matzopoulos, 2002), in 2001 26.7% of non-natural deaths reported for whites were due to suicide; 18.3% of those were due to homicide. Of those who die violent deaths, 80.5% are males, the majority being black (Padayachee, 2003; Prinsloo, 2002b). Overall, nearly five times more males than females commit suicide, the male/female ratio being 4.7:1 (Donson & Van Niekerk, 2002).



In 1994 the reported overall average crude South African death rate was about 4.9/1000 of the population per annum (Ntuli, Crisp, Clarke & Barron, 2000). For 2000 the non-natural deaths were estimated to be between 68 930 and 80 000 per annum (Prinsloo, 2002a). If we consider the fact that between 8% and 10% of all South African non-natural deaths were due to suicides, it means a significant loss of lives as a result of suicides in relation to the approximate population of the country, which in 2000 was 43 291 441 (Matzopoulos, 2002; Ntuli *et al.*, 2000). This tragic situation excludes figures based on non-fatal suicides, for which no accurate statistics are available since there has been no systematic collection of data, and information concerning this self-destructive phenomenon is mostly derived from *ad hoc* studies (Schlebusch & Bosch, 2000). However, the picture is equally alarming, since for every fatal suicide it is estimated that there are at least 20 (sometimes more) non-fatal suicides (Schlebusch, 2000a).

Studies show that between 10% (Deonarain & Pillay, 2000) and 12% (Bosch, McGille & Noor Mohamed, 1995) of patients referred for psychological/psychiatric help are non-fatal suicides. Given the high fatal suicide prevalence rate of at least 17.2/100 000 (possibly more), and the equally high fatal: non-fatal suicide ratio, the South African situation has clearly reached serious proportions. According to the data mentioned here, and based on the most recent figure of 10% of non-natural deaths being fatal suicides, it can be estimated then that between 6893 and 8000 South Africans die of suicide annually, and that between 137 860 and 160 000 or more engage in non-fatal suicidal behaviour annually. This represents up to: (a) 667 deaths by suicide every month, 154 per week, 22 every day and virtually 1 every hour; and (b) 13 333 non-fatal suicides every month, 3077 per week, 438 every day and 18 per hour in South Africa. These figures refer to all age groups and do not distinguish between adults and young people. What is alarming is that they are based on various national and regional samples in which suicidal behaviours were recorded, and most likely reflect only a tip of the iceberg. With an overall average household size of 4.4 in 1996 (Ntuli *et al.*, 2000), it means that a vast number of South Africans are directly affected by suicidal behaviour. This excludes those who are indirectly affected, such as family members outside the nuclear family, friends, schoolmates and work colleagues, and the community at large.

This disturbing profile of suicidal behaviour in South Africa is exacerbated by the emerging realisation that data reflecting prevalence rates for suicidal behaviour based on earlier reported figures (Schlebusch, 1988a, 1992a, 1995a; Schlebusch & Bosch, 2000) are an under-representation, frequently largely based on academic hospital statistics and apartheid era research. For example, in the past suicidal behaviour was under-researched among the majority black population, for whom lower rates were reported compared to other ethnic groups (such as whites, coloureds and Indians). Such earlier findings are contradicted by contemporary research (Burrows *et al.*, 2003; Schlebusch, Vawda & Bosch, 2003), which shows that suicidal behaviour among black South Africans is a neglected, serious problem that is increasing. It has also been argued that this increase should be viewed as a genuine escalation of the problem, rather than simply as a reflection of improved recording practices over recent years in post-apartheid South Africa (Mkize, 1992; Schlebusch & Bosch, 2000; Schlebusch *et al.*, 2003). This is also demonstrated by other reports that in South Africa 43.3% of all fatal suicides are among blacks (WHO, 1999b). According to the most recent research (Schlebusch *et al.*, 2003), in some centres non-fatal suicidal





behaviour among black South Africans has seen an increase of up to 58.1% over a 10-year period.

Research has also found that suicidal behaviour in patients with a life-threatening disease such as cancer is a significant but poorly researched area in South Africa (Noor Mahomed, Schlebusch & Bosch, 2003). This is an important consideration given the fact that one in four South Africans will develop cancer and one in two is likely to know someone who has cancer (Schlebusch, 1999b). Further, sub-Saharan Africa is experiencing an HIV/AIDS pandemic. This includes South Africa (Schlebusch, Schweitzer & Bosch, 1998). The prevalence of suicidal behaviour in this group in South Africa is unknown, but likely to be significant. An increased likelihood of suicidal behaviour in HIV/AIDS patients has been found, and some researchers have reported a 36 times higher risk for suicidal behaviour in these patients compared to the general population (Van Dyk, 2001). Another disturbing feature is a reported correlation between HIV testing and suicidal ideation before the test results are known (Van Dyk, 2001). One of the few hospital-based studies in this regard (Noor Mahomed & Karim, 2000) also found that there is a higher risk for suicidal behaviour in HIV-positive patients compared to the general population.

Regarding age in those with non-fatal suicidal behaviour, an earlier general hospital-based study (Bosch, McGill & Noor Mahomed, 1995) identified the peak age to be between 20 and 29 years (41%). More recently, Deonarain and Pillay (2000) reported a mean age of 25 years for non-fatal suicidal behaviour in a general hospital sample.

## CHILD AND ADOLESCENT SUICIDAL BEHAVIOUR IN SOUTH AFRICA

As is the case for adults, it is difficult to obtain accurate, reliable statistics on child and adolescent suicidal behaviour for South Africa. One can only arrive at an informed estimate of prevalence rates based on available research findings.

Several studies reported at South African suicide conferences (Schlebusch, 1988a, 1992a, 1995a; Schlebusch & Bosch, 2000) have noted that up to about one-third of all non-fatal suicidal behaviours involve children and adolescents. Noor Mohamed, Selmer and Bosch (2000) found that in young children the age peaked at 9 years (age range studied being 4 to 12 years). The Durban Parasuicide Study (DPS) findings noted that the child and adolescent group was the second most at-risk age group for non-fatal suicidal behaviour, after young adults (the DPS, a multicentre research-based intervention programme for suicidal behaviour, is more fully discussed at the end of this chapter). This was further confirmed by more recent hospital-based research (Schlebusch *et al.*, 2003), which noted a sharp rise in suicidal behaviour in blacks generally, but also noted that 24.5% of the total sample of suicidal behaviour patients admitted to the hospital where the study was undertaken were black youths aged 18 years and younger. These findings and a male to female ratio of 1:2 for the adolescent group were comparable to those of earlier studies. Such findings have important implications for school-based suicide prevention programmes, as discussed later.

South African non-hospital-based studies have reported figures ranging from 4% of school children who expressed suicidal ideation to their school counsellors (Pillay,



1995a), to 7.8% (Flisher, Ziervogel, Chalton & Robertson, 1992) of school children who have attempted suicide. Research conducted among a high school sample of black youths in the Eastern Cape region found that up to 47% had suicidal ideation (thoughts of harming themselves). Of these, 18% reported definite plans to commit suicide, while 5% indicated that they would kill themselves if they could. A further 24% had thoughts of self-harm, but felt that they would not act on these (Mayekiso & Mkize, 1995). These cohorts represented a group not usually seen in hospitals but who seek help and utilise services at their schools.

According to the recent NIMSS findings (Donson & Van Niekerk, 2002), the youngest fatal suicides in 2001 were 10 years old, but more fatal suicides occurred in the 15- to 19-year age group than in the 10- to 14-year group. As in non-fatal suicides in young people in South Africa, fatal suicide rates also reflect that more females (12%) in the 10- to 19-year age group commit suicide than males (7%) (Bradshaw, Masiteng & Nannan, 2000). This means that on average 9.5% of deaths in young people in South Africa are because of suicides, which - disturbingly - is as high as the adult suicide rate. While the reported adult suicide rates reflect more male suicides, it is interesting to note that more females among the young people of South Africa commit suicide. These findings require further research.

Other causes of death in this young age group are injuries (the most common cause overall, but especially in the 15- to 19-year age group for males); infectious diseases (most common in the 10- to 14-year age group); tuberculosis (the most common disease, followed by AIDS, in young females); and epilepsy. Generally speaking, gender-based violence; sexual risk-taking behaviour; alcohol abuse and high levels of general violence are the most important aetiological factors that affect the health of South African youth (Bradshaw *et al.*, 2000). This has significant implications for suicidal behaviour.

Given such research findings, one can understand the severity of the problem in young people in South Africa. Statistics reflecting death by suicide, as well as problems with other suicidal behaviours and/or ideation, appear to be inordinately high in this age group.

## METHODS USED IN SUICIDAL BEHAVIOUR IN SOUTH AFRICA

### Fatal suicide

In a comprehensive international review Lester (2000) quotes selected South African studies that found firearms, hanging and poison ingestion to be common methods in suicidal behaviour. Several ethnic differences were found in the past in non-fatal and fatal suicides in some of the DPS research studies (Lerer *et al.*, 1995). The latter Cape Town study (Lerer *et al.*, 1995) showed that firearms and hanging were the methods of choice in 68% of suicides, while another study (Lerer, 1992) also noted the link between suicide, homicide and high blood alcohol concentration (BAC) levels, especially among women.





More recently, according to the WHO (1999b), hanging is the most frequently employed method (36.2%) in South African suicides, closely followed by shooting (35%), poisoning (9.8%), gassing (6.5%) and burning (4.1%).

According to the most recent NIMSS findings (Donson & Van Niekerk, 2002), in 2001 hanging (42.3%) and firearms (29.4%) were the major methods used in suicides, while poisoning with drugs and pesticides was used by 13.6% of suicides, and gassing by 7.1%. Other methods included the use of sharp objects, asphyxia, electrocution, drowning and falls (jumping off high areas). According to the same report, seasonal trends indicated that the use of poison peaked in March (11.5%). Hanging as a method peaked around July (9.7%), while the use of firearms was highest in April (9.9%). Although there was a noticeable trough in May, suicide appeared to increase towards the end of 2001.


Analysis of sex distribution in the same report showed that males accounted for 82.4% of suicides, in whom hanging (46.4%) and firearms (31.4%) were the major choice of method. In females most suicides were as a result of poisoning (35.1%) and hanging (22.7%). Hanging was the method of choice in the largest percentage of suicides among Asians, blacks and coloureds, while in whites firearms accounted for the largest percentage. Among victims aged 10-54 years hangings predominated, whereas in the 30- to 34-year age group use of firearms was highest. In the 25- to 29-year age group the use of poisoning was most common. For those aged 40-44 years gassing peaked as a method, whereas the highest numbers of burns and jumping were found in the 25- to 29- year age group (Donson & Van Niekerk, 2002).

This latest NIMSS report also revealed that in terms of day of the week, 18.3% of male suicides and 16.1% of female suicides occurred on Mondays. However, more than 40% of suicides occurred over weekends, 43.5% of male and 43.7% of female suicides. In terms of time of the day, most suicides were committed between 07h00 and 20h00. Female suicides peaked at 08h00 and at 16h00, while most male suicides also occurred at 08h00. Suicide did not have any major seasonal variations over the year (Donson & Van Niekerk, 2002).

One of the few South African studies (Cassimjee & Pillay, 2000) on suicidal behaviour in family practice found that the most common method used was substance overdose (63.63%), followed by fatal hanging (21.21%), firearms (9.09%) (fatal except in one case) and lacerations of the wrists (6.06%). Of the overdose patients, 60.06% used medication as their method of choice. A further breakdown showed that 30.3% used over-the-counter substances and 30.3% used prescription-only substances.

### Non-fatal suicide

The findings from a large DPS study (Bosch *et al.*, 1995) are in keeping with other studies, which found that overdosing on medication is one of the most common methods used in young people who present with non-fatal suicidal behaviour. It was emphasised by the authors that patients probably used the substances as a result of availability. This has also been noted in another South African investigation, which implicated availability in the choice of method; almost three-quarters of a sample of young self-poisoners used medicines belonging to family members in the same household (Pillay, 1988).



Collectively the DPS research showed that overall choice of method in non-fatal suicide behaviour is overdosing (90% of cases), followed by other forms of self-injury (10%). In the case of overdosing a wide variety of substances are ingested, but over-the-counter analgesics (painkillers), and prescription-only benzodiazepines (tranquillisers) and anti-depressants are most commonly used. Schlebusch (1987, 1992b, 1995b) argued strongly for better control of over-the-counter analgesics, which are common substances of abuse in South Africa. They feature in suicidal behaviour as well as in a variety of neuropsychological problems and serious diseases, such as analgesic nephropathy resulting in end-stage renal disease (Schlebusch, Lasich & Wessels, 1985).

In a recent cohort of hospital-based patients studied by members of the DPS group (Schlebusch *et al.*, 2003), certain common non-fatal suicide methods emerged as a cause for concern, especially among blacks. These methods included self-poisoning by means of household utility liquids such as paraffin and various poisons in 40.4% of the patients seen. The same study reported that other potentially lethal methods such as hanging and lacerations to the throat accounted for 7.5% of suicide methods.

The choice of method used most frequently in all age groups, namely medicinal substances and poisons, is strongly influenced by a number of factors, including: (a) accessibility; (b) knowledge or lack thereof; (c) experience and familiarity; (d) meaning, symbolism and cultural influence; and (e) the potential suicidal person's state of mind and level of intent.

The DPS research also supported the views that: (a) with repeated attempts, more severe and lethal methods may be used; and (b) there appears to be more recklessness in terms of securing help as the ongoing non-fatal suicidal behaviour does not get the desired effect from significant others on whom the suicidal behaviour is supposed to impact.

## AETIOLOGY OF SUICIDAL BEHAVIOUR IN SOUTH AFRICA

Many of the research studies quoted so far have noted the role of family dynamics in suicidal behaviour. For example, one of the DPS investigations (Pillay, 1995a) found a significantly higher prevalence of family conflict as a recent stressor among suicidal adolescents compared to control subjects. In Cassimjee and Pillay's (2000) study involving suicidal patients seen in general practice, the following causes were the most prominent: interpersonal, marital and partner-relational problems, family problems, financial problems, stress, examination problems at school or university, mental illness and incest. Such findings are in keeping with other studies (Schlebusch & Bosch, 2000) that found family problems and interpersonal conflicts to be common reasons given for suicidal behaviours. A frequent problem involves feelings of loss of support because of family change caused by parental separation, divorce and remarriage, and adverse parent-child interactions. Du Plessis and Schlebusch (1992) found that parental loss through divorce, and especially through parental bereavement, can be high risk factors in suicidal behaviour.



Other critical aetiological considerations are associated with family psychopathology (such as suicidal behaviour, substance abuse and other psychological disorders in the family), school-related and academic problems among young people, exposure to family violence, and child abuse (Noor Mahomed, Selmer & Bosch, 2000). Regarding sexual abuse, a study of university students with suicidal ideation and behaviours found that in 28.9% of those surveyed, 36.3% reported contact sexual abuse, and 63.7% reported non-contact sexual abuse such as exposure to exhibitionism and sexual requests (Collings, 1992). This study also identified other research that found a significant association between child sexual abuse and later self-destructive behaviour. From a cognitive behaviour therapy point of view it has long been known that dysfunctional cognitive schemata in children (i.e. more unhappy than happy memories) can lead to a vulnerability to depression and suicidal ideation and/or behaviour.

Pillay and Wassenaar (1997a) found pathological levels of inflexibility and cohesion in the family functioning of suicidal adolescents. Rigid problem-solving behaviour, over-controlling parenting styles, and a lack of tolerance for developmental or role changes were characteristic features of such families. Similarly, these families were found to be over-involved with and over-protective of their children, allowing little or no room for individuation and normal developmental progression. Another investigation by the same researchers found a significantly higher prevalence of family conflict as a recent stressor among suicidal adolescents compared to control subjects (Pillay & Wassenaar, 1997b). These authors found that the conflicts were ongoing stressors, with the suicidal behaviour occurring at a threshold point in the crisis build-up, indicating the young person's inability to continue in the conflict-ridden environment. Both these studies noted that the recognition of family risk factors for suicidal behaviour in young people is an essential feature in planning intervention and prevention programmes.

An interesting study involving black adolescents (Mayekiso, 1995) showed a relationship between self-punitive wishes and dissatisfaction with father-adolescent relationships, mother-adolescent relationships, family interaction and the degree of family acceptance. Researchers (Schlebusch, 1988a, 1992a, 1995a; Schlebusch & Bosch, 2000) have persistently cautioned: (a) that the prevalence of suicidal and other self-destructive behaviour can increase significantly during adolescence and early adulthood if risk factors are not timeously identified and addressed; (b) that young people's perceptions of suicidal behaviour may be a significant factor in such behaviour; (c) that interpersonal problems are major causative factors; (d) that the media can play a significant role in influencing perceptions about suicidal behaviour (because of the Werther or 'copy-cat' effect); and (e) that family problems are often perceived as one of the main causes of suicidal behaviour.

What is perhaps less known in South Africa is that reading impairment (one of the most prominently investigated learning disabilities internationally) has been associated with many psychopathological disorders, and can serve as a co-morbid factor in suicidal behaviour (Wood & Goldston, 2000). Identifying and treating such disabilities (especially problems in reading) can be powerful preventors of subsequent psychological disorders and potential suicidal behaviours.



Various authors have noted that suicidal people are often poor at solving interpersonal problems (Schlebusch, 1992a, 1995a; Williams & Pollock, 1993). It is in this context that suicidal behaviour has been viewed as an inappropriate method of communication and problem solving. Furthermore, research data from the DPS group (Schlebusch & Bosch, 2000; Schlebusch *et al.*, 2003) provide support for the hypothesis that, as part of a process, non-fatal (low intent) suicidal behaviour is increasingly being employed as a first-line crisis management strategy by people (especially younger people) who would not always be considered to have particularly overt psychological morbidity. That is, they use it as an inappropriate problem-solving strategy.

Chronic and acute stress are critical to co-morbid aetiological considerations in suicidal behaviour (Pretorius & Roos, 1995; Schlebusch, 1995b). The role of dysfunctional perceptions in stress arousal associated with a range of psychological problems, including suicidal behaviour, has been well documented in South Africa (Schlebusch, 2000c). Wassenaar *et al.* (2000) also referred to the role of stress as precipitated by a conflict in social roles in young people from traditional backgrounds in the multicultural South African society; these young people have to cope with new roles and a more Western-orientated culture. Schlebusch *et al.* (2003) also emphasised the role of acculturation, socio-economic pressures, high crime and violence rates, a history of human rights violations with resultant trauma, and the process of transformation in creating high stress levels that can act as suicidal triggers. What is lacking is in-depth research on the causes of extended suicidal behaviour.

There is an escalation in 'crimes of passion' and family murders being witnessed in South Africa. Of the few studies in this regard, one (Schlebusch, 1988b) looked at the role of personality disorders (especially the dependent personality), and another (Graser, 1992) emphasises the distinction between 'murder-suicide' and extended suicide. In the case of 'murder-suicide', the family murder occurs primarily as an act of murder and secondarily as a suicidal act, whereas in the case of extended suicide, it is the other way around – i.e. the intention had been there all along to commit suicide after first killing the family as part of the extended suicidal act.

International research (Hawton & Van Heeringen, 2000; Wasserman, 2001) has clearly identified various psychopathological conditions (in particular mood disorders) as co-morbid factors in the aetiology of suicidal behaviour. This is also true for South Africa in all ethnic groups (Schlebusch, 1992a, 1995a; Schlebusch & Bosch, 2000; Schlebusch *et al.*, 2003). In line with international studies, a recent study (Schlebusch *et al.*, 2003) reported that mood disorders were the most common diagnosis among non-fatal suicidal black patients researched, being present in nearly two-thirds (63.9%) of them. Other diagnoses reported in the same study included substance abuse, schizophrenia and substance-induced psychosis.

A study on attitudes of black adolescents towards suicide and the prevalence of depression among adolescents in some areas (Mayekiso, 1995) also indicated a high incidence of depression in school children. Up to 38% of the sample was diagnosed as mildly depressed, 20% as moderately depressed, and 13% as severely depressed. Only 29% of the sample could be diagnosed as not being depressed. These findings are an increasing cause of concern, especially in view of national and international research predictions that stress and mood disorders (which have been shown to be





associated with so many other somatic and mental health problems, as well as suicidal behaviour) constitute one of the greatest maladies of our time (Hawton & Van Heeringen, 2000; Schlebusch, 2000c; Wasserman, 2001).

At the same time, a history of prior suicidal behaviour and substance abuse (especially alcohol abuse) as co-morbid factors in suicidal behaviour remain another cause for disquiet because of their aetiological importance for future suicidal behaviour (Schlebusch, 1995a; 1998; Schlebusch & Bosch, 2000). As emphasised earlier, research (Schlebusch, 1987, 1998) has confirmed that alcohol, household poisons, over-the-counter substances (especially analgesics), benzodiazepines and anti-depressants are methods of choice in substance overdosing or abuse for adults and youngsters alike in their attempts to cope with the ravages of stress.

According to a WHO (1999b) report on suicide, 45% of fatal suicide victims had high levels of alcohol in their blood; that is, a mean BAC of 0.16 g/100 ml. In all, 15% of the deceased had a BAC of 0.2 g or more per 100 ml. The most recent NIMSS figures (Donson & Van Niekerk, 2002) show that alcohol was a factor in about one-third of all suicides; BACs were positive in 36.8%, and of that group 27% were at or above 0.05 g/100 ml (Sukhai & Van Niekerk, 2002). Another astonishing fact is that in almost 50% of South African non-natural deaths generally, due to homicide and motor vehicle collisions, BACs of 0.08 g/100 ml were present. In just over one-quarter of deaths from suicide or other 'accidents', BAC levels of 0.08 g/100 ml were present. In addition, 61% of non-fatal injury patients admitted to trauma units in several major South African centres had a mean BAC level of 0.12 g/100 ml. There is also a significant relationship between BAC and injured pedestrians, and research has shown that in instances of violence 74% of cases showed positive alcohol levels (Parry, 2000).

It is clear that South Africa's anguished legacy of apartheid has not only severely traumatised its citizens because of human rights violations (Pillay & Schlebusch, 1997), but has left a heritage of stress-related psychological problems (Schlebusch & Bosch, 2002), with implications for potential suicide. Additional factors that combine to elevate stress levels, with a potential to affect suicidal behaviour, are: extremely high prevalence rates of violence and trauma (McKendrick & Hoffman, 1990; Schlebusch & Bosch, 2002); the influences of 'First World' forces in an internationally less isolated post-apartheid South Africa; socio-economic difficulties, including high unemployment levels; high expectations following political and other transformation, which are not always realised; and acculturation and economic pressures, which (if not timeously addressed) all combine to produce a breeding ground for potential suicidal behaviour (Schlebusch *et al.*, 2003).

## MANAGEMENT OF SUICIDAL BEHAVIOUR IN SOUTH AFRICA

It is generally recognised that suicidal behaviour is a highly complex phenomenon that cannot be readily attributed to a single cause since it involves intricate interactions between psychosocial and biological variables (Van Heeringen, Hawton & Williams, 2000; Schlebusch, 1990a). As such, we now know that suicidal behaviour is a process. Given this, family practitioners and primary health care workers who usually have ongoing contact with patients can play a critical role in the prevention and management of this problem (Cassimjee & Pillay, 2000). As long ago as 1985 it was



argued that South African health care practitioners (especially medical doctors) should be alert to suicidal intent in their patients, since a significant preponderance of their suicidal patients consult them (often with somatic symptoms and masked suicidal ideation) in the weeks preceding the suicidal act (Schlebusch, 1985a). As we move forward in the twenty-first century, little seems to have changed in this respect (Cassimjee & Pillay, 2000).

The need for an astute diagnosis of underlying psychopathology and its appropriate treatment (including medication and, where necessary, hospitalisation or referral for psychological/psychiatric help) by suitably trained health care professionals speaks for itself. Treatment guidelines for one of the most common co-morbid conditions (mood disorders) are regularly updated and made available (Lasich & Schlebusch, 1999; Schlebusch, 1990b). Suicidal individuals often appear to: (a) access limited ways of dealing with their problems (Kienhorst, de Wilde & Diekstra, 1995); and (b) tend to slip into a cognitive rut, whereby it is difficult for them to see alternatives (Schlebusch, Luiz, Bosch & Levin, 1986). Therefore, the central role of a perception in children (Pillay, 1995b) and adults especially of entrapment (i.e. being closed in with no escape) is an additional important factor to consider in the suicidal person's feelings of hopelessness and suicidal risk profile (Van Heeringen *et al.*, 2000). From a psychological perspective, treatment, rather than being based on an adventitious approach, can be more usefully designed around an *ad rem* organisational system (Schlebusch, 1990a, 1990b, 2000b) or structured psychotherapy, especially cognitive behaviour therapy, often lacking when suicidal patients are treated.

To further address the problem of management, it is essential to establish a protocol regarding the referral of suicidal patients. For example, the DPS research group did so in collaboration with the Professor and Head of the Department of Medicine at the medical school where it is based and in the affiliated relevant teaching hospitals (Schlebusch *et al.*, 2003). This was done because of the significant demands these patients make on the Department of Medicine's clinical service load and hospital bed occupancy. Initially all suicidal patients referred to these hospitals are admitted by the Department of Medicine and treated as a medical emergency by their staff. Once medically stabilised, these patients are referred for clinical psychological or psychiatric attention. It is now routine hospital policy in our teaching hospitals that all patients admitted with suicidal behaviour are seen by a mental health care professional once medically stable. This usually occurs within 24 to 48 hours after admission, and before discharge. As a result, patients and their families can be psychologically managed more effectively. It also serves to provide a substantial database for research designed to seek ways of preventing suicidal behaviour.

A more controversial point in management is the highly complex question of ethical and legal issues in suicidology. An international group of experts on suicidology that included South African representation critically examined issues such as standards of care, responsibility and failure of care, failing to diagnose appropriately, malpractice, euthanasia and assisted suicide (Leenaars *et al.*, 2001; Leenaars, Betancourt *et al.*, 2000; Leenaars, Cantor *et al.*, 2000). Other international work (Snyder & Caplan, 2002) focused on providing a framework for a better understanding of assisted suicide (especially physician-assisted suicide) and its legal and ethical implications. Space does not allow for a detailed discussion of these considerations here, save to note





that they are being debated in medico-legal circles and suicidology in South Africa, where euthanasia ('mercy killing') and assisted suicide are not legal (McQuoid-Mason, 1995; Sneiderman & McQuoid-Mason, 2000).

Furthermore, there are currently various professional associations and support groups that assist with the treatment and prevention of suicidal behaviour, and that help those that have suffered psychologically because of such behaviour. These include the Survivors of Loved Ones of Suicide (SOLOS) (which operates in Durban), the South African Depression and Anxiety Support Group, Lifeline and Befrienders International. Such groups and organisations are valuable partners as part of prevention and treatment strategies.

## PREVENTION OF SUICIDAL BEHAVIOUR IN SOUTH AFRICA

Prevention rather than cure is the best hope for combating persistent problems with suicidal behaviour (Schlebusch, 1999a). In the 'new' (post-apartheid, democratic) South Africa, the problems mentioned so far are important considerations in realising any efforts at establishing suicide prevention programmes, clear guidelines for which exist (Schlebusch, 2000b; WHO, 1999b). With the exception of the South African Police Services, there are no national suicide prevention programmes in place at present. This and the other issues discussed in this chapter, as well as the fact that research on suicide prevention has languished as a relatively minor endeavour in combating suicidal behaviour in South Africa, are not readily taken into account when explaining the high rates of suicidal behaviour in the country. The DPS research group's present research track on stress and suicidal behaviour hopes to, in part, address this lacuna.

The WHO (1999b) emphasises that research has shown that preventative interventions are highly effective in reducing suicide rates. Some of these interventions, e.g. the early and effective diagnosis and treatment of individuals with stress-related problems, depression or other psychopathology who are at particularly high risk for suicidal behaviour, are cost-effective and can be integrated into primary health care programmes. As noted before, this is one of the primary thrusts of the current research of the DPS, along with early identification of stress and at-risk persons in working towards developing a national suicide prevention programme in South Africa.

Such a programme cannot be developed without the support and assistance of all interested parties in the community and the government. The WHO (1999b) has also recommended that the problem of prevention concerns society as a whole and that solutions should be sought with full participation of NGOs; that a national task force on suicide prevention should be established; that policies on pesticides should be reviewed because of the impact of pesticides on suicidal behaviour; that the training of health care workers should be tailored to specific local conditions; that assistance should be given to suicide support groups; and that media co-operation should be enlisted. The WHO has further provided resource booklets on the prevention of suicide for the media, general physicians, teachers and other school staff, primary health care workers, prison officials, other professionals, and survivor groups.





If we take into account the spiralling health care bill of South Africa, the need to prevent suicidal behaviour in all age groups is paramount. Suicidal behaviour results not only in much psychological anguish, but invariably leads to hospital admissions and attendant expensive procedures that further escalate already high health care costs, and result in more stress for those affected. This does not take into account costs incurred because of post-hospital treatment and the treatment of devastated family members or loved ones. Apart from the enormous cost in human suffering, health care planners and the government cannot continue to ignore the financial implications, loss of skills and psychological suffering resulting from suicide.

To achieve an improved situation, it needs to be recognised that the prediction, prevention and management of suicidal behaviour should be everyone's responsibility. I have argued before that:

For too long we have focused on a health care system that is almost exclusively science and technology based with a consequent essential aim of treating the patient who presents with suicidal behaviour. Although health care scientists need to continue with their scientific research, increased concern with prevention of health-risk behaviour and promotion of healthful lifestyles must now be given top priority. In essence, that means a shift to a health behaviour based approach rather than a morbidity based health care approach. This obviously includes a healthy dose of both patient and health care workers' education. Clearly, the linchpin in this effort is no longer just the health care worker; it has to involve health care consumers as active participants in the process (Schlebusch, 1995a, pp. 1-2).

Preventing suicidal behaviour should start early in life. Studies have demonstrated the importance of the school, university, college and family as first levels of intervention and prevention, since these are obvious targets for identifying and preventing suicidal behaviour in all age groups, but especially among youngsters. Several of the studies quoted in this overview revealed that suicidal patients often use firearms or ingest medical substances and household poisons. These trends suggest that the availability of firearms and such substances influence the nature of the suicidal act (i.e. its lethality) and type of substance ingested, and that knowledge of lethality and availability do not always appear to be seriously considered. For example, a decade and a half ago already it was strongly argued (Schlebusch, 1987) that there is a *prima facie* case for considering the availability of substances as a major cause of concern in suicide prevention. Suitable school programmes, educating adults and in particular youngsters in this regard should be a priority in any suicide prevention programme. Of course, these findings are suggestive of several avenues of prevention, but particularly of continuing education regarding the dangers associated with access to lethal weapons, over-the-counter substances, medicine storage and accumulation, and issuing medical prescriptions to vulnerable patients. In this regard, Williams and Pollock (1993) emphasised that reducing the availability of lethal equipment and substances is one approach to prevention, but that this needs to be combined with knowledge about who is most vulnerable.

Pillay (1995a, 1995b) observed that to achieve even a modest chance of enduring success in preventing suicidal behaviour, programmes designed to reduce such behaviour must be directed at the level of the individual as well as at the family,





school, workplace and, on a larger scale, at organisations and community levels. Pillay (1995a, 1995b) lamented the withdrawal of teacher-counsellors from schools as part of the rationalisation process that is taking place in South African education, and pointed out that in most cases these counsellors are now expected to teach mainstream subjects and are allowed only a few periods of "guidance". These limited "guidance" periods are the only counselling services offered by many schools presently. It was noted that this situation has a negative impact on the mental health of school-going children, especially the cohort at risk for suicidal behaviour. Pillay (1995a, 1995b) recommended that liaison between the various clinical services and the education department is essential to prevent adolescent suicidal behaviour.

Considering the large numbers of learners with suicidal behaviour who are referred from school teachers, closer co-operation between educators and health care providers can effect more successful prevention of suicidal behaviour in young people. Teachers should be alerted to the fact that when assessing suicide risk factors in these learners, family background factors should also be assessed in conjunction with other factors such as relationships outside the family, relationships with siblings and changes in living conditions, and potential psychopathology, such as depression and stress.

Suicidal behaviour, then, remains one of the many psychological problems of childhood and adolescence, requiring intersectoral collaboration between the education and health departments. Considering the large numbers of referrals of patients with suicidal behaviour from school teachers, it is evident that closer co-operation between educators and health care providers is in children's best interests. In this regard a proposal on child and adolescent mental health policy for South Africans recommended a multi-level system, with the first tier incorporating schools as one of the many service sites at the district level (Dawes *et al.*, 1997).

Those at risk for suicidal behaviour need an empathetic ear during moments of crisis. This applies to all, but especially to the young, not only because of the high incidence of suicidal behaviour and/or ideation in school-going children (Flisher *et al.*, 1992; Mayekiso & Mkize, 1995; Noor Mahomed *et al.*, 2000; Pillay, 1995a, 1995b) and university students (Mayekiso & Ngcaba, 2000), but because all young people need help in developing crisis-resolution techniques. Given such findings, a school-based prevention programme (Wassenaar, Pillay, Burns & Davies, 1993) provided encouraging results. The programme was found to increase school teachers' understanding of the problem; improve their attitudes and helpfulness to school children; and decrease school children's inclinations towards viewing suicidal behaviour as an option. A time-series analysis of hospital records of attendance and admissions for the catchment area where the study was done showed a 58% reduction in youngsters who presented with suicidal behaviour during the six-month period following the programme. Mayekiso and Mkize (1995) also expressed the view that adolescents as a group (rather than just symptomatic suicidal individuals) could benefit from supportive intervention within the school context. Attempts to address the problem of young people's suicidal behaviour should also reflect their attitudes and perceptions towards such behaviour.

It is essential to take note of this when designing suicide prevention programmes, since several studies presented at the four Southern African conferences on suicidology to date showed that adolescents and children as a group need help (or

training) in dealing with life stresses and conflict resolution. This implies a shift in prevention in the sense that there should not just be a focus on those with suicidal thoughts and suicidal behaviour, but that adults as well as school-going children and university or college students should be taught stress management and conflict resolution skills. Such programmes have been reviewed in the literature (Schlebusch, 2000c).

Further, the DPS research studies have shown that in many patients, traditional social role expectations are changing. This seems to have a significant impact on black South Africans, especially women. In this regard the DPS work group also emphasised the importance of more cross-cultural research within the ambit of suicidal behaviour (Schlebusch, 1995c). Researchers therefore need to examine more carefully the influential role of traditional health beliefs in shaping responses to health messages, subsequent role expectations and changes in health behaviour (Schlebusch & Ruggieri, 1996) as part of suicide prevention programmes. These issues, in part, also relate to the predicted shift from traditional cultural identification to more Western lifestyles, since they no doubt will accelerate the impact on at-risk individuals, with subsequent significant implications for suicide prevention programmes. To prevent suicidal behaviour one needs to examine its aetiology and co-morbid factors. Strategies should include life or social skills components, education programmes for adults and the youth (and more specifically for high-risk individuals and their families) on the various risks associated with suicide, including alcohol consumption.

## A RESEARCH-BASED INTEGRATED APPROACH: THE DURBAN PARASUICIDE STUDY

To provide a better historical and current understanding of suicidal behaviour in South Africa, a research-based intervention and prevention model to deal with suicidal behaviour is presented here. The Department of Medically Applied Psychology, Nelson R Mandela School of Medicine, University of Natal, Durban, South Africa, and its affiliated teaching hospitals and community clinics have had an active interest in service delivery and research into suicidal behaviour in South Africa for the past quarter of a century. As mentioned earlier, these activities have been grouped into an ongoing programme known as the DPS, which is a multi-centre research-based intervention programme studying suicidal behaviour in South Africa which originated in 1978 under the leadership of the author. Since then, the DPS research group has generated considerable data. A brief review of some of the research findings over this period are presented against the backdrop of the concurrent rapid socio-political and economic changes in South Africa; changes which have also impacted on the suicidal behaviour catchment population during the period under review. Some of the crucial issues for health service delivery and policy development on suicidal behaviour into the next decade and beyond are also discussed. Conclusions are reached by contextualising research on suicidal behaviour and the various research themes which have been linked to the DPS, and proposals for future research on suicidal behaviour are outlined. This constitutes an adaptation and update of findings proposed as far back as 1992 (Du Preez & Schlebusch, 1992).



### Origin and aims

The DPS originated following the appointment of the first full-time clinical psychologist (the author) to a university-affiliated general teaching hospital (Addington Hospital in Durban) - as opposed to a mental hospital - in the Province of KwaZulu-Natal in 1976, because of the significant numbers of suicidal patients referred to the hospital's psychological services at the time. Much of the early work done by the DPS grew out of the establishment of formal consultation-liaison clinical psychology services, which were later extended to other principal general teaching hospitals in that province (Schlebusch, 1983). The 'consultation' aspect of these services refers to the health services rendered to patients and families, while the 'liaison' component refers to the assessment and management of services offered to referring physicians and medical departments throughout the hospital network referred to earlier.

The initial impetus of the original service at Addington Hospital came from a growing awareness by both the casualty or trauma units and the medical or surgical units of the various hospitals that only medical stabilisation was being provided to patients admitted because of some form of suicidal behaviour. A referral protocol was established, allowing all patients admitted for medical treatment after suicidal behaviour to be comprehensively assessed by a clinical psychologist.

The establishment of the DPS culminated in various early conference presentations (Schlebusch, 1978a) and the first publications on suicidal behaviour (Minnaar, 1978; Minnaar, Schlebusch & Levin, 1980; Schlebusch, 1978b, 1985a, 1985b, 1985c, 1986; Schlebusch *et al.*, 1986; Schlebusch & Minnaar, 1980) reflecting its initial work. The original attempt to draw together its work and the work of other researchers on suicidal behaviour in Southern Africa was realised in convening the First Southern African Conference on Suicidology (Schlebusch, 1988a). Two years later saw the publication of an academic text (Schlebusch, 1990a) which, *inter alia*, reflected contributions by members of the DPS to the field of medical psychology as related to suicidal and health-risk behaviour and medical problems in South Africa. At this point in the research programme it was possible to comment on suicidal and self-destructive behaviour in South Africa within a wide variety of medical and psychological contexts, including training in the prediction, management and prevention of suicidal behaviour. The convening of three subsequent Southern African Conferences on Suicidology every few years continued to offer a platform for further consolidation of research on suicidology in the Southern African region (Schlebusch, 1992a, 1995a; Schlebusch & Bosch, 2000).

### Problem areas

Following the experience of the DPS research group over the past 25 years, a number of problem areas have been identified. These are probably applicable nationally, and include:

- a) Identifying suicidal behaviours which are often masked by the patient and/or family, or by the method of note-taking of the attending medical practitioners. For example, although in the main it is a simple matter for emergency staff in the particular hospital where the patient is admitted to enter a note that states "intentional overdose", it is apparent that with many patients who present in the emergency rooms "accidental overdose" is stated in the notes, or that the suicidal



behaviour or ideation is obscured by patient chart entry notes referring to “patient intoxication”, “belligerence” and/or other “non-suicidal” patient behaviours.

- b) Identifying suicidal behaviour involving motor vehicle accidents, which is frequently recorded in patients’ records as “motor vehicle accidents (MVA)-drunken driving”, or “non-suicidal intentions”, while questions about potential sub-intentioned suicidal behaviour are not entertained.
- c) Ensuring that any enquiry into suicidal behaviour should include data about previous suicidal behaviour when interviewing a patient. This type of enquiry is useful for identifying sub-intentioned suicidal behaviour, and for identifying previous suicidal behaviour which did not require medical attention (Schlebusch, 2000b).
- d) Problems with data collection and storage, because teaching hospitals and associated medical academic departments are characterised by a large component of rotating and temporary personnel. Individual styles in conducting interviews and recording data become problematic when longitudinal or historical data are sought. Experience has shown that training in standardised interview formats and careful supervision of staff in training are essential in compiling appropriate data about suicidal behaviour, and that the use of a structured assessment is invaluable (Schlebusch, 2000b).
- e) Problems relating to terminology and definitions of suicidal behaviour when varied terminology is used, such as: parasuicide, attempted suicide, sublethal suicide, sub-intentioned suicide, failed suicide, suicide gestures, etc. Some of these terms are mutually exclusive while others clearly overlap. Since this creates problems, a proposed classification in this regard has been developed to assist researchers and practitioners with the use of a common nomenclature in suicidal behaviour (Schlebusch, 1992b, 2000b).
- f) The fact that problems are further compounded by individual suicidal patients’ knowledge or lack of knowledge of the lethality of the particular method of suicide chosen and/or accessibility to such method(s).
- g) The fact that most data and statistics to date have been based on samples drawn from academic hospital and/or mortuary settings. With a few exceptions that involve community studies, data on patients receiving treatment from private practitioners, private facilities and occupational health services are often missing, as are data on non-fatal suicides based on community surveys, because they are not systematically reported or recorded. It is generally agreed in both the local and international literature that prevalence data in suicidal behaviour are under-reported and frequently lack generalisability to the general population. This is particularly true for South Africa.
- h) The fact that a general overview of the literature on suicidal behaviour research in South Africa reveals various methodological problems and a diversity of research designs, sampling procedures and methods of analyses. There is frequently a heavy preponderance of retrospective data reported and *post hoc* style research, with a concurrent significant paucity of replicated (or potentially replicable), well-controlled, prospective studies. In short, this simply reveals that too many researchers are still historically confined to the phase of merely ‘describing the problem’, or ‘counting heads’. There is a poignant need to move beyond this to a research level of managing and/or ‘preventing the problem’ as part of a more effective strategy. This is, in fact, one of the primary aims of the DPS.



- i) The lack of an appropriate national prevention programme which, according to the WHO (1999b), also places major obstacles in the way of obtaining reliable and useful national data.

## A CONCEPTUAL MODEL FOR THE FUTURE

The motivation for continuing to develop a conceptual model to deal with suicidal behaviour in South Africa springs from the early work undertaken by the DPS (Du Preez & Schlebusch, 1992). Historically, the tremendous changes associated with sociopolitical, and socio-economic factors, increased violence and related issues as witnessed in South Africa in the last decade, have tended to elevate stress in South Africans (Schlebusch & Bosch, 2002). This has also impacted on the catchment population served by suicide researchers in the country. For example, in its timeframe the DPS research group has experienced the birth and decline of a racially segregated health services administration, which had its associated replication of services and inequalities in South Africa.

Since becoming a respected democracy, there is little doubt that the country is on the threshold of a new era in health service management and provision, with a major drive towards primary health care and preventative strategies. Nevertheless, the call remains for the development of relevant and contextualised services for the present and future. In this process, cost-effectiveness will be an essential factor, determining the nature and practises of health service delivery in the future. In addition, these interventions need to take cognisance of the significant increase of violence in South Africa, which includes suicidal behaviour (WHO, 1999b) and trauma-producing behaviours (Schlebusch & Bosch, 2002) with potential associated suicidal risk factors.

Given the abovementioned concerns regarding suicidal behaviour in South Africa, it becomes imperative on a national basis to:

- a) Examine the existing database and to develop programmes for gathering more reliable statistics;
- b) Identify current demographic and epidemiological trends;
- c) Evaluate the existing services in the light of these trends;
- d) Identify groups or areas of special concern that can lend themselves to the development of more proactive service strategies that are relevant to these groups;
- e) Develop more refined criteria for describing what constitutes suicidal behaviour;
- f) Differentiate between various forms of suicidal behaviours;
- g) Highlight the role of substance-taking and health-risk behaviour (including alcohol consumption and driving behaviour) (Matzopoulos, 2002; Hooper-Box, 2003) in the context of suicidal behaviour;
- h) Refine existing models of guidelines for the management of health risk behaviour (Schlebusch, 1990a);
- i) Further promote educational guidelines for use in primary health settings for both patients and health practitioners, regarding non-compliance (non-adherence behaviour), medicine-taking behaviour, control of medicines in the home, and the storage and disposal of medicines and household and other poisonous substances, given that guidelines for the management of non-compliance or non-adherence behaviour have been developed (Schlebusch, 1990a);

- j) Focus on health care professional-relationships and promote cost-effectiveness of existing and future service developments, given that guidelines for effective health care professional-patient communication have been developed (Schlebusch, 1990a);
- k) Utilise an appropriate model for contextualising research programmes on suicidal behaviour, such as the biopsychosocial model (based on systems theory), which can be utilised as an anchor point because of its robustness and its demonstrated usefulness in a variety of health care contexts (Schlebusch, 1990a);
- l) Focus on cognate dimensions associated with the different applicable variables related to people who display suicidal behaviour, the methods used in suicidal behaviour, and the context in which suicidal behaviour occurs;
- m) Look at future needs; and
- n) Reflect on where the DPS and other suicidal behaviour research tracks in South Africa now feature in relation to national and international suicide research activities and neEds

Finally, the DPS has facilitated the gathering of detailed data on suicidal patient demographic and biological characteristics; methods employed in suicidal behaviour; psychiatric and psychological diagnostic data of patients who display suicidal behaviour; and on the psychological/psychiatric treatment of these patients. The research work of the DPS is ongoing. It hopes to further extend its research activities into a national and international programme by inviting participation from other groups researching suicidal behaviour. This has partly been achieved internationally; new data obtained from the DPS are currently being incorporated into a database being established for an international WHO suicide research prevention programme. With regard to broadening the work of the DPS, the author would like to take this opportunity to invite wider research collaboration with South African researchers on suicidal behaviour.

## CONCLUSION

Thanks to the expertise of many researchers, there have been significant developments in trying to understand the phenomenon of suicidal behaviour in South Africa. However, much research remains to be done. In particular, there is an urgent need to address the problem of suicidal behaviour on a collective national basis in South Africa. Suicidal behaviour, a mordant tragedy that should and can be avoided, is an increasingly critical issue facing the government, health care professionals, other professionals, employers, administrators, health care and cognate organisations, and the public.

## REFERENCES

- Bosch, B. A., McGill, V. R., & Noor Mahomed, S.B. (1995). Current trends in suicidal behaviour at a general hospital. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 71-94). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Bradshaw, D., Masiteng, K., & Nannan, N. (2000). Health status and determinants. In A. Ntuli, N. Crisp, E. Clarke, & P. Barron (Eds), *South African health review* (pp. 89-124). Durban: Health Systems Trust.



- Burrows, S., Vaez, M., Butchart, A., & Laflamme, L. (2003). The share of suicide in injury deaths in the South African context: Sociodemographic distribution. *Public Health, 117*, 3-10.
- Cassimjee, M. H., & Pillay, B. J. (2000). Suicidal behaviour in family practice: A pilot study. In L. Schlebusch (Ed.), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp. 49-55). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Collings, S. J. (1992). Suicidal thoughts and behaviours in men who were sexually molested as children: A study of a nonclinical sample. In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on Suicidology* (pp. 182-186). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Dawes, A., Robertson, B., Duncan, N., Ensink, K., Jackson, A., Reynolds, P. *et al.* (1997). Child and adolescent mental health policy. In D. Foster, M. Freeman, & Y. Pillay (Eds), *Mental health policy issues for South Africa* (pp. 193-215). Cape Town: MASA Multimedia.
- Deonarain, M., & Pillay, B. J. (2000). A study of parasuicide behaviour at the Chris Hani Baragwanath Hospital. In L. Schlebusch (Ed.), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp.112-127). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Donson, H., & Van Niekerk, A. (2002). Suicide. In R. Matzopoulos (Ed.), *A profile of fatal injuries in South Africa. Third annual report of the National Injury Mortality Surveillance System* (pp. 31-34). Tygerberg: MRC-UNISA Crime, Violence and Injury Lead Programme.
- Du Plessis, W. F., & Schlebusch, L. (1992). Suicidal behaviour and parental loss: A comparative study. In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on Suicidology* (pp. 86-98). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Du Preez, M. R., & Schlebusch, L. (1992). An outline of a multistudy research protocol on suicidal behaviour. In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on Suicidology* (pp. 99-106). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Flisher, A. J., Ziervogel, C. F., Chalton, D. O., & Robertson, B. A. (1992). In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on Suicidology* (p.107). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Graser, R. R. (1992). *A study of selected cases of family murder in South Africa*. Pretoria: Human Sciences Research Council.
- Hawton, K., & Van Heeringen, K. (Eds). (2000). *The international handbook of suicide and attempted suicide*. Chichester: Wiley.
- Hooper-Box, C. (2003, May 25). South African road death toll bombshell. *Sunday Tribune*, p. 3.
- Kienhorst, I. W. M., De Wilde, E. J., & Diekstra, R. F. W. (1995). Suicidal behaviour in adolescents. *Archives of Suicide Research, 1*, 185-209.
- Lasich, A. J., & Schlebusch, L. (1999). Depressive disorders. In J. R. Snyman, & D. K. Sommers (Eds), *Disease review* (pp. 623-628). MIMS: Pretoria.



- Leenaars, A., Betancourt, M., Cantor, C., Connolly, J., EchoHawk, M., Gailiene, D., *et al.* (2000). Ethical & legal issues. In K. Hawton, & K. Van Heeringen, (Eds), *The international handbook of suicide and attempted suicide* (pp. 421-435). Chichester: Wiley.
- Leenaars, A., Cantor, C., Connolly, J., EchoHawk, M., Gailiene, D., Zhao Xiong He, *et al.* (2000). Controlling the environment to prevent suicide: International perspectives. *Canadian Journal of Psychiatry*, 45, 639-644.
- Leenaars, A., Connolly, J., Cantor, C., EchoHawk, M., Zhao Xiong He, Lester, D., *et al.* (2001). Suicide, assisted suicide and euthanasia: International perspectives. *Irish Journal of Psychological Medicine*, 18 (1), 33-37.
- Lerer, L. B. (1992). The violent death of a woman: Victim or self-destruction. Towards an understanding of the role of alcohol in female homicide and suicide. In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on Suicidology* (pp.108-116). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Lerer L. B., Knobel G. J., & Matzopoulos, R. G. (1995). The epidemiology of suicide in a South African city: From mortality surveillance to injury control. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 54-63). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Lester, D. (2000). *Why people kill themselves. A 2000 summary of research on suicide* (4<sup>th</sup> ed.). Springs, Ill: Thomas, C. C.
- Matzopoulos, R. (Ed.). (2002). *A profile of fatal injuries in South Africa. Third annual report of the National Injury Mortality Surveillance System*. Tygerberg: MRC-UNISA Crime, Violence and Injury Lead Programme.
- Mayekiso, T. V. (1995). Attitudes of black adolescents towards suicide. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 46-53). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Mayekiso, T. V., & Mkize, D. L. (1995). The relationship between self-punitive wishes and family background. In L. Schlebusch (Ed.), *Suicidal Behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 95-103). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Mayekiso, T. V., & Ngcaba, R. L. (2000). Suicidal thoughts and behaviour among 1<sup>st</sup> year medical students at the university of Transkei. In L. Schlebusch, & B. A. Bosch (Eds), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp. 34-37). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- McKendrick, B., & Hoffman, W. (Eds). (1990). *People and violence in South Africa*. Cape Town: Oxford University Press.
- McQuoid-Mason, D. J. (1995). Recent developments concerning euthanasia in South Africa. *Law and Medicine*, 1, 7-23.
- Minnaar, G.K. (1978). Facets of attempted suicide: Results of a survey. In L. Schlebusch (Ed.), *The vulnerable. Understanding and preventing suicide* (pp.1-9). Durban: Lifeline, Natal Coastal Region.
- Minnaar G. K., Schlebusch, L., & Levin, A. (1980). A current study of parasuicide in Durban. *South African Medical Journal*, 57, 204-207.
- Mkize, D. L. (1992). Suicide rate in Umtata: 1971-1990. In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on*



- Suicidology* (pp. 9-22). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Noor Mahomed, S. B., & Karim, E. (2000). Suicidal ideation and suicide attempts in patients with HIV presenting at a general hospital. In L. Schlebusch (Ed.), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp. 38-48). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Noor Mahomed, S. B., Schlebusch, L., & Bosch, B. A. (2003). Suicidal behaviour in patients diagnosed with cancer of the cervix. *Crisis*, 24, 168-172.
- Noor Mahomed, S. B., Selmer, C. A., & Bosch, B. A. (2000). Psychological profiles of children presenting with suicidal behaviour, with a specific focus on psychopathology. In L. Schlebusch, & B. A. Bosch (Eds), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp. 56-70). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Ntuli, A., Crisp, N., Clarke, E., & Barron, P. (Eds) (2000). *South African health review*. Durban: Health Systems Trust.
- Padayachee, N. (2003, April 13). White suicides outnumber murders. Report warns young African men that they are more likely to die a violent death than anyone else - at 9pm on a weekend. *Sunday Times*, p. 9.
- Parry, C. (2000). Alcohol and other drug use. In A. Ntuli, N. Crisp, E. Clarke, & P. Barron (Eds), *South African health review* (pp. 441-454). Durban: Health Systems Trust.
- Pillay, A. L. (1988). Methods of self-destructive behaviour in adolescents and young adults. *Psychological Reports*, 63, 552-554.
- Pillay, B. J. (1995a). A study of suicidal behaviour at a secondary school. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 9-18). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Pillay, B. J. (1995b). Children's perceptions of suicide – A study at a primary school. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 162-171). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Pillay, B. J., & Schlebusch, L. (1997). Psychological intervention to assist victims and others exposed to human rights violations in South Africa. *International Psychologist*, 37, 94.
- Pillay, A. L., & Wassenaar, D. R. (1997a). Family dynamics, hopelessness and psychiatric disturbance in parasuicidal adolescents. *Australian and New Zealand Journal of Psychiatry*, 31, 227-231.
- Pillay, A. L., & Wassenaar, D. R. (1997b). Recent stressors and family satisfaction in suicidal adolescent in South Africa. *Journal of Adolescence*, 20, 155-162.
- Pretorius, H. W., & Roos, J. L. (1995). Chronic and acute stressors in non-fatal suicide behaviour. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 64-70). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Prinsloo, M. (2002a). Participating facilities and data representivity. In R. Matzopoulos (Ed.), *A profile of fatal injuries in South Africa. Third annual report of the National Injury Mortality Surveillance System* (pp. 5). Tygerberg: MRC-UNISA Crime, Violence and Injury Lead Programme.
- Prinsloo, M. (2002b). Manner of non-natural death. In R. Matzopoulos (Ed.), *A profile of fatal injuries in South Africa. Third annual report of the National Injury Mortality*



- Surveillance System* (pp. 7-14). Tygerberg: MRC-UNISA Crime, Violence and Injury Lead Programme.
- Schlebusch, L. (Ed.). (1978a). *The vulnerable. Understanding and preventing suicide*. Durban: Lifeline, Natal Coastal Region.
- Schlebusch, L. (1978b). Mental disorder and attempted suicide. In L. Schlebusch (Ed.), *The vulnerable. Understanding and preventing suicide* (pp. N1-N7). Durban: Lifeline, Natal Coastal Region.
- Schlebusch, L. (1983). Consultation-liaison clinical psychology in modern general hospital practice. *South African Medical Journal*, 64, 781-786.
- Schlebusch, L. (1985a). Self-destructive behaviour in adolescents. *South African Medical Journal*, 68, 792-795.
- Schlebusch, L. (1985b). Short-term precipitants of parasuicide in adolescents. *South African Medical Journal*, 70, 165-167.
- Schlebusch, L. (1985c). Current management of parasuicide. *South African Prescriber, Suppl: Stress-The Modern Scourge*, 1, 25-29.
- Schlebusch, L. (1986). Comments on medical psychology and the aetiology of adolescent parasuicides. *Psychiatric Insight*, 3, 3-6.
- Schlebusch, L. (1987). Drug accessibility and the overdose epidemic. *South African Medical Journal*, 71, 746-747.
- Schlebusch, L. (Ed.). (1988a). *Suicidal behaviour. Proceedings of the First Southern African Conference on Suicidology*. Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (1988b). Family murder. *Psychiatric Insight*, 5(3), 5-7.
- Schlebusch, L. (Ed.). (1990a). *Clinical health psychology. A behavioural medicine perspective*. Halfway House: Southern Book Publishers.
- Schlebusch, L. (Ed.). (1990b). *A basic guide to the diagnosis and treatment of depression*. Johannesburg: Ciba-Geigy.
- Schlebusch, L. (Ed.). (1992a). *Suicidal behaviour 2. Proceedings of the second Southern African conference on suicidology*. Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (1992b). The classification of suicidal behaviour, the abuse of analgesics and indirect self-destructive behaviour. In L. Schlebusch (Ed.), *Suicidal behaviour 2. Proceedings of the Second Southern African Conference on Suicidology* (pp. 23-35). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (Ed.). (1995a). *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology*. Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (1995b). Stress, analgesic abuse and suicidal behaviour. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 19-38). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (1995c). A cross-cultural comparison of suicidal behaviour. In L. Schlebusch (Ed.), *Suicidal behaviour 3. Proceedings of the Third Southern African Conference on Suicidology* (pp. 104-119). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (1998). Recent advances in stress research and implications for health and well-being. In L. Schlebusch (Ed.), *South Africa beyond transition: Psychological well-being. Proceedings of the Third Annual Congress of the Psychological Society of South Africa* (pp. 265-283). Pretoria: Psychological Society of South Africa.



- Schlebusch, L. (1999a). *Suicidal behaviour in South Africa as we enter the new millennium*. Paper presented at the Second Congress of the International Association for Suicide Prevention, Athens. Abstract published in *Programme and Book of Abstracts* (pp.143) and *Congress News* (pp. 4).
- Schlebusch, L. (1999b). *Psychological recovery from cancer*. Cape Town: Longman, Maskew, Miller.
- Schlebusch, L. (2000a). An overview of suicidal behaviour in South Africa at the dawn of the new millennium. In L. Schlebusch, & B.A. Bosch (Eds), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp. 3-11). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (2000b). Workshop on stress and the management of the suicidal patient. In L. Schlebusch, & B. A. Bosch (Eds), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp.191-215). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L. (2000c). *Mind shift. Stress management and your health*. Pietermaritzburg: University of Natal Press.
- Schlebusch, L., & Bosch, B. A. (2000). *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology*. Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Schlebusch, L., & Bosch, B. A. (2002). The emotional injuries of indirect trauma. In C. E. Scout (Ed.), *The psychology of terrorism. Clinical aspects and responses* (vol. 2, pp. 133-141). Westport, Connecticut: Praeger.
- Schlebusch, L., Lasich, A. J., & Wessels, W. H. (1985). Psychological problems, analgesic nephropathy and substance use disorder. *South African Medical Journal*, 68, 912.
- Schlebusch, L., Luiz, H. A., Bosch, B. A., & Levin, A. (1986). On suicide in South African general hospital psychiatric inpatient unit. *South African Journal of Psychology*, 16, 15-20.
- Schlebusch, L., & Minnaar, G. K. (1980). The management of parasuicide in adolescents. *South African Medical Journal*, 57, 81-84.
- Schlebusch, L., & Ruggieri, G. (1996). Health beliefs of a sample of black patients attending a specialised medical facility. *South African Journal of Psychology*, 26, 35-38.
- Schlebusch, L., Schweitzer, G., & Bosch, B. A. (1998). Psychological considerations in the management of the HIV-infected patient with polytrauma: A case presentation. In L. Schlebusch (Ed.), *South Africa beyond transition. Psychological well-being*. (pp. 260-283). Pretoria: Psychological Society of South Africa.
- Schlebusch, L., Vawda, N., & Bosch, B. A. (2003). Suicidal behaviour in black South Africans. *Crisis*, 24, 24-28.
- Sneiderman, B., & McQuiod-Mason, D. (2000). Decision-making at the end of life: The termination of life-prolonging treatment, euthanasia (mercy killing), and assisted suicide in Canada and South Africa. *The Comparative and International Law Journal of Southern Africa*, 33, 193-209.
- Snyder, L., & Caplan, A. L. (2002). *Assisted suicide. Finding common ground*. Indiana: University Press.
- Sukhai, A., & Van Niekerk, A. (2002). Transport-related deaths. In R. Matzopoulos (Ed.), *A profile of fatal injuries in South Africa. Third annual report of the National Injury Mortality Surveillance System* (pp. 23-26). Tygerberg: MRC-UNISA Crime, Violence and Injury Lead Programme.



- Van Dyk, A. (2001). *HIV-AIDS. Care & counselling. A multidisciplinary approach*. Cape Town: Pearson Education.
- Van Heeringen, K., Hawton, K., & Williams, J. M. G. (2000). Pathways to suicide: An integrative approach. In K. Hawton, & K. van Heeringen (Eds), *The international handbook of suicide and attempted suicide* (pp. 223-234). Chichester: Wiley.
- Wassenaar, D. R., Pillay, A. L., Burns, K. D., & Davies, M. (1993). Evaluation of prevention in schools. In D. Lester (Ed.), *Suicide '93* (pp. 71-74). Denver, Co: American Association of Suicidology.
- Wassenaar, D. R., Pillay, A. L., Descoins, S., Goltman, M., & Naidoo, P. (2000). Patterns of suicide in Pietermaritzburg 1982-1996: Race, gender and seasonality. In L. Schlebusch, & B. A. Bosch (Eds), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp.97-111). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- Wasserman, D. (Ed.). (2001). *Suicide. An unnecessary death*. London: Martin Dunitz.
- Williams, J. M. G., & Pollock, L. R. (1993). Factors mediating suicidal behaviour. *Journal of Mental Health*, 2, 3-26.
- Wood, F., & Goldston, D. (2000). Learning disabilities: A hidden source of suicidal thought and behaviour. In L. Schlebusch, & B. A. Bosch (Eds), *Suicidal behaviour 4. Proceedings of the Fourth Southern African Conference on Suicidology* (pp. 79-96). Durban: Department of Medically Applied Psychology, Faculty of Medicine, University of Natal.
- World Health Organization (WHO). (1999a). *Figures and facts about suicide*. Geneva: Author.
- World Health Organization (WHO). (1999b). *Report on a workshop on suicide. Prevention for countries in the African region*. Geneva: Author.

# 7 Road traffic injury in South Africa: An epidemiological overview for 2001

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Injuries, and particularly road traffic injuries (RTIs), constitute a serious public health challenge. Besides the physical consequences of trauma, disablement and death, many victims and families may be predisposed to psychosocial trauma and other health consequences, such as alcohol and illicit drug abuse. The impact also extends to communities and society at large, since RTIs are a drain on scarce resources, hamper economic development and further perpetuate poverty.

Globally, injuries account for more than 5 million deaths each year, of which more than one-fifth are attributable to RTIs (Murray & Lopez, 1996). A conservative estimate of the number of associated injuries is 10 million (World Bank Group, undated). Estimates for 1998 indicate that RTIs are the ninth leading cause of all disability adjusted life years (DALYs) lost and account for 2.8% of global disability. By 2020 it is expected that RTIs will be the third leading cause of all DALYs lost worldwide (Murray, Lopez, Mathers & Stein, 2001). Low- and middle-income countries experience a disproportionately higher burden and account for about 85% of the deaths and 90% of the DALYs lost globally (Krug, Sharma & Lozano, 2000). The cost of these injuries to the economy is enormous – crude estimates indicate that the cost as a percentage of a country's GDP ranges from 1% in 'developing' countries to 2% in 'highly motorised' countries (Jacobs, Aaron-Thomas & Astrop, 2000).

In South Africa injuries accounted for 12% of all deaths in 2000 (Bradshaw *et al.*, 2003). The MRC-UNISA National Injury Mortality Surveillance System (NIMSS)<sup>2</sup> revealed that in 2001 approximately one-quarter (27%) of all injury-related deaths occurred as a result of road traffic accidents (Matzopoulos, 2002). Compared globally, South Africa's road traffic death rate of 11.7 per 100 million kilometres travelled is the fifth highest in the world (International Road Federation, 1991). The National

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<sup>2</sup> The National Injury Mortality Surveillance System (NIMSS) produces and disseminates descriptive epidemiological information that is readily available from documentation that arises from medico-legal post-mortem investigations. In 2001, 32 mortuaries in 6 different provinces contributed their data to this system. These cases accounted for between 32% and 39% of all non-natural mortality in South Africa. In 2001, a total of 25 361 cases were included in the system, of which 6454 were traffic-related.



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Department of Transport (NDoT) indicated that in 2001 the South African traffic burden translated to 512 000 crashes, which resulted in 7900 road traffic deaths and 150 000 injuries (NDoT, 2002; NDoT, 2003a). The cost of this carnage to the South African economy was estimated at approximately R13.8 billion (NDoT, 2002).

In terms of cost of traffic crashes to the economy, the KwaZulu-Natal province (KZN) rated among the highest in the world. Using the "human capital" method, KZN's cost of traffic crashes to the economy was 4.5% of the GNP, which was similar to that of the USA (Jacobs, Aaron-Thomas & Astrop, 2000). In South Africa the disability burden is also massive. Road traffic collisions were ranked as the fourth highest cause of premature mortality, accounting for 489 979 years of life lost (YLL) in 2000 (Bradshaw *et al.*, 2003).

An overview of the epidemiology of RTIs in the South African context is presented using data from the MRC-UNISA Crime, Violence and Injury Lead Programme (CVILP), the University of Natal Interdisciplinary Accident Research Centre (UNIARC) and the NDoT. Information on populations at risk, temporal and spatial characteristics, vehicles and their associated challenges, and high-risk driving behaviours are presented. Based on this overview, general and focused public health intervention strategies are discussed.

## POPULATIONS AT RISK

In 2001 the NIMSS revealed that pedestrians accounted for the largest percentage of traffic-related deaths (40%), followed by about one-quarter 'unspecified' traffic deaths and nearly one-fifth passenger deaths (Figure 1). The distributions by gender, age and 'race'<sup>3</sup> are presented below. The overall distributions for these variables among the motorist population were not available and population risks are therefore not presented.

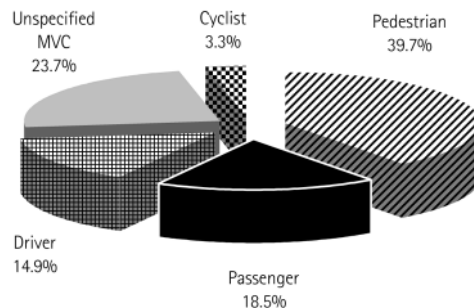


Figure 1. Traffic-related deaths by user category, NIMSS, 2001 (N=6454)

There were 3.2 male road traffic deaths for every female death; further breakdown by user category and gender showed that the highest male to female ratio occurred

<sup>3</sup> See *Selected Glossary* for definition.



among cyclists (16.3:1) and the lowest among passengers (1.7:1). The male to female ratio among drivers was 8.6:1.

The age distribution by user category for 2001 showed that pedestrian deaths peaked among the 30- to 34-year age group. Furthermore, more than one-third (39.5%) of infant (<1 year) and more than half (56.4%) of childhood (1 to 14 years) traffic-related deaths were the result of pedestrian injuries. Passenger deaths were almost equally as high in all age groups from 20 to 34 years, but among children the 5- to 9-year group was most at risk. Driver deaths peaked in the 25- to 29-year age group and cyclist deaths peaked equally among the 15- to 19- and 20- to 24-year age groups.

The highest percentage of pedestrian deaths was recorded among coloureds and blacks (55% and 44.3% respectively), while the highest percentage of cyclist and driver deaths was among whites (11.7% and 38.6% respectively). Driver, passenger and unspecified cases were equally distributed among Asians, each accounting for about one-quarter of their deaths.

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## TEMPORALITY

Results from the NIMSS showed that when the time and day of death was known, cases peaked between 17h00 and 22h00 and the highest percentages were recorded on Saturdays (22.9%), followed by Sundays (18.1%) and Fridays (16.1%). Furthermore, significantly more deaths occurred on Saturdays than on Sundays ( $\chi^2=45.35, p<0.001$ ). These results should, however, be interpreted with caution since they reflect the time and day of *death* rather than that of the actual *injury*. Nonetheless, when the nature of medical treatment was known (in 4349 cases), only about one-third (36.0%) were transported to a treatment facility, which may suggest that most deaths were almost instantaneous. The data on time and day of death therefore provide a relatively reliable proxy for the actual time of injury.

Overall, traffic deaths peaked during June (9.9%) followed by September (9.1%) and March (8.9%). However, deaths in June were not significantly different from September ( $\chi^2=2.34, p=0.12$ ). Figure 2 shows that in 2001, pedestrian deaths peaked in March, June, September and October. Passenger deaths peaked in June and low percentages



Road traffic injury

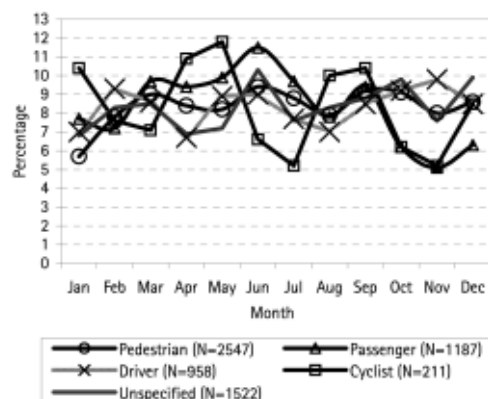


Figure 2. Traffic-related deaths by user category and month of death, NIMSS, 2001 (N=6425)

were recorded in July and November. Driver deaths declined from February to April and from June to August, after which they increased to a peak in November. The highest percentage of cyclist deaths was recorded in May, and unspecified traffic cases in June.

## INTER-CITY AND PROVINCIAL COMPARISONS

For 2001 the NIMSS allowed for fatal traffic rates to be calculated for five cities, in which full coverage was achieved. These cities were Durban, Cape Town, Port Elizabeth, East London and Pretoria. Pretoria had the highest traffic fatality rate of 42 deaths per 100 000 population, followed by Durban and East London (both at 39 deaths per 100 000 population). Based on the source data for the rate calculations, the difference between Pretoria and Durban was statistically significant ( $\chi^2=4.34$ ,  $p=0.004$ ), while the rates for Pretoria and East London were similar ( $\chi^2=1.60$ ,  $p=0.21$ ). The highest pedestrian fatality rate was recorded for Cape Town (22 deaths per 100 000 population) followed by Durban (15 deaths per 100 000 population), and the difference was statistically significant ( $\chi^2=38.40$ ,  $p<0.001$ ). With driver deaths, Pretoria had the highest rate (7/100 000 population) followed by East London (5/100 000 population) and the difference was not statistically significant ( $\chi^2=2.05$ ,  $p=0.15$ ).

Figure 3 shows the total number of injuries for both fatal and non-fatal cases by province for 2001 (NDoT, 2003a). Gauteng had the highest number of injuries followed by KZN and Western Cape. However, Gauteng had the lowest percentage of fatal cases (3.8%). The highest percentage of fatal cases was recorded in Mpumalanga (8.4%), followed by Northern Cape (7.7%) and Free State (7.3%). The difference between Gauteng and Mpumalanga in the proportion of fatal cases was statistically significant ( $\chi^2=402.06$ ,  $p<0.001$ ) but for Mpumalanga and the Northern Cape the proportion was not statistically different ( $\chi^2=2.05$ ,  $p=0.15$ ).

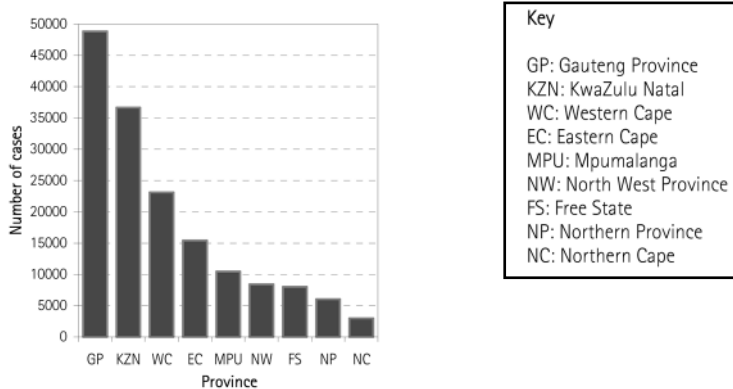


Figure 3. Total injuries (fatal and non-fatal) by province, Arrive Alive, 2001 (N=159 949)



Road traffic injury



## CHALLENGES

Current estimates are that there are approximately 6 million licensed drivers and about 6.73 million licensed and registered vehicles on South Africa's roads. The vehicle types include 57.4% passenger vehicles, 17.8% light commercial vehicles, 3.8% minibus taxis, 3.4% heavy commercial vehicles and 0.4% buses (NDoT, 2002). However, estimates in 1992 for the number of collisions per vehicle type per 100 million kilometres travelled include a staggering 1106 for minibus taxis followed by 916 for passenger vehicles, 571 for buses, 429 for heavy commercial vehicles and 396 for light commercial vehicles (NDoT, 1998a). However, the figures above should be viewed with caution since they do not indicate a vehicle's contribution to the collision and generally the recording of traffic collisions is subject to reporting bias, including underreporting, duplication and misclassification. Estimates for 1998 showed that minibuses and buses had the highest number of fatalities per 100 million vehicle kilometres travelled (17 and 11 respectively) (NDoT, 2002). This is mainly because of the larger number of occupants that are transported in these vehicles. However, these rates do not take into account the relatively larger number of collateral deaths that occur among persons in other vehicles and pedestrians, as is typical with heavy vehicle collisions. Some of the key challenges posed by these vehicle types are discussed below.



Road traffic injury

### Minibus taxis

The minibus industry constitutes the bulk of public transport and is often characterised by substandard vehicles, overloading and other high-risk driving behaviour, such as speeding and 'reckless driving'. Generally, the contribution of substandard vehicles to traffic collisions is debatable since drivers may drive with greater caution. But when substandard vehicles are overloaded and travel at excessive speeds, it can be expected that the risk of collision and injury would increase. Increasing growth of the minibus taxi industry and greater competition further exacerbates the situation. Most commuters rely heavily on this mode of transport and are therefore at increased risk of injury and death.

The Minibus Taxi Recapitalisation Project is a current initiative (started in 1996) to formalise the South African minibus taxi industry. However, the project is yet to be implemented.

### Heavy commercial vehicles

In 1996, 58 904 heavy commercial vehicles were weighed at weighbridges in South Africa. One-third were found to be overloaded (NDoT, 1998b). The present pattern does not seem much different, since in KZN alone 42 291 (29%) were found to be overloaded in 2001 (NDoT, 2003b). It is estimated that these illegally overloaded heavy vehicles are responsible for 60% of the damage to the road network in South Africa, which costs the taxpayer some R550 million per year (NDoT, 1998b). Although human behaviour plays the largest role in traffic collisions, deteriorating and hazardous road conditions caused mainly by illegal overloading also compromises road safety. The enormous cost to the economy of repairing road networks adds to the drain on available resources for road safety initiatives.

Compliance with safety regulations is also a problem among this sector. An amended Road Traffic Act of 1996 compels operators to display retro-reflective materials on

all heavy commercial vehicles within certain specifications. A UNIARC survey was conducted to gauge compliance with these regulations at three of the country's toll plazas and one heavy-vehicle checkpoint. These sites were selected to be representative of the heavy vehicle sector in the country using different highways, and represented the three major cities of Cape Town, Pretoria and Durban. Results indicated that of 1000 heavy commercial vehicles, 57.9% were in breach of these regulations (Haarhof, 2002).

## HIGH-RISK TRAFFIC BEHAVIOUR

The crash process is often complex and multifactorial and may be viewed as a combination of various human, vehicle and environmental risk factors that interact to produce the event. In the South African context the contribution of driver, vehicle and road environment factors towards traffic collisions has been reported to be between 80% and 90%, 10% and 30%, and 5% and 15% respectively (NDoT, 2002). In the driver category, excessive speed and alcohol intoxication are most often implicated.

### Alcohol and illicit drugs

In 2001 the NIMSS indicated that overall, more than half (53.6%) of all fatal traffic cases were alcohol-related and the mean blood alcohol concentration (BAC) was nearly four times the legal driving limit of 0.05 g/100 ml (Table 1). Pedestrians constituted the highest percentage of cases that tested positive for alcohol (62.5%). They also had the highest mean level of consumption at 0.20 g/100 ml. More than half (51.8%) of the drivers tested were positive for alcohol and the mean level of consumption was 0.17 g/100 ml.

Driving under the influence of alcohol is strongly associated with the risk of injury and death. A study in the USA showed that the relative risk of fatal crash involvement

**Table 1.** Traffic-related deaths by user category and blood alcohol content (BAC), NIMSS, 2001 (N=2157)

BAC (g/100 ml)	Pedestrian No. %	Passenger No. %	Driver No. %	Unspec. MVC No. %	Cyclist No. %	Total No. %
> 0.25	262 24.7	14 5.0	34 9.5	45 12.3	6 6.5	361 16.7
0.15-0.24	218 20.5	38 13.7	67 18.8	64 17.4	13 14.0	400 18.5
0.05-0.14	127 12.0	39 14.0	65 18.2	43 11.7	14 15.1	288 13.4
0.01-0.04	57 5.4	13 4.7	19 5.3	15 4.1	3 3.2	107 5.0
Zero	398 37.5	174 62.6	172 48.2	200 54.5	57 61.3	1001 46.4
<b>TOTAL</b>	<b>1062 100</b>	<b>278 100</b>	<b>357 100</b>	<b>367 100</b>	<b>93 100</b>	<b>2157 100</b>
Mean pos. BAC (±SD)	0.20 (0.10)	0.15 (0.09)	0.17 (0.10)	0.18 (0.10)	0.16 (0.09)	0.19 (0.10)

MVC = motor vehicle collision

among adult drivers was 5-6 at 0.05 g/100 ml (the legal driving limit) and more than 80 at 0.15 g/100 ml (which was the approximate mean BAC of the NIMSS driver sample) (Zador, Krawchuk & Voas, 2000).

The use of illicit drugs among traffic users is also a serious and growing problem. Analysis of aggregate data (1999 to 2001 and including three cities) from the MRC-



Road traffic injury

UNISA Trauma and Drug study<sup>4</sup> (TADS) showed that of all RTI cases tested, 35.0% were associated with at least one illicit drug and 22.1% used both alcohol and an illicit drug in combination. The drug used most often was cannabis (29.6% of all RTI cases tested). The highest drug-relatedness was found among pedestrians (47.1%), followed by drivers (31.8%) and passengers (24.8%). However, further research is needed on the role of illicit drugs in contributing to traffic collisions when the drugs are consumed in isolation and in combination with alcohol.

### Excessive speed

Excessive speed for prevailing circumstances plays a role in approximately 30% of all crashes and about 50% in the case of heavy commercial and public passenger vehicles (NDoT, 2002). Furthermore, vulnerable road users are also exposed to a greater risk of being involved in a collision and in being injured. Besides increasing the probability of a collision occurring, resultant injuries are expected to be more severe with higher speeds. For example, studies undertaken internationally indicate that a reduction of average vehicle speed by 1 km/hr would result in a reduction of injury and crashes by about 3% (Finch, Kompfner, Lockwood & Maycock, 1994; Nilsson, 1981).

### Driver aggression

Excessive speed and alcohol intoxication are the major contributors to road traffic collisions in South Africa (NDoT, 2002) and these high-risk behaviours are also related to aggressive tendencies behind the wheel, as found in a study on driver aggression and other high-risk driving behaviour in South Africa (Sukhai, 2003). This was a cross-sectional descriptive study undertaken among a representative sample of motorists in the Durban Metropolitan Area with a total sample size of 1006 participants. Driver aggression was categorised into four subscales, with Group 1 constituting the mildest forms of aggressive behaviours and Group 4 the extreme behaviours, including rage and direct confrontation. Based on self-reporting, the prevalence of at least one aggressive driving behaviour that was experienced as a victim per aggression group ranged from 24% (Group 4) to 95% (Groups 2 and 3). From the perspective of perpetrating these behaviours, the prevalence ranged from 10% in Group 4 to 87% in Group 1.

Furthermore, just more than half of the motorists reported driving above the posted speed limits half the time that they had the opportunity to do so. About one-tenth of motorists acknowledged driving under the influence of alcohol and about half reported becoming more aggressive when they drove under the influence of alcohol. Relationships were established between driver aggression and other high-risk driving behaviours. All groups of driver aggression were positively related with driving above the speed limit ( $p < 0.001$ ,  $p = 0.01$ ,  $p = 0.03$  and  $p = 0.001$  respectively driver aggression Groups 1 to 4). However, only Group 1 behaviours were predicted by driving above the legal blood alcohol limit ( $p < 0.001$ ).

<sup>4</sup> The Trauma and Drug study (TADS) monitors substance abuse at sentinel trauma units throughout the country. A total of 1935 patients were included in the study from 1999 to 2001 from five sentinel sites in three cities, viz. Durban, Cape Town and Port Elizabeth. The TADS is discussed in further detail in chapter 8.



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## DISCUSSION AND IMPLICATIONS FOR INTERVENTION

Historically, in South Africa as in many other countries traffic injuries have been viewed as 'accidents', which conferred a large degree of inevitability upon these incidents. Injury control (or containment of injuries after they occur) was prioritised, and much less attention was afforded to primary prevention (or pre-event action) and the upstream or root causes of these incidents. Consequently, these cases were not of priority on the public health agenda and injury prevention efforts suffered.

South Africa as a context for traffic trauma also influences the disproportionately high traffic statistics. Rapid urbanisation results in environments with high population densities and inadequate separation of people and vehicles. Informal developments create a particular challenge where immigrants are forced to cross roadways that do not have safe crossings and they may also be unfamiliar with 'modernised' traffic behaviour. High levels of crime and violence, increasing levels of motorisation and long travelling distances also contribute to this challenge. Hence it is imperative that injury prevention initiatives include general socio-economic and environmental upliftment, particularly among the low-income sector. Importantly, road safety planning needs to be well integrated into the initial stages of all town planning and other civil engineering projects.

The universal public health approach to interventions is applied specifically to some of the previously identified high-risk factors (substance abuse and speeding) and the high-risk pedestrian group. Generally, passive intervention strategies (environmental modification and engineering) allow for creating 'forgiving' transportation systems and are also advocated as being more successful than the active measures (education and enforcement).

## PRIORITY AREAS FOR INTERVENTION

### **Alcohol and illicit drugs**

Results from the NIMSS indicated that in 2001 more than half of all fatal traffic cases were alcohol-related, and that the mean levels of alcohol consumption were extremely high at nearly four times the legal driving limit. The obvious intervention strategy is to increase enforcement based on the epidemiological data previously presented. Generally, however, South Africa is criticised for implementing first-class legislation (for example, our new driving under the influence laws) but with inadequate enforcement of such legislation (Van der Spuy, 2000). Roadside testing for alcohol is generally concentrated only during the popular holiday seasons and besides, testing is conducted only on drivers showing more overt signs of intoxication. This was also confirmed by a UNIARC survey on drinking and driving habits. The study was conducted among 600 participants at bars, clubs and shebeens in the Durban Metropolitan Area and results indicated that 61% of respondents had not seen a roadblock for the entire year of 2000 (Watson, 2000). International experience such as in Australia has shown that alcohol screening among motorists should be frequent, routine and random in order to be effective (Hemel, 1990). While the probability of getting caught should be higher to increase the effectiveness of laws, importantly the public need evidence to appreciate that the funds generated are being used for the benefit of the public, such as for road safety projects and not merely as a 'revenue-raising' initiative.



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However, to effectively address high-risk traffic behaviours, education and awareness initiatives need to be integrated with behavioural science approaches (Sleet & Lonero, 2002). With impaired driving, an important component would be to provide reasonable good practice alternatives. Alternatives to driving while impaired include spending the night at one's destination, designating a sober driver or using a safe ride home. The concepts of designated driver and safe ride programmes are popular among high-income countries, but unfortunately these are relatively unexplored among South African motorists. Although these programmes propagate the concepts of sensible drinking and harm reduction, the aim is not to accept and condone the consumption of alcohol. People are first encouraged not to drink and drive, and if they do drink, they should be reminded to limit their intake to within legal limits and are encouraged to designate a sober driver or to use a safe ride home. Besides providing alternatives to making informed choices, promotion of these concepts is very influential in reducing alcohol-impaired driving. When the US Department of Transportation launched the 'Friends don't let friends drive drunk' campaign, nearly 80% took action to prevent a friend or loved one from driving drunk and 25% reported that they stopped drinking and driving as a result of the campaign (NHTSA, undated). Therefore such campaigns affect not only individuals but mobilise communities to take action against impaired driving. A new social norm is promoted - that drinking and driving is unacceptable, and this also helps to 'legitimise' the non-drinking option.




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The TADS study indicated that a high percentage of traffic injuries were related to illicit drug use; also of concern was that many used illicit substances in combination with alcohol. The Drug Expert Recognition programme was developed by the Los Angeles Police Department with support from the Southern California Research Institute and was validated to show an accuracy of over 90% in determining impairment and also in correctly identifying the type of drug involved (Mynhardt & Van der Spuy, 2000). This programme was also piloted for use in the South African setting by the Council for Scientific and Industrial Research (CSIR) and South African Police Services (SAPS). Participants in the study were 54 detainees, and results indicated that 63% tested as impaired by alcohol, 54% by dagga, 30% by mandrax, 2% by LSD and 6% by opiates (NDoT, 2002). Full implementation of the South African Drug Expert Recognition Programme needs to proceed with urgency in order to detect and prosecute offenders and hence reduce the incidence of substance abuse in the traffic environment.

Besides the prosecution of alcohol- and drug-impaired road users, rehabilitation efforts are required at patient care facilities or upon prosecution to allow for early identification and treatment of substance abuse and to help prevent the recurrence of traffic collisions related to substance abuse. Furthermore, creating a safe and efficient public transport system together with formalising illegal drinking establishments, which will allow for people to drink closer to their homes, will go a long way in keeping intoxicated drivers and pedestrians off the road network (Watson, 2000).

### **Excessive speed**

Here too, enforcement needs to be frequent and routine to deter potential offenders, and the public should be persuaded of the dangers of excessive speed. However, vehicle and road design are equally important. Community-wide traffic-calming



measures are needed, and application of relevant speed-limiting devices to all vehicles needs to be investigated. As far as possible, motorised and non-motorised vehicles, as well as vehicles with varying speeds need to be separated using appropriate engineering measures. Visibility and reaction times are seriously compromised at night and the need for lower speed limits should be investigated. Excessive speed was also shown to be positively related to driver aggression (Sukhai, 2003).

The psychological and emotional aspects of driving may need to be incorporated in the learner licensing process or in a potential graduated licensing system to address driver aggression and other hazardous driving behaviours. The graduated licensing system, which is used internationally, requires young drivers to demonstrate responsible driving behaviour in several phases before obtaining a final unrestricted licence. Such a system will also provide the necessary time-frame to address issues around stress and anger in the traffic environment.

### **Pedestrians**

As in other developing countries (Afukaar, Antwi & Ofosu-Amaah, 2003; Khayesi, 1997; Otero, 1995), the hallmark of South Africa's road traffic epidemiology is the disproportionately large pedestrian component. The NIMSS indicated that most pedestrian deaths were among the disadvantaged African and coloured populations, were higher among males, and peaked in the 30- to 34-year age group. The loss of males, especially in the economically active age group, means an increase in widows and orphans, which has great social and economic consequences for poor households and further perpetuates their poverty.

The NIMSS also revealed strong temporal patterns to pedestrian injuries. These occurred mainly in the evenings and during the winter months, which indicates that decreased visibility over these periods may be a significant factor in fatal road traffic crashes. A current initiative is being undertaken by the CVILP together with the CSIR, 3M and Drive Alive to pilot and evaluate the use of reflectorisation among child pedestrians.

Historically, road planning that was more relevant to industrial countries and which had a large focus on increasing mobility has been deployed in developing countries, resulting in scant attention to basic accessibility and to the pedestrian group (Wasike, 2001). A National Pedestrian Action Plan, which proposes a variety of pedestrian safety education and hazardous location upgrade programmes, has been developed as part of South Africa's Road to Safety 2001 to 2005 strategy. It is hoped that these interventions will materialise and that child and adult pedestrians will receive due attention.

Furthermore, biomechanics and crash engineering have focused largely on protecting vehicle occupants, with little attention to injuries sustained by pedestrians (Crandall, Bhalla & Madeley, 2002). Recently European automotive manufacturers have proposed safer car fronts to protect pedestrians in crashes; these include pop-up bonnets and windscreen airbags to soften the head impact and energy-absorbing bumpers to minimise lower-limb trauma (Crandall, Bhalla & Madeley, 2002). It is reported that pedestrian fatalities could be reduced by 20% if vehicles are required to comply with these recommendations.



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A systematic review which included 15 controlled trials showed that safety education among child pedestrians can improve their knowledge of the road-crossing task and can change observed road-crossing behaviour, but there is no conclusive evidence that this reduces the risk of pedestrian-motor vehicle collisions (Duperrex, Bunn & Roberts, 2002). Furthermore, we cannot rely on pedestrians to always make the safest decisions in the traffic environment, particularly not children who have many physical and cognitive limitations. Hence, passive pedestrian protection is advocated. With rapid urbanisation the biggest challenge lies in providing adequate separation of people and vehicles, especially in the context of informal developments that often lie close to major roads. Good practice measures, for example, on the use of physical barriers and convenient overpasses and underpasses in such a setting, are urgently required to optimise the safety of all road users in these areas.

Importantly, a culture that accepts pedestrians as equal users of the traffic environment needs to be fostered. This will afford pedestrians greater respect and priority from other road users, and from the various disciplines that are instrumental in enhancing road traffic safety.

## POLICY AND LEGISLATION


Road to Safety 2001 to 2005 is a current and promising strategy by the South African Department of Transport aimed at addressing the carnage on the country's roads (NDoT, 2002). The strategic objective is to reduce crashes, deaths and injuries on South Africa's roads by 5% year-on-year until 2005. The main focal areas identified by the five flagship programmes are: inefficiency; fraud and corruption in the driver licensing system and vehicle registration systems; the development of an operator code of conduct and fleet safety management system; combating overloading by freight and public passenger transport operators; and implementing community-driven pedestrian safety education and hazardous location upgrade programmes.

Although important, the above factors should not be overrated since there is no evidence that these issues have a major influence on traffic crash rates. Furthermore, greater urgency is required with other priority initiatives which, among others, include creating a safe and reliable public transport network, formalising appropriate laws to regulate the liquor industry, and the development of a graduated driver licensing system. The benefits of these measures are discussed above. Additionally, rail transportation needs to be promoted and reorganised in order to relieve the road network of congestion, large speed differentials and damage.

## RESEARCH

The World Health Organisation's 5-year strategy for RTI prevention identified poor-quality data as a major obstacle to improving road safety globally (Peden *et al.*, 2001). South African traffic research is largely fragmented and therefore 'champions' are needed to initiate an integrated approach to road traffic safety. Optimal surveillance systems are crucial to provide good epidemiological data on the nature and extent of priority issues and to identify risk factors, trends and emerging priorities. This information will be vital to inform prevention and evaluation programmes, and policy initiatives.






In South Africa the under-reporting of traffic statistics is of serious concern. The NIMSS presently records 32% to 39% of the country's non-natural mortality. However, during 2001, 6859 traffic cases were recorded, which represents 87% of that recorded by the NDoT. This indicates that there may be gross under-reporting of the country's already inflated traffic statistics.

## CONCLUSION

South Africa's unacceptably high levels of RTIs suggest that road safety should be prioritised at all levels and especially on the public health agenda. As a basis, good quality data for informing intervention and policy initiatives, together with an acknowledgement of the magnitude of the problem by all role-players are required. Hence, a multidisciplinary response with interagency partnerships needs to be fostered to pool expertise and help develop a coordinated and integrated response to this challenge. People at grassroots level should be empowered and mobilised since they also have a valuable role to play.

Importantly, the upstream determinants in the South African context need to be prioritised to ensure that we move beyond addressing just the 'symptoms' of the traffic burden. The platform will then be set to influence value systems and foster a culture of responsible road usage that will challenge irresponsible traffic behaviour, and the ideology that these incidents are inevitable.

## REFERENCES

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- Afukaar, F. K., Antwi, P., & Ofosu-Amaah, S. (2003). Pattern of road traffic injuries in Ghana: Implications for control. *Injury Control and Safety Promotion*, 10(1-2), 69-76.
- Bradshaw, D., Groenewald, P., Laubscher, R., Nannan, N., Nojilana, B., & Norman, R. (2003). *Initial Burden of Disease Estimates for South Africa, 2000*. Tygerberg: South African Medical Research Council.
- Crandall, J. R., Bhalla, K. S., & Madeley, N. J. (2002). Designing road vehicles for pedestrian protection. *British Medical Journal*, 324, 1145-1148.
- Duperrex, O., Bunn, F., & Roberts, I. (2002). Safety education of pedestrians for injury prevention: A systematic review of randomised controlled trials. *British Medical Journal*, 324, 129-1131.
- Finch, D. J., Kompfner, P., Lockwood, C. R., & Maycock, G. (1994). *Speed, speed limits and accidents* (Research Report No. 58). Crowthorne, UK: Transport Research Centre.
- Haarhoff, M. (2002). *Retro-Reflective material at the rear of heavy vehicles: Determining whether usage is in line with the updated traffic regulation* (Research Report No. 2002/8). Durban: University of Natal Interdisciplinary Accident Research Centre (UNIARC).
- Homel, R. J. (1990). Random breath testing: The Australian way. *Alcohol Health and Research World*, 14(1), 70-75.
- International Road Federation. (1991). *World road statistics*. Washington: Author.
- Jacobs, G., Aaron-Thomas, A., & Astrop, A. (2000). *Estimating global road fatalities* (Research Report No. 445). London: London Transport Research Laboratory.
- Khayesi, M. (1997). Liveable streets for pedestrians in Nairobi: The challenge of road traffic accidents. *World Transport Policy & Practice*, 3(1), 4-7.


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- Krug, E. G., Sharma, G. K., & Lozano, R. (2000). The global burden of injuries. *American Journal of Public Health, 90*(4), 523-526.
- Matzopoulos, R. (Ed.). (2002). *A profile of fatal injuries in South Africa, 2001: Third annual report of the National Injury Mortality Surveillance System*. Tygerberg: MRC-UNISA Crime, Violence and Injury Lead Programme.
- Murray, C., & Lopez, A. (1996). *The global burden of disease, Vol. 1*. Cambridge, MA: Harvard University Press.
- Murray, C. G. L., Lopez, A. D., Mathers, C. D., & Stein, C. (2001). *The global burden of disease 2000 project: Aims, methods, and data sources* [revised] (Global Program on Evidence for Health Policy Discussion Paper No. 36). Geneva: World Health Organisation.
- Mynhardt, C., & Van der Spuy, J. W. (2000). The drug recognition programme: Its implications in preventing drug-related road traffic incidents. *Trauma and Emergency Medicine, 17*(1), 24-28.
- National Department of Transport. (1998a). Vehicle collisions. *Robot*, winter 1998, [electronic version]. Retrieved 11 November, 2002, from <http://www.transport.go.za/library.docs/robot/1998/22-23.html>.
- National Department of Transport. (1998b). Overloaded Vehicles. *Robot*, winter 1998, [electronic version]. Retrieved 11 November, 2002, from <http://www.transport.go.za/library.docs/robot/1998/p16-17.html>.
- National Department of Transport. (2002). *The road to safety 2001-2005*. Retrieved 5 September, 2002, from <http://www.transport.gov.za/projects/rts/>.
- National Department of Transport. (2003a). *The Arrive Alive Campaign, 2001* (Customised research report). Pretoria: Author.
- National Department of Transport. (2003b). *Towards a consolidated approach to combat overloading* (Press release, 17 January 2003). Retrieved 23 January, 2003, from <http://www.transport.go.za/comm-centre/pr/2003/pr0117.html>.
- NHTSA. (undated). *Designated Driver Safe Ride Program*. Retrieved 2 August, 2002, from <http://www.nhtsa.dot.gov/injury/alcohol/designateddriver/index.html>.
- Nilsson, G. (1981). The effect of speed limits on traffic accidents in Sweden. *Proceedings of the OECD International Symposium on the Effects of Speed Limits on Traffic Accidents and Transport Energy Use*. Dublin: Organisation for Economic Cooperation and Development.
- Odero, W. (1995). Road traffic accidents in Kenya: An epidemiological appraisal. *East African Medical Journal, 72*(5), 299-305.
- Peden, M. M., Krug, E., Mohan, D., Hyder, A., Norton, R., & MacKay, M. (2001). *A 5-year WHO strategy for road traffic injury prevention*. Geneva: World Health Organisation.
- Sleet, D. A., & Lonerio, L. (2002). Behavioral strategies for reducing traffic crashes. In L. Brenslow (Ed.), *Encyclopaedia of public health* (pp. 105-107). New York: McMillan Publishing Company.
- Sukhai, A. (2003). *An exploratory study of road rage, aggressive driving and other hazardous driving behaviour among a representative sample of motorists in Durban, South Africa* (Technical Report 2003/08). Durban: MRC-UNISA Crime, Violence and Injury Lead Programme/University of Natal Interdisciplinary Accident Research Centre.
- Van der Spuy, J. W. (2000). An overview of traffic prevention strategies in South Africa. *Trauma and Emergency Medicine, 17*(1), 4-9.
- Wasike, W. S. K. (2001). *Road infrastructure policies in Kenya: Historical trends and current challenges* (KIPPRA working paper No. 1). Retrieved 27 November, 2003, from <http://www.kippira.org/Download/wp01.doc>.



Watson, S. (2000). *Results of a baseline survey on drinking and driving habits, conducted in bars, clubs and shebeens in the Durban Metro region, during September, October and November 2000* (Research Report No. 2000/4). Durban: University of Natal Interdisciplinary Accident Research Centre.

World Bank Group. (undated). *Road safety*. Retrieved 14 October 2002, from <http://www.worldbank.org/transport/roads/safety.htm>.

Zador, P. L., Krawchuk, S. A., & Voas, R. B. (2000). Alcohol-related relative risk of driver fatalities and driver involvement in fatal crashes in relation to driver age and gender: An update using 1996 data. *Journal of Studies on Alcohol*, 61(3), 387-395.



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## 8 Monitoring alcohol and other substance use in South Africa: The alcohol and drug injury nexus

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Monitoring alcohol and other substance use

Since the early 1990s, with changing market conditions and the opening up of its borders and markets to global tourism, commerce and trade, South Africa has become an attractive market for long-distance drug trafficking and has seen an increase in the activities of international drug syndicates. In general, the Southern African region became exposed to drugs previously rarely available on the market, ranging from cocaine and opiates to synthetics like MDMA. Notwithstanding, alcohol and the locally produced illicit cannabis remain by far the most widely used drugs in the region. In fact, alcohol abuse alone is seen as a major cause of health and social problems in the region (MacDonald, 1996).

The above-mentioned situation has increased the need for reliable systems to monitor the use of alcohol and other illicit substances as well as their associated consequences in South Africa and the Southern African region. There has been increasing pressure from local organisations (e.g. the Drug Advisory Board), regional organisations (e.g. the Southern African Development Community, SADC), and international bodies (e.g. the United Nations Drug Control Program) to provide accurate information on substance use trends (Parry, Bhana & Bayley, 1997).

In addition to establishing trends, accurate and timely information is also needed to develop programmes and policy and to monitor the impact and efficacy of intervention programmes.

To answer to this need, the Medical Research Council (MRC) and the University of Durban-Westville established the South African Community Epidemiology Network on Drug Use (SACENDU) in 1996. The SACENDU network consists of researchers, practitioners and policy-makers from five sentinel sites in South Africa. These sites include three large port cities (Cape Town, Durban and Port Elizabeth) and two provinces (Gauteng - largely urban, and Mpumalanga - mostly rural).

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A multi-source and multi-method sentinel approach to data collection is favoured above conducting national surveys since the former is seen to be more cost-effective, sensitive to location-specific differences, and therefore more suited to conditions in developing countries. The most important data sources for SACENDU include treatment data collected from specialist alcohol and other drug (AOD) treatment centres, substance abuse-related admissions or discharge diagnoses reported by psychiatric facilities, and AOD-related trauma unit admission data as well as other data, including the findings of studies on risky behaviour among teenagers (Parry *et al.*, 2002).

More recently, the SADC Epidemiology Network on Drug Use (SENDU), coordinated by the MRC in collaboration with the SADC, has been established. This network supports the development of substance abuse surveillance systems in each of the 14 SADC member states over the next 5 years.

SACENDU and SENDU host biannual meetings bringing together representatives from each sentinel site to network and share information. They support numerous spin-off projects, foster research capacity building and disseminate information to be used by policy makers and planners (Oyemade Bailey, Morojele & Tsetsane, 2001; Parry, Pluddeman & Strydom, in press).

## THE ALCOHOL AND DRUG SCENE IN SOUTH AFRICA

There is a paucity of recent statistical information on national trends for drug or alcohol use in South Africa (Parry, 2000). Some information on alcohol use patterns does exist, but less is known about other drugs. The National Department of Health's 5-yearly Demographic Health Survey contains information on alcohol consumption patterns. The first of these surveys, completed in 1998, indicated that 45% of men and 17% of women of 15 years and older reported that they currently drank alcohol. Rates differ substantially according to population group and gender. One-third of current drinkers drink at risky levels over weekends (South African Demographic Health Survey [SADHS], 2001). The SADHS was repeated in 2003.

Information is also available on a national level on the alcohol-relatedness of deaths due to injuries. The MRC's National Injury Surveillance System (NIMSS) was established in 1998 and collects mortality data on an ongoing basis. Blood alcohol concentrations are found to be particularly high in people killed by firearms and sharp instruments, as well as in pedestrians and drivers who died in motor vehicle crashes (Matzopoulos, 2002).

In addition to the above, information from a variety of sources on alcohol and other drugs is monitored by SACENDU. Findings collected since its inception in 1996 to 2003 show the following trends:

- a) Alcohol remains the dominant substance of abuse across sites.
- b) Alcohol is associated with risky behaviours, such as sexual relations with multiple partners and dangerous driving.
- c) The use of cannabis and Mandrax alone or in combination continues to be high.
- d) The demand for treatment for cocaine-related problems has levelled off, but



- e) 15-18% of patients in treatment in Cape Town and Gauteng indicated that cocaine is a primary drug of abuse or that cocaine is abused in conjunction with other drugs.
- f) Over time, there has been an increase in treatment demand for heroin as a primary drug of abuse in Cape Town and Gauteng, but this trend has levelled off. Between 8% and 9% of patients in treatment in Cape Town and Gauteng indicated that heroin is a primary drug of abuse or that heroin is abused in conjunction with other drugs (Parry *et al.*, 2003).<sup>2</sup>

The TADS, the first of its kind in South Africa, monitored alcohol and other drug use in trauma patients (the Trauma and Drug Study that formed part of the National Injury and Violence Surveillance initiative at the MRC). Information from this study feeds into SACENDU (Peden & Butchart, 1999). A discussion of the findings of this study and how alcohol and other drug usage relates to injury causation in particular will form the core of this chapter.

## TADS AS SOURCE OF INFORMATION

A 3-year MRC Trauma and Drug Study (TADS) was conducted on trauma patients at five health care facilities in three sentinel sites (Cape Town, Durban and Port Elizabeth) between 1999 and 2001. The aim of the study was to measure and monitor substance abuse and trauma trends in these sentinel sites. Alcohol and illicit drug use in trauma patients adds an interesting dimension to the overall picture of monitoring substance abuse trends in a community or region, because of claims around the association between substance abuse and injuries in general, as well as between substance abuse and violence in particular.

### Substance abuse and injuries

Alcohol and drug use have been implicated as contributing factors to, or a main associated factor in nearly all types of trauma. The prevalence of substance use in victims of motor vehicle crashes, homicides, suicides and interpersonal violence has been reported in numerous studies as between 39% and 89% (Madan, Yu & Beech, 1999; Van der Spuy, 2000). The increased risk as well as risk-taking behaviour associated with both alcohol consumption and illicit drug use in various types of injuries have also been highlighted (Lipsey, Wilson, Cohen & Derzon, 1997; Peden & Van der Spuy, 1996; Scott *et al.*, 2002). It has also been found that multiple attendances at trauma facilities are higher among patients testing positive for alcohol (Marais, 2002).

Substance use appears to play a role in trauma because it has a number of important effects (Madan *et al.*, 1999). The most prevalent effect in both acute alcohol and drug ingestion is an altered level of sensory perception, impaired judgement and psychomotor performance. Alcohol intoxication has been associated with central nervous system depression, which may manifest in belligerence, incoherence, impaired intellectual and motor performance, loss of inhibitions and exaggerated self-confidence (Madan *et al.*, 1999; Peden & Van der Spuy, 1996). The consequences can

<sup>2</sup>SACENDU data, i.e. data from multiple sources, was recently used to sketch trends in adolescent and other drug use over the period 1997-2001 for Cape Town, Durban and the Gauteng Province (Parry *et al.*, in press).





be seen especially with motor vehicle crashes where coordination and judgement play a role in reaction time. The neurophysiological effects of substance use may render people vulnerable to assaults as a result of decreasing ability of an intoxicated person to defend him or herself.

Less seems to be known about the effects of drugs other than alcohol. Although it may be assumed that drugs will affect, for instance, driving performance and increase the risk for injuries, there is insufficient scientific evidence to prove an increased risk for collisions in particular (Peden & Van der Spuy, 1996). Altered sensory perception, a sense of euphoria and a diminished sensitivity to pain perception that may accompany the use of illicit drugs have been found to lead to injuries in studies of emergency room trauma (Madan *et al.*, 1999).

The association between trauma and substance abuse is multifactorial. More research needs to be done to indicate whether there is a causal relationship between trauma and substance abuse, and what the nature of this relationship might be (Lipsey *et al.*, 1997).

### **Substance abuse and violence**

The connection between substance abuse and violence is even more complex. Although some studies have shown a close association between alcohol intoxication and fatal violent crimes (Madan *et al.*, 1999), information on causality remains inconclusive.

Observations and measurements regarding, for instance, the effects of alcohol use and the likelihood of violence as a consequence, may incorporate several distinctly different aspects (Lipsey *et al.*, 1997). Firstly, there is the measurable blood alcohol concentration; then factors such as psychological variables (i.e. personality traits) can have their own effects. In addition, drinking is generally embedded in a social context involving a mix of circumstances, locations, companions and the like that may or may not influence the likelihood of violence.

Two important aspects to the question of causality between alcohol consumption and violence usually explored by researchers are whether persons who consume alcohol have a higher probability of engaging in violent behaviour than essentially similar persons in essentially similar circumstances. Another important variable is age. The probability of violent behaviour can change with age or can change from situation to situation in certain age groups, such as in adolescents. For instance, White, Loeber, Stouthamer-Loeber and Farrington (1999) found that the association between substance use and violence in adolescence is assumed to be tangential rather than causal or associational. The second important aspect concerning violence and substance abuse is the belief that causal effects come essentially in the form of an alcohol/drug  $\times$  person  $\times$  situation interaction; in other words, that alcohol consumption increases the probability of violent behaviour only for some persons in some situations (Bennett, Campillo, Chandrashekar & Gureje, 1998). It is important to keep in mind that the reverse may also be true. It is difficult to determine whether substance use is a response to violence exposure, or precedes violent behaviour (Vermeiren, Schwab-Stone, Deboutte, Leckman & Ruchkin, 2003). The methodological challenges inherent in studying this complex relationship are evident.





The question concerning the generalisability of findings on substance use and risk of injury from those attending emergency rooms to the general population is important. Some studies have found patients in emergency room settings to be more frequent heavy drinkers and to report more alcohol-related problems than the general population, whereas other studies have not found such an association (Cherpitel, 1999). Possible reasons for this over-representation of substance-use problems in some clinical settings may partly be due to the socio-demographic characteristics of those using the facility under study. For instance, results from studies conducted at primary care facilities may differ from those at hospital-based facilities because the patient populations are different and represent different groups in the community. Similarly, results may be different between private and public health facilities for the same reasons (Cherpitel, 1999). Again, findings like these show that interpretations, generalisations and comparisons should be made with caution.

Nevertheless, monitoring alcohol and drug use trends at trauma facilities provides some indication of trends in the usage of these substances in the broader population if these data are combined with data from other sources. In a study where three different sources of data were used as information for the epidemiology of illicit and abused drugs, i.e. self-reported drug usage in the general population, drug-related data from trauma patients and drug-related information from arrestees, it was found that, given the different samples and methodologies of data collection, any similarities in drug trends may be considered more reliable indicators of actual drug patterns than any one data system (Rouse, 1996).

This chapter is limited to a discussion of the findings of one study, i.e. the MRC TADS study and its value for the bigger picture of drug use in Southern Africa. Some recommendations are suggested that may have policy implications.

## METHODOLOGY

The MRC TADS study formed part of a bigger national injury surveillance system for South Africa started in 1999, and was initially funded by the Department of Arts, Culture, Science and Technology. The aim was to monitor substance abuse and establish trends among trauma patients by assessing the proportion of patients with fresh trauma who were alcohol-positive at the time of their injury; assessing the proportion of patients with fresh trauma who had used an illicit drug prior to their injury; and assessing, by means of the CAGE questionnaire (Ewing, 1984), what proportion of trauma patients were chronic alcoholics.

Between 1999 and 2001 annual, cross-sectional, descriptive studies were conducted at five facilities in three cities, namely, two hospitals in Cape Town, one hospital in Durban, and two hospitals in Port Elizabeth (one hospital in Umtata was included for the first year of the study, but due to logistical problems surveys were discontinued at this site). Three harbour cities were chosen to monitor possible drug imports via seaports. For the sampling framework the concept of an 'ideal week' was used at the trauma unit. Each day of a week was divided into four 6-hour shifts and one shift was randomly selected per day, i.e. over 4 weeks the 24-hour period for each day of a week was covered. All patients of 14 years and older with fresh trauma attending



during these times were included in the studies, provided that they gave written consent for this. For those younger than 18 years of age, permission was requested from a parent or guardian. The injury-to-presentation time was set at a maximum of 6 hours.

The following instruments were used and procedures followed. Each patient was interviewed by a fieldworker using a specially constructed interview sheet. Alcohol usage was assessed using self-reporting, a breath alcohol test and the CAGE questionnaire. Self-reports were obtained by either asking the patients whether they had consumed alcohol prior to their injury or by using clinical judgement in unconscious or uncooperative patients. Breath alcohol concentration – BrAC, measured in gr/100ml – levels were assessed by means of the Lion Alcolmeter SD2, the use of which has previously been validated in a study in Cape Town (Peden, 1997). The CAGE questionnaire was included to assess chronic alcohol usage. The CAGE is a four-item screening tool for problem drinking consisting of questions on **C**utting down, **A**nnoyance and criticism, **G**uilty feelings and use of **E**ye-openers. A score of two or more positive answers is considered a positive CAGE and indicative of problem drinking.

Self-reporting was also used to assess drug usage among patients. Furthermore, a urine specimen was taken from the patient. A portion was used to screen for five drugs, namely amphetamine, cannabis (THC), morphine, cocaine and methamphetamine, using a multi-drug kit. The Multi-Drug Test kit is a dip-type lateral flow test in a panel format that detects drugs and drug metabolites in urine. It is used on site and the results are easily interpreted. The card is dipped into a sample of urine, placed on a flat surface, and results are ready within 5 minutes.

A formal chemical analysis (to test for cannabis and methaqualone [Mandrax]) was conducted on the rest of the urine specimen by the Department of Pharmacology, University of Cape Town.

The data were checked, coded and cleaned before being entered into Epi-Info Version 6.02. Epi-Info was also used to analyse the basic descriptive data presented in this chapter. The Student's *t*-test and Chi-square tests were used to test for significance.



## MAIN FINDINGS: ANNUAL TRENDS

A total of 1935 patients were included in the study from the five sentinel sites in the three cities over the 3-year period 1999-2001 (Table 1). The following section presents aggregated data for these sentinel sites. Importantly, these results cannot be

**Table 1.** Participating trauma facilities, 1999 to 2001, *N* = 1935

Hospital	City	Year			Total
		1999	2000	2001	
G. F. Jooste	Cape Town	121	115	86	322
Groote Schuur	Cape Town	112	116	99	327
Livingstone	Port Elizabeth	189	118	146	453
Provincial	Port Elizabeth	84	114	63	261
Addington	Durban	205	179	188	572
TOTAL		711	642	582	1935



generalised to the whole of South Africa, but provide some indication of trends across these sentinel sites for the period 1999-2001.

For each year of the study, nearly three-quarters of all injuries occurred among males and the mean age across time periods was around 32 years. Table 2 shows that for all 3 years, approximately 60% of all injuries resulted from violence. Between 1999 and 2001 there was a significant increase in the number of violence-related injuries ( $\chi^2=5.06$ ,  $p=0.02$ ). Although transport and other unintentional injuries decreased during this time period, these decreases were not statistically significant ( $\chi^2=1.69$ ,  $p=0.20$ , and  $\chi^2=2.19$ ,  $p=0.14$ ).

There was very little variation in the proportion of injuries for each of the above

**Table 2.** Overall cause of injury, 1999 to 2001,  $N = 1935$

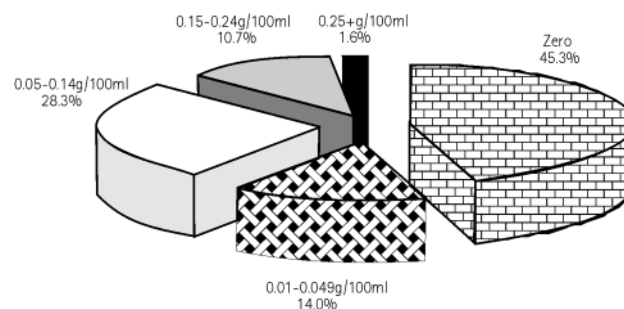
	1999	2000	2001	TOTAL
Violence	412 (57.9)	378 (58.9)	373 (64.1)	1163 (60.1)
Transport	159 (22.4)	122 (19.0)	113 (19.4)	394 (20.4)
Other Unintentional injury	140 (19.7)	142 (22.1)	96 (16.5)	378 (19.5)



general causes of injury during 1999-2001. Consistently for each year, sharp objects accounted for about half of all violence-related injuries, while passengers accounted for about half of all transport-related injuries. Falls accounted for about 43% of all other unintentional injuries. Patients aged between 12 and 54 years were more likely to sustain an injury due to violence involving a sharp object, while patients aged 55 years and older were more likely to be injured due to falls.

### Alcohol

Most of those who could be interviewed (52.0%) (114 patients could not be interviewed because of the severity of their injuries) acknowledged that they had consumed alcohol prior to being injured. Of the 1900 patients that were tested, 54.7% tested positive for alcohol (see Figure 1). With a sensitivity of 85.4% (true positive rate of those that acknowledged alcohol usage versus those that tested positive), self-reported alcohol usage was found to be relatively reliable. Of the positive cases, 74.4% had blood alcohol levels at or above 0.05 g/100 ml (a



**Figure 1.** Alcohol levels in injured patients, 1999 to 2001,  $N=1900$

proxy level that may suggest impaired judgement). The overall mean for the alcohol-positive cases was 0.10 ( $\pm$  0.07) g/100 ml. Nearly 60% of patients were alcohol-positive in 1999, compared to about half in 2001. This decrease was statistically significant ( $\chi^2=7.17$ ,  $p=0.007$ ). The mean blood alcohol level showed a decrease from 0.10 g/100 ml in 1999 to 0.09 g/100 ml in 2001. This decrease was not statistically significant ( $t=1.27$ ,  $p>0.05$ ).

To test for chronic alcoholism, 1507 patients were interviewed using the four-question CAGE questionnaire (a number of patients were excluded because of the severity of their injuries or because they were too intoxicated to answer the questions). Of the 1507 patients interviewed, 605 (40.1%) had a total CAGE score of two or more, indicating problem drinking or possible alcohol dependence (Table 3). Patients with a total CAGE score of two or more decreased significantly from 1999 to 2001 (47.8%, 37.5%, and 32.7% for each year respectively) ( $\chi^2=22.83$ ,  $p<0.001$ ).

**Table 3.** Problem drinking or alcohol dependence, 1999 to 2001,  $N = 1507$

		CAGE = 0 (%)	CAGE = 1 (%)	CAGE =2 (%)
Violence	1999 ( $N = 344$ )	36.3	5.8	57.8
	2000 ( $N = 314$ )	48.4	5.7	45.9
	2001 ( $N = 267$ )	58.1	3.7	38.2
Transport	1999 ( $N = 117$ )	56.4	2.6	41.0
	2000 ( $N = 90$ )	71.1	3.3	25.6
	2001 ( $N = 74$ )	73.0	2.7	24.3
Other Unintentional	1999 ( $N = 116$ )	75.0	0	25.0
	2000 ( $N = 110$ )	70.0	6.4	23.6
	2001 ( $N = 75$ )	76.0	2.7	21.3

### Illicit drugs

A total of 1770 patients could be interviewed with regard to the use of illicit drugs prior to their injury. Only 187 (10.6%) acknowledged that they had used such a substance. As expected, the sensitivity of self-reporting (true positive rate of cases that acknowledged using an illicit drug versus the cases that tested positive for any illicit drug using drug-screening or pharmacology) was very low (25.9%). The low reporting rate is probably due to the illicit nature of drugs and a fear of prosecution and/or victimisation.

A total of 1565 patients were tested using the multi-drug kit. Table 4 shows that cannabis was most often found in patients' urine for each of the 3 years. The highest percentage of cannabis-positive patients was recorded in 2001 (40%), while the highest percentage of cocaine- and opiate-positive patients was reported in 2000 (7% and 8% respectively). The test for opiates, however, should be viewed with caution since pre-hospital analgesia and even over-the-counter pain medications may also yield positive results.



**Table 4.** Analysis of urine for illicit drugs using a multi-drug kit, 1999 to 2001, (N = 1565)

	1999 No. (%)	2000 No. (%)	2001 No. (%)	TOTAL No. (%)
Amphetamine	0	3 (0.5)	7 (1.7)	10 (0.6)
Cannabis	220 (36.2)	156 (28.2)	163 (40.4)	539 (34.4)
Opiates	23 (3.8)	44 (7.9)	15 (3.7)	82 (5.2)
Cocaine	11 (1.8)	38 (6.9)	11 (2.7)	60 (3.8)
Methamphetamine	1 (0.2)	2 (0.4)	0	3 (0.2)
TOTAL TESTS	608	554	403	1565

The presence of cannabis and methaqualone were also assessed using a conventional wet analysis (Table 5). Overall, 35% of the cases were found to have cannabis in their urine and 15% had methaqualone metabolites. The proportions of cannabis, methaqualone and 'white pipe' smoking (use of cannabis and methaqualone concurrently) were fairly stable across all 3 years.

**Table 5.** Analysis of urine for cannabis and methaqualone using conventional wet analysis, 1999 to 2001

	1999 No. (%)	2000 No. (%)	2001 No. (%)	TOTAL No. (%)
Cannabis	225 (37.0)	176 (31.8)	152 (37.7)	553 (35.3)
Methaqualone	96 (15.8)	73 (13.2)	65 (16.1)	234 (15.0)
'White pipe' (cannabis + methaqualone)	92 (15.1)	67 (12.1)	61 (15.1)	220 (14.1)
TOTAL TESTS	608	554	403	1565

### Substance abuse and injury

Unfortunately, because of the long half-life of substances such as cannabis in the body, these results only indicate drug usage and cannot be associated with injury causation.

**Table 6.** Substance abuse by cause of injury, 1999 to 2001

	Alcohol or illicit drug No. (%)	Illicit drug No. (%)	Cannabis No. (%)	White Pipe No. (%)	Alcohol No. (%)
Violence	902 (83.5)	443 (45.1)	389 (39.6)	162 (16.5)	758 (66.5)
Transport	201 (66.6)	103 (36.3)	87 (30.6)	27 (9.5)	163 (42.1)
Other Un- intentional	185 (58.4)	107 (35.8)	77 (25.8)	31 (10.4)	118 (31.6)

The percentages are of the total cases tested for that substance/s per cause category

Table 6 shows that patients who were injured as a result of violence were more likely to have consumed alcohol as well as other drugs prior to their injury than those who were injured in transport collisions or who had other unintentional injuries.

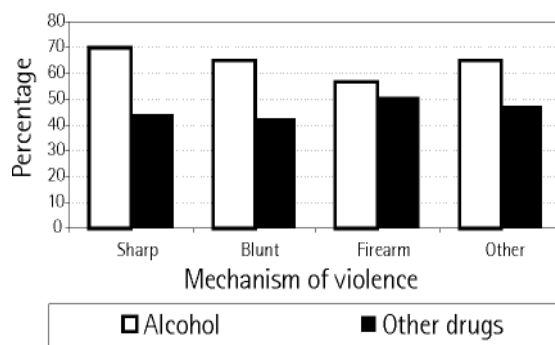
Table 7 shows the alcohol-relatedness of the different general causes of injury by year. Between 1999 and 2001 violence- and transport-related injuries showed a statistically significant decrease in alcohol-relatedness ( $\chi^2=4.31, p=0.04$ ). While the alcohol-relatedness of other unintentional injuries also decreased, this was not statistically significant.

**Table 7.** Alcohol-relatedness by cause of injury: 1999-2001 ( $N = 1039$ )

	Alcohol positive			Mean BrAC ( $\pm$ S.D)		
	1999	2000	2001	1999	2000	2001
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Violence	286 (71.0)	248 (66.3)	224 (61.9)	0.11 (0.08)	0.10 (0.07)	0.09 (0.06)
Transport	79 (51.3)	46 (37.7)	38 (34.2)	0.09 (0.07)	0.08 (0.06)	0.10 (0.07)
Other Un-intentional injury	41 (29.7)	50 (35.5)	27 (28.4)	0.08 (0.07)	0.10 (0.08)	0.09 (0.05)

### Violence

Figure 2 shows that patients who were injured with sharp instruments such as knives were more likely to be alcohol-positive (70.1%) than those who were injured as a result of blunt force (65.1%) or by a firearm (56.6%).



**Figure 2.** Substance abuse by mechanism of violence

Furthermore, patients injured with sharp objects were more often classified as problem drinkers (50.2%), compared to patients injured by blunt objects (42.8%) or firearms (28.1%). In contrast, patients injured in firearm-related violence were more likely to have used an illicit drug prior to their injury (50.6%), compared to those injured by sharp objects (44.0%), blunt objects (42.9%) or by other means (47.1%).



### Transport

Among patients injured in transport collisions, about half the drivers and pedestrians were alcohol-positive, compared to one-third of passengers (Figure 3).

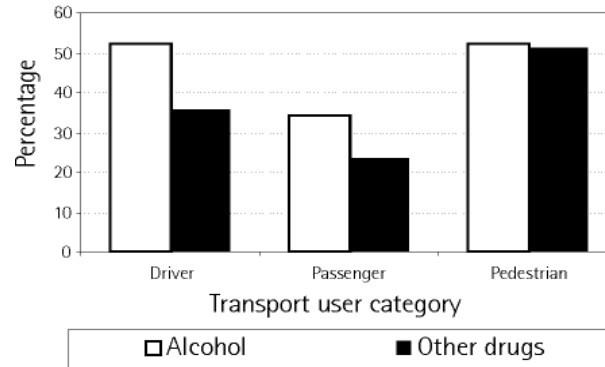


Figure 3. Substance abuse by transport user category

Overall, just less than one-third (31.7%) of the transport victims could be classified (according to the CAGE results) as problem drinkers. Problem drinking was more common among pedestrians (42.2%) than among drivers (30.0%) or passengers (23.0%). The average levels of alcohol consumption were the same for all categories at 0.09 g/100 ml. It was noted that 67.9% of the drivers who were alcohol-positive were over the legal alcohol limit of 0.05 g/100 ml for driving. Pedestrians were also more likely to have used illicit drugs (48.7%) than passengers (25.4%) or drivers (34.1%).

### Other unintentional injury

Falls accounted for just under half of all other unintentional injuries. About one-third (36.3%) of these cases tested positive for alcohol and 29.4% tested positive for an illicit drug. Overall, about one-quarter (23.2%) of all other unintentional injury cases had a total CAGE score of two or more.

### Substance abuse and gender

Table 8 shows that higher percentages of males than females were alcohol- and drug-positive. These differences were statistically significant ( $\chi^2=56.72, p<0.001$  and  $\chi^2=114.99, p<0.001$  respectively). The average levels of alcohol consumption for both groups were the same (0.10 g/100 ml).

Table 8. Substance abuse by gender, 1999 to 2001

Alcohol positive	Male (N = 1378)	60.0
	Female (N = 520)	40.7
Mean positive BrAC ( $\pm$ S.D)	Male	0.10 (0.07)
	Female	0.10 (0.07)
Illicit drug positive	Male (N = 1163)	49.6
	Female (N = 400)	19.0

### Substance abuse and severity of injury

Figure 4 shows that patients who sustained moderate to serious injuries (New Injury Severity Score [NISS]  $\geq 9$ ) were more likely to be alcohol-positive than patients who sustained minor injuries. This difference was statistically significant ( $\chi^2=6.48$ ,  $p=0.01$ ).

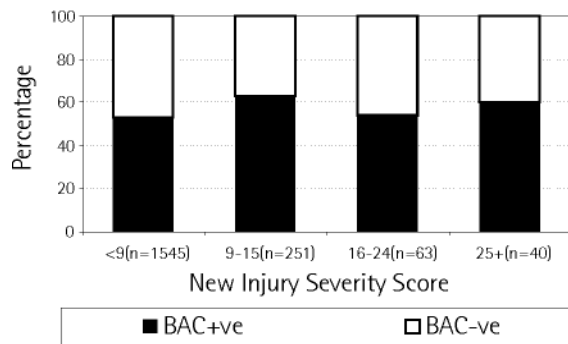


Figure 4. Injury severity by alcohol usage

## MAIN FINDINGS: INTER-CITY DIFFERENCES

Generally, the main strength of sentinel surveillance lies in detecting temporal trends and emerging problems at a sentinel site in order to provide a basis for intervention, evaluation and policy initiatives. However, aggregate data (3 years combined) were compiled for each of the three TADS sentinel sites (trauma centres in Durban, Cape Town and Port Elizabeth) in order to profile the general characteristics of the trauma population as well as to create a profile of the substances abused. The fact that convenience sampling was used means that the sample was not representative of the trauma population of the city or the catchment area of the sentinel sites. Hence, comparisons between sites should be interpreted with caution. Furthermore, statistical analysis is also restricted due to the lack of representivity. The three sentinel sites are located at the major port cities in the country, which are possible entry-points for drug trafficking from outside the region. It is assumed that this trafficking may also have a strong influence on substance abuse and trauma among the local populations.

### Demographics and cause of injury

The mean age of participants across the three sentinel sites ranged between 30.8 years and 33.2 years, and the highest mean age was found in the Port Elizabeth sample. Males accounted for more than two-thirds of the sample population at each of the three sentinel sites, and the highest percentage of males was in Cape Town (76.4%). Violence was the dominant cause of injury across all sites; the highest percentage of these cases was recorded in Port Elizabeth (64.1%).



### Temporality and scene of injury

Although most injuries across all three sites occurred after office hours, Durban and Cape Town had a similar proportion with about two-thirds of the sample occurring then compared to only 56% in the Port Elizabeth sample. Generally, most injuries occurred over weekends (Friday to Sunday) and particularly on Saturdays. While Cape Town and Port Elizabeth recorded similar percentages of injuries on Saturdays (28.5% and 29.6% respectively) and over weekends (63.2% and 64.7% respectively), Durban showed the least variability, with 23.6% of cases on Saturdays and 57.7% over weekends. Patients in Port Elizabeth were most often injured in and around the home (51.3%), while the road or pavement was the dominant scene of injury among patients in Durban and Cape Town (52.8% and 43.4% respectively).

### Clinical data

The average NISS was similar for Durban and Port Elizabeth (4.7 and 4.6 respectively). Cape Town had a higher mean of 7.2, which was largely due to higher NISS values (indicative of fatal cases) recorded at this site. On average, patients in Cape Town were hospitalised for longer (median length of stay 5 days) compared to Durban and Port Elizabeth (median length of stay 4 days each).

Table 9 shows the substances abused among trauma populations at each sentinel site by cause of injury. Overall, more than three-quarters of all cases across all three sites had taken at least one substance (alcohol or illicit drug) prior to being injured.



Table 9. Substance abuse by cause of injury and city

	Violence			Transport-related			Other unintentional			Total		
	Dbn	CT	PE	Dbn	CT	PE	Dbn	CT	PE	Dbn	CT	PE
Alcohol positive	159 (54.1)	238 (61.5)	361 (78.8)	33 (25.8)	52 (39.7)	78 (60.9)	36 (28.8)	35 (27.8)	47 (38.2)	228 (41.7)	325 (50.5)	486 (68.5)
Mean positive BrAC (± SD)	0.08 (0.08)	0.09 (0.07)	0.12 (0.06)	0.06 (0.08)	0.08 (0.06)	0.11 (0.06)	0.05 (0.07)	0.09 (0.06)	0.12 (0.06)	0.07 (0.08)	0.09 (0.07)	0.12 (0.06)
<b>Total tests (alcohol)</b>	<b>294</b>	<b>387</b>	<b>458</b>	<b>128</b>	<b>131</b>	<b>128</b>	<b>125</b>	<b>126</b>	<b>123</b>	<b>547</b>	<b>644</b>	<b>709</b>
Any illicit drug positive	128 (49.4)	159 (50.3)	156 (38.3)	16 (20.5)	48 (46.2)	39 (38.2)	41 (39.8)	33 (33.0)	33 (34.4)	185 (42.0)	240 (46.2)	228 (37.7)
Cannabis positive	115 (44.4)	137 (43.4)	137 (33.7)	16 (20.5)	39 (37.5)	32 (31.4)	27 (26.2)	26 (26.0)	24 (25.0)	158 (35.9)	202 (38.8)	193 (31.9)
White pipe positive	42 (16.2)	71 (22.5)	49 (12.0)	3 (3.8)	16 (15.4)	8 (7.8)	3 (2.9)	15 (15.0)	13 (13.5)	48 (10.9)	102 (19.6)	70 (11.6)
<b>Total tests (illicit drug)</b>	<b>259</b>	<b>316</b>	<b>407</b>	<b>78</b>	<b>104</b>	<b>102</b>	<b>103</b>	<b>100</b>	<b>96</b>	<b>440</b>	<b>520</b>	<b>605</b>
Alcohol or illicit drug positive	218 (86.9)	297 (94.9)	387 (95.1)	42 (53.8)	73 (70.2)	86 (84.3)	63 (61.8)	60 (60.0)	62 (64.6)	323 (74.9)	430 (83.2)	535 (88.4)
Alcohol & illicit drug positive	69 (27.5)	100 (31.9)	130 (31.9)	7 (9.0)	27 (26.0)	31 (30.4)	14 (13.7)	8 (8.0)	18 (18.8)	90 (20.9)	135 (26.1)	179 (29.6)
<b>Total tests alcohol &amp; drug)</b>	<b>251</b>	<b>313</b>	<b>407</b>	<b>78</b>	<b>104</b>	<b>102</b>	<b>102</b>	<b>100</b>	<b>96</b>	<b>431</b>	<b>517</b>	<b>605</b>

Dbn = Durban; CT = Cape Town; PE = Port Elizabeth.

**NOTE:** The table shows the number of cases and the percentages of positive cases for substances abused by cause and sentinel site using aggregate data from 1999 to 2001. Percentages were calculated using the total cases tested for that substance/s per cause category. The total cause category per city only includes those cases where the general cause of injury was known.



### **Alcohol**

Overall, Port Elizabeth recorded the highest percentage of alcohol-positive cases (69%), also having the highest mean level of consumption of 0.12 g/100 ml. The alcohol positivity and levels of alcohol consumption for Port Elizabeth were also consistently the highest for each cause of injury. Across all sites, patients injured as a result of violence were most likely to test positive for alcohol, ranging from 54% of cases in Durban to 79% in Port Elizabeth.

### **Illicit drugs**

Overall, the highest percentage of cases testing positive for at least one illicit drug was found among patients in Cape Town (46%), and the drug used most often was cannabis (39%). The highest percentage of 'white pipe' smoking was also found among patients in Cape Town (19.6%). While the highest overall drug positivity was found among violence-related injuries for Durban and Cape Town (49% and 46% respectively), Port Elizabeth had an almost equal distribution among the different causes of injury.

For violence-related injuries, the highest percentage of positive cases for overall illicit drug and cannabis use was found among patients in Durban (49% and 44% respectively) while for 'white pipe' smoking the highest percentage was recorded in Cape Town (23%). With transport-related injuries, Cape Town had the highest percentages of positive tests for overall drug use, cannabis and 'white pipe' smoking (46%, 38%, and 15% respectively). For other unintentional injuries, the highest percentage of positive cases for overall drug use was recorded among the Durban trauma population (40%). While for other unintentional injury cannabis was almost equally distributed across the sites, 'white pipe' smoking was highest in Cape Town and Port Elizabeth (both about 15%).

### **Alcohol and illicit drugs**

Overall, about one-fifth of the trauma population in Durban, one-quarter in Cape Town, and close to one-third in Port Elizabeth had used alcohol and an illicit drug in combination. Across all three sites the highest percentage was found among violence-related cases, ranging from 28% in Durban to 32% in both Cape Town and Port Elizabeth.

### **Other illicit drugs**

Across all sites very small numbers of 'club' drugs (amphetamine and methamphetamine) were detected among the cases included in the study. These results are therefore not presented. Tables 4 and 5 show that cannabis followed by methaqualone were the illicit drugs that were most often abused, and these were followed by opiates and cocaine. Overall, the highest percentage of opiate use was found in Cape Town (8%), and Cape Town recorded the highest percentages among violence- (7%) and transport-related injury cases (12%). The highest overall percentage for cocaine use was in Port Elizabeth (5%), which also recorded the highest percentages for cocaine use among people with transport-related injuries (4%) and other unintentional injuries (8%).





## CONCLUSION

Findings from the TADS study feed into and make an important contribution to the ongoing monitoring of alcohol and other substance use in South and Southern Africa. The SACENDU network plays a crucial role in the collection, collation and dissemination of information to stakeholders, including policy makers. Information from this network is used, for instance, to inform the implementation of the National Drug Master Plan, South Africa's core document of substance policy approved by Cabinet in 1999.

Furthermore, the TADS study confirms and adds to our understanding of the nexus between alcohol and illicit substance use and injuries in general, and also injuries due to violence for patients attending emergency care services. Emergency room survey data are, however, limited to only victims that sustain injuries. No information is collected at present on the perpetrator, the involvement of the victim, or the circumstances under which alcohol and/or illicit substances were used in the injury episode. Further research at emergency rooms should be aimed at collecting more comprehensive data on the perpetrator/victim interaction and circumstances leading to the injury. Some studies have been done on substance abuse among perpetrators (Leggett, 2002), but more information is needed on abuse patterns in the general population in comparison to specific populations such as trauma unit attenders.

Although the TADS study is the first of its kind in South Africa, findings from the study cannot be generalised. Follow-up studies should include a more representative sentinel site surveillance methodology.

As far as recommendations for prevention strategies are concerned, the following suggestions need urgent attention in South Africa. Alcohol screening and early interventions in emergency rooms is a neglected field and should receive much more attention than it has up to the present. Law enforcement in respect of alcohol abuse among road users is an essential step towards the prevention of motor crashes and pedestrian injuries and deaths (intoxicated pedestrians on public roads is especially problematic). However, preventative and educative initiatives at a primary prevention level should be initiated on a larger scale. Lastly, well-designed, dedicated and ongoing violence prevention programmes should be aimed at children at primary school level and not later when these behaviours are already established (Van der Spuy, 2000).

## REFERENCES

- Bennett, L. A., Campillo, C., Chandrashekar, C. R., & Gureje, O. (1998). Alcohol beverage consumption in India, Mexico, and Nigeria. *Alcohol, Health and Research World*, 22(4), 243-252.
- Cherpitel, C. J. (1999). Emergency room and primary care services utilization and associated alcohol and drug use in the United States general population. *Alcohol & Alcoholism*, 34(4), 581-589.
- Ewing, J. A. (1984). Detecting alcoholism: The CAGE Questionnaire. *Journal of the American Medical Association*, 252(14), 1905-1907.
- Leggett, T. (Ed.). (2002). *Drugs and crime in South Africa – A study in three cities* (Monograph no. 69) Johannesburg: Institute for Security Studies.
- Lipsy, M. W., Wilson, D. B., Cohen, M. A., & Derzon, J. H. (1997). Is there a causal relationship between alcohol use and violence? In M. Galanter (Ed.), *Recent*



- developments in alcoholism (Vol.13), Alcoholism and violence* (pp. 245-282). New York: Plenum Press.
- Macdonald, D. (1996). Drugs in Southern Africa: An overview. *Drugs: Education, Prevention and Policy*, 3(2), 127-153.
- Madan, A. K., Yu, K., & Beech, D. J. (1999). Alcohol and drug use in victims of life-threatening trauma. *Journal of Trauma: Injury Infection, and Critical Care*, 47(3), 568-571.
- Marais, S. (2002). *WHO Collaborative study on alcohol and injuries: South Africa*. Unpublished manuscript.
- Matzopoulos, R. (Ed.). (2002). *A profile of fatal injuries in South Africa 2001: Third Annual Report of the National Injury Mortality Surveillance System*. Tygerberg: MRC-UNISA, Crime, Violence and Injury Lead Programme.
- Oyemade Bailey, U. J., Morojele, N. K., & Tsetsane A. (Eds). (2001, July). Substance abuse, crime, violence and HIV/Aids as consequences of poverty: Strategies for prevention intervention and treatment in the United States and South Africa. *Proceedings of the United States/South Africa meeting July 1-5, 2000*. Pretoria: Department of Correctional Services.
- Parry, C. D. H. (2000). Alcohol and other drug use. In A. Nthuli, N. Crisp, E. Clarke & P. Barron (Eds), *South African health review 2000* (pp. 441-454). Durban: Health Systems Trust.
- Parry, C. D. H., Bhana, A., & Bayley, J. (1997). *South African Community Epidemiology Network on Drug Use (SACENDU): Monitoring alcohol and drug abuse trends (Highlights and Executive Summary (Vol. 1))*. Tygerberg: Medical Research Council.
- Parry, C. D. H., Bhana, A., Plüddeman, A., Myers, B., Siegfried, N., Morojele, N. K., Flisher, A. J., & Kozel, N. J. (2002). The South African Community Epidemiology Network on Drug Use: Description, findings (1997-1999) and policy implications. *Addiction*, 97, 969-976.
- Parry, C. D. H., Myers, B., Morojele, N. K., Flisher, A. J., Bhana, A., Donson, H., & Plüddemann, A. (in press). Trends in adolescent alcohol and other drug use: Findings from three sentinel sites in South Africa (1997-2001). *Journal of Adolescence*.
- Parry, C. D. H., Plüddemann, A., Bhana, A., Harker, N., Potgieter, H., & Gerber, W. (2003). *South African Community Epidemiology Network on Drug Use (SACENDU) Update: Alcohol and drug abuse trends: January-June 2003* (Phase 14). Tygerberg: Medical Research Council.
- Parry, C. D. H., Plüddeman, A., & Strijdom, J. (in press). Developing the Southern African Development Community Epidemiology Network on Drug Use: Methods and issues. *United Nations Bulletin on Narcotics*.
- Peden, M. M. (1997). Substance abuse surveillance among trauma patients. *Trauma Review*, 5(3), 7-8.
- Peden, M. M., & Butchart, A. (1999). Trauma and injury. In N. Crisp & A. Ntuli (Eds), *South African health review 1999* (pp. 331-344). Durban: Health Systems Trust.
- Peden, M. M., & Van der Spuy, J. (1996). Substance abuse and traffic-related injuries. *Trauma Review*, 4(3), 8-9.
- Rouse, B. A. (1996). Epidemiology of illicit and abused drugs in the general population, emergency department drug-related episodes, and arrestees. *Clinical Chemistry*, 42(8B), 1330-1336.
- Scott, R. G. A., Keaney, F., Marshall, E. J., Strang, J., Sinha, J., & Peters, T. J. (2002). The feasibility of substance misuse screening in referrals from accident and emergency to an inner-city fracture clinic: Results from a pilot study. *Journal of Substance Use*, 7, 65-70.



- Van der Spuy, J. (2000). The trauma impact of alcohol and other substances. *Trauma Review*, 8(1), 1-3.
- Vermeiren, R., Schwab-Stone, M., Deboutte, D., Leckman, P. E., & Ruchkin, V. (2003). Violence exposure and substance use in adolescence: Findings from three countries. *Pediatrics*, 3(3), 535-540.
- White, H. R., Loeber, R., Stouthamer-Loeber, M., & Farrington, D. P. (1999). Developmental associations between substance use and violence. *Development and Psychopathology*, 2, 785-803.

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