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).
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, Plüddeman & 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 mortuary 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).²

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

²SACENDU 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 × person × 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 Cutting down, Annoyance and criticism, Guilty feelings and use of Eye-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>
<thead>
<tr>
<th>Hospital</th>
<th>City</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. F. Jooste Cape Town</td>
<td>121</td>
<td>115</td>
<td>86</td>
<td>322</td>
<td></td>
</tr>
<tr>
<td>Groote Schuur Cape Town</td>
<td>112</td>
<td>116</td>
<td>99</td>
<td>327</td>
<td></td>
</tr>
<tr>
<td>Livingstone Port Elizabeth</td>
<td>189</td>
<td>118</td>
<td>146</td>
<td>453</td>
<td></td>
</tr>
<tr>
<td>Provincial Port Elizabeth</td>
<td>84</td>
<td>114</td>
<td>63</td>
<td>261</td>
<td></td>
</tr>
<tr>
<td>Addington Durban</td>
<td>205</td>
<td>179</td>
<td>188</td>
<td>572</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>711</td>
<td>642</td>
<td>582</td>
<td>1935</td>
<td></td>
</tr>
</tbody>
</table>
Monitoring alcohol and other substance use

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 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.

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

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Violence</td>
<td>412 (57.9)</td>
<td>378 (58.9)</td>
<td>373 (64.1)</td>
<td>1163 (60.1)</td>
</tr>
<tr>
<td>Transport</td>
<td>159 (22.4)</td>
<td>122 (19.0)</td>
<td>113 (19.4)</td>
<td>394 (20.4)</td>
</tr>
<tr>
<td>Other Unintentional Injury</td>
<td>140 (19.7)</td>
<td>142 (22.1)</td>
<td>96 (16.5)</td>
<td>378 (19.5)</td>
</tr>
</tbody>
</table>

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, $N=1900$
Monitoring alcohol and other substance use

proxy level that may suggest impaired judgement). The overall mean for the alcohol-positive cases was 0.10 (± 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

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

### 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: Test results for illicit drugs, 1999 to 2001, N = 1565

| Substance | 1999 (N = 111) | 2000 (N = 110) | 2001 (N = 74) |
| Cannabis | 75.0 | 6.4 | 2.7 | 21.3 |
| Cocaine | 7.0 | 6.4 | 2.7 | 21.3 |
| Opiates | 8.0 | 6.4 | 2.7 | 21.3 |
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 4. Analysis of urine for illicit drugs using a multi-drug kit, 1999 to 2001, (N = 1565)

<table>
<thead>
<tr>
<th></th>
<th>1999 No. (%)</th>
<th>2000 No. (%)</th>
<th>2001 No. (%)</th>
<th>TOTAL No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamine</td>
<td>0 (36.2)</td>
<td>3 (28.2)</td>
<td>7 (1.7)</td>
<td>10 (0.6)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>220 (0.5)</td>
<td>156 (40.4)</td>
<td>163 (15.7)</td>
<td>539 (34.4)</td>
</tr>
<tr>
<td>Opiates</td>
<td>23 (11.8)</td>
<td>44 (11.6)</td>
<td>11 (11.6)</td>
<td>82 (5.2)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>11 (0.2)</td>
<td>38 (6.9)</td>
<td>11 (2.7)</td>
<td>60 (3.8)</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>1 (0.2)</td>
<td>2 (0.4)</td>
<td>0 (0.1)</td>
<td>3 (0.2)</td>
</tr>
<tr>
<td>TOTAL TESTS</td>
<td>608</td>
<td>554</td>
<td>403</td>
<td>1565</td>
</tr>
</tbody>
</table>

The percentages are of the total cases tested for that substances per cause category.

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

<table>
<thead>
<tr>
<th></th>
<th>1999 No. (%)</th>
<th>2000 No. (%)</th>
<th>2001 No. (%)</th>
<th>TOTAL No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis</td>
<td>225 (37.0)</td>
<td>176 (31.8)</td>
<td>152 (16.5)</td>
<td>553 (35.3)</td>
</tr>
<tr>
<td>Methaqualone</td>
<td>96 (15.8)</td>
<td>73 (13.2)</td>
<td>65 (14.1)</td>
<td>234 (15.0)</td>
</tr>
<tr>
<td>'White pipe' (cannabis + methaqualone)</td>
<td>92 (15.1)</td>
<td>67 (12.1)</td>
<td>61 (15.1)</td>
<td>220 (14.1)</td>
</tr>
<tr>
<td>TOTAL TESTS</td>
<td>608</td>
<td>554</td>
<td>403</td>
<td>1565</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Alcohol or Illicit drug No. (%)</th>
<th>Illicit drug No. (%)</th>
<th>Cannabis No. (%)</th>
<th>White Pipe No. (%)</th>
<th>Alcohol No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Violence</td>
<td>902 (83.5)</td>
<td>443 (45.1)</td>
<td>389 (39.6)</td>
<td>162 (15.5)</td>
<td>758 (66.5)</td>
</tr>
<tr>
<td>Transport</td>
<td>201 (66.6)</td>
<td>103 (36.3)</td>
<td>87 (30.6)</td>
<td>27 (9.5)</td>
<td>163 (42.1)</td>
</tr>
<tr>
<td>Other Unintentional</td>
<td>185 (58.4)</td>
<td>107 (35.8)</td>
<td>77 (25.8)</td>
<td>31 (10.4)</td>
<td>118 (31.6)</td>
</tr>
</tbody>
</table>

The percentages are of the total cases tested for that substances 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 ($N=1039$)

<table>
<thead>
<tr>
<th></th>
<th>Alcohol positive</th>
<th>Mean BrAC (± S.D)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999 No. (%)</td>
<td>2000 No. (%)</td>
</tr>
<tr>
<td>Violence</td>
<td>286 (71.0)</td>
<td>248 (66.3)</td>
</tr>
<tr>
<td>Transport</td>
<td>79 (51.3)</td>
<td>46 (37.7)</td>
</tr>
<tr>
<td>Other Unintentional Injury</td>
<td>41 (29.7)</td>
<td>50 (35.5)</td>
</tr>
</tbody>
</table>

**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%).

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).

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

<table>
<thead>
<tr>
<th>Substance abuse</th>
<th>Male ($N = 1378$)</th>
<th>Female ($N = 520$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol positive</td>
<td>60.0</td>
<td>46.0</td>
</tr>
<tr>
<td>Mean positive BrAC (± S.D)</td>
<td>Male</td>
<td>0.10 (0.07)</td>
</tr>
<tr>
<td>Illicit drug positive</td>
<td>Male ($N = 1163$)</td>
<td>49.6</td>
</tr>
</tbody>
</table>
Substance abuse and severity of injury

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

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 (32.5% and 31.6% 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 (53.1%), 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.


**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-related cases (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


Monitoring alcohol and other substance use developments in alcoholism (Vol.13), Alcoholism and violence (pp. 245-282). New York: Plenum Press.


