



Our findings confirm that medical management alone is effective for over 80% of patients with ALA. We have shown that lack of clinical improvement after 48 hours is the major criterion for aspiration, which should be ultrasound-guided, and that the size, site and surface proximity are not absolute indications for aspiration. This approach is safe and can be complemented by catheter drainage in selected cases, sparing patients the unnecessary morbidity of laparotomy. It is our recommendation therefore that all patients with ALA should initially receive medical management and that percutaneous aspiration should only be resorted to in case of failure of clinical improvement. Operative drainage should be reserved for intraperitoneal rupture.

References

1. Li E, Stanley SL. Amebiasis. *Gastroenterol Clin North Am* 1996; 25: 471-492.
2. Adams EB, MacLeod IN. Invasive amebiasis. *Medicine* 1977; 56: 325-334.
3. Luvuno FM. Surgery for complicated amebiasis. *Bailliere's Clinical Tropical Medicine* 1988; 3: 349-365.
4. Akgun Y, Tacyildiz IH, Çelik Y. Amebic liver abscess: Changing trends over 20 years. *World J Surg* 1999; 23: 102-106.
5. Frey CF, Zhu Y, Suzuki M, Isaji S. Liver abscesses. *Surg Clin North Am* 1989; 69: 259.
6. Sachdev GK, Dholi P. Colonic involvement in patients with amebic liver abscess: endoscopic findings. *Gastrointest Endosc* 1997; 46: 37-39.
7. De la Rey Nel J, Simjee AE, Patel A. Indications for aspiration of amoebic liver abscess. *S Afr Med J* 1989; 75: 373-376.
8. Meng X, Wu J. Perforated amebic liver abscess: Clinical analysis of 110 cases. *South Med J* 1994; 87: 985-989.
9. Tandon A, Jain AK, Dixit VK, et al. Needle aspiration in large amoebic liver abscesses. *Trop Gastroenterol* 1997; 18: 19-21.
10. Saraswat VA, Agarwal DK, Baijal SS, et al. Percutaneous catheter drainage of amoebic liver abscess. *Clin Radiol* 1992; 45: 187-189.
11. Singh JP, Kashyap A. A comparative evaluation of percutaneous catheter drainage for resistant amebic liver abscesses. *Am J Surg* 1989; 158: 58.
12. Mondragon-Sanchez R, Cortes-Espinoza T, Alonzo-Fierro Y, et al. Amebic liver abscess. A 5 year Mexican experience with a multimodality approach. *Hepatogastroenterology* 1995; 42: 473-477.
13. Archampong EQ. Peritonitis from amoebic liver abscess. *Br J Surg* 1972; 59: 179.
14. Ibrarullah MD, Aggarwal DK, Kapoor VK. Ruptured amoebic liver abscess - Changing trends in management. *Trop Gastroenterol* 1993; 14: 132-138.
15. Hai AA, Singh A, Mittal VK, et al. Amoebic liver abscess. Review of 220 cases. *Int Surg* 1991; 76: 81-83.
16. Simjee AE, Patel A, Gathiram V, et al. Serial ultrasound in amoebic liver abscess. *Clin Radiol* 1985; 36: 61-68.
17. Elechi EN, Etawo SU. Chest complications of amoebic liver abscess: a report of six cases from Nigeria. *East Afr Med J* 1994; 71: 189-192.

Accepted 6 September 2002.

An epidemiological perspective of substance use among high school pupils in rural KwaZulu-Natal

M Taylor, C C Jinabhai, K Naidoo, I Kleinschmidt, S B Dlamini

Objectives. To investigate prevalence and the factors influencing substance use among rural high school pupils in KwaZulu-Natal in order to develop and implement intervention programmes.

Design. Cross-sectional study.

Setting. Twenty-eight high schools in southern KwaZulu-Natal.

Subjects. One thousand three hundred and eighteen grade 10 pupils.

Outcome measures. An anonymous self-reporting questionnaire was used to investigate the use of alcohol, tobacco (cigarettes), cannabis and solvents.

Results. Of the male scholars, 52.9% (95% confidence interval (CI): 45.4 - 60.3) reported ever using alcohol, 16.9% (CI: 11.5 - 24.0) reported using cannabis, and 13.1% (CI: 7.2 - 22.5) had

smoked more than one cigarette daily. Among male pupils 45.5% (CI: 38.6 - 52.6) had inhaled benzene and 34.6% (CI: 28.0 - 41.8), thinners; 7.4% (CI: 3.4 - 15.2) had used cocaine and 4.1% (CI: 1.0 - 10.6), crack. Female pupils reported significantly less use of alcohol (25.5%, CI: 17.6 - 35.3), cannabis (2.3%, CI: 1.3 - 4.1), cigarettes (more than one daily) (2.0%, CI: 1.0 - 4.1), and inhalation of benzene (18.8%, CI: 13.8 - 25.2) and thinners (10.8%, CI: 7.2 - 16). Logistical regression indicated that the odds of smoking cigarettes increased significantly ($p < 0.0005$) with use of the other substances.

Conclusion. The results of this study confirm the prevalence of multi-substance use among pupils at the majority of rural high schools in this district and the need for targeted interventions to reduce/prevent this.

S Afr Med J 2003; 93: 136-140.

Department of Community Health, Nelson R Mandela School of Medicine, University of Natal, Durban

M Taylor, PhD
C C Jinabhai, MD

K Naidoo, MMed
S B Dlamini, DipMedTech
Medical Research Council, Durban
I Kleinschmidt, PhD



The use and abuse of substances such as tobacco, alcohol, cannabis (dagga) and cocaine among young people is a problem facing schools and communities worldwide.¹ Substance use has also been reported locally among Cape Peninsula high school pupils.^{2,4} A KwaZulu-Natal study interviewing 14 - 22-year-old youth at home (urban and rural) found that although 7% of 14 - 15-year-olds reported using alcohol in the previous 4 weeks, this increased to about 20% among youth of 16 years of age and over.⁵ In the study 27% of males and 10% of females reported alcohol use, with males (5%) also more likely to report drug use than females (1%).⁵ The study by Rocha-Silva *et al.*⁶ of rural South African youth (10 - 21 years) reported that although one-quarter of males smoked, females were unlikely to do so. Currently in South Africa cannabis and cocaine are illegal, but alcohol can be legally used and purchased by persons over 18 years of age, while tobacco may be purchased from 16 years of age.

In the past decade South Africa has undergone major political transformation. Globalisation, increasing urbanisation and the media (in particular television) are likely to impact on the norms, values, expectations and aspirations of young people. KwaZulu-Natal, where the majority (nearly 60%) of the population live in rural areas, is one of the poorest of South Africa's provinces, with high unemployment rates and limited opportunities for youth resulting in increasing pressures on young people.⁷ An example of the visible pressure which fosters substance use in South Africa is the high-profile advertising linking alcohol with the glamour of sport. This inculcates values that promote alcohol use.⁸

Substance abuse has been shown to be a problem since the use of drugs can have adverse consequences both in the short and long term on the health of young people, as well as a detrimental effect on their education.¹ The use of more than one drug and the possibility that the use of a particular substance may encourage the use of other more potent substances, are also issues of concern.¹

Perry and Kelder¹ explain that young people can be affected physically, psychologically, socially and spiritually. The World Health Organisation (WHO)⁹ has detailed the many diseases for which heavy drinkers are at increased risk and has indicated that adolescence and early adulthood are periods when patterns of problem drinking are established, and that adolescents are more likely than older youth to engage in bouts of heavy drinking.⁹

In KwaZulu-Natal there are 2.3 million children aged between 7 and 18 years.¹⁰ The health of this large complement of young people is of vital importance to the future of the country. Substance use has many deleterious effects as described and strategies need to be developed for what is both a health and social problem. Studies have shown that delaying the initiation of substance use is a useful preventive strategy, hence the importance of targeting young people at an early age.¹¹

Although studies have been undertaken in high schools in the Cape Peninsula (where Flisher *et al.*¹² reported associations between many types of substances), information is required for schools in rural areas of KwaZulu-Natal. The aim of this study was therefore to determine the prevalence and frequency of substance use and associated factors (including age, gender, and co-variation of substance use) among pupils in rural high schools in this province.

Method

A cross-sectional study was carried out in September 2000 in Ugu North district, southern KwaZulu-Natal (population 260 000), with 28 public high schools in one circuit under the KwaZulu-Natal Department of Education and Culture. All schools were included as this circuit was designated to be the initial site of an intervention following this study. They were all public schools and the majority were in rural areas (with no reticulated water, pit latrines and limited facilities). Grade 10 pupils at all the high schools in the district completed a questionnaire. At each school all the pupils in one grade 10 class were included, but if there was more than one grade 10 class the class was chosen randomly and the observations were weighted in proportion to the number of grade 10 classes in the school. The total number of pupils at each of these schools ranged from 120 to 1 304.

A semi-structured questionnaire was developed based on questions used in previous surveys and on focus group discussions held with pupils. The questions included demographic variables, and the current and lifetime use of cigarettes, alcohol, cannabis and solvents. The questionnaire was translated into Zulu and retranslated into English to ensure clarity and then tested in one school to identify if there were any problems. To encourage valid responses and since use of some of the drugs investigated is illegal, the questionnaire was completed anonymously. Field workers handed out and collected the questionnaires in the absence of the teacher, and monitored the classroom so that pupils could complete their questionnaires confidentially. All pupils chose to participate.

Ethical approval was obtained from the Ethics Committee of the Nelson R Mandela School of Medicine, University of Natal. Permission for the survey was also obtained from the KwaZulu-Natal Department of Education and Culture and the principals at each of the schools. Parents provided written informed consent and pupils gave verbal consent.

The data were double entered using the Epi-Info 6.04¹³ statistical package and analysed using Stata.¹⁴ Univariate associations between variables were tested using chi-square, and logistical regression was used for the multiple variable analysis and to calculate odds ratios (ORs) in relation to baseline categories. All analysis was carried out taking account



of the unequal selection probabilities and within-schools clustering, using the survey estimation commands provided in Stata. The results are presented as ORs with 95% confidence intervals (CIs), indicating the likelihood of using the different substances. Analysis of variance was used to test for differences in substance use among schools.

Results

The 1 318 pupils who completed the questionnaire were in grade 10 at the 28 schools and ranged from 13 to 29 years of age, with a mean age of 17.04 years (standard deviation (SD) 1.87). The majority of pupils (63.9%) were under 18 years of age. One-fifth of the pupils (18.9%) were 19 years of age or older. Fifty-five per cent were females, and home languages were Zulu (89.5%) and English (10.5%).

Table I. Prevalence (95% confidence interval) of reported substance use among rural high school pupils by gender, taking into account weights and intra-cluster correlation of schools

Substance use	Prevalence (%) (95% CI)		p-value
	Males (N = 545)	Females (N = 666)	
Alcohol	52.9 (45.4 - 60.3)	25.5 (17.6 - 35.3)	< 0.0001
Cannabis	16.9 (11.5 - 24.0)	2.3 (1.3 - 4.1)	< 0.0001
Cigarettes (one or more) daily)	13.1 (7.2 - 22.5)	2.0 (1.0 - 4.1)	< 0.0001
Benzine	45.5 (38.6 - 52.6)	18.8 (13.8 - 25.2)	< 0.0001
Thinners	34.6 (28.0 - 41.8)	10.8 (7.2 - 16.1)	< 0.0001
Glue	17.0 (14.3 - 20.1)	6.6 (4.6 - 9.4)	< 0.0001
Petrol	16.4 (10.0 - 25.0)	3.7 (1.7 - 8.1)	< 0.0001
Cocaine	7.4 (3.4 - 15.2)	1.3 (0.5 - 3.5)	0.007
Crack	4.1 (1.0 - 10.6)	1.3 (0.5 - 3.6)	0.12

Table I details the reported prevalence of substance use and includes smoking one or more cigarettes daily, but 30.1% of male pupils and 6.1% of females had tried smoking cigarettes. Of the respondents, 13.0% drank alcohol weekly, 4.9% two to three times weekly, and 2.9% more than four times weekly. The mean age at which pupils started drinking was 14.5 years (SD 2.56), while for cigarette smoking this was 13.9 years (SD 2.89). Among pupils under 16 years, for whom cigarette smoking is illicit, 11.3% indicated that they had tried it and more than half of these 13 - 15-year-old pupils were regular smokers who smoked at least one cigarette daily. Of the smokers 82.8% had tried to stop smoking. Pupils over the age of 19 years were more likely to smoke cannabis compared with those under 15 years of age (OR 2.12, CI: 1.17 - 3.84). Older pupils (> 19 years) were also more likely to use crack (OR 7.3, CI: 1.65 - 32.47) compared with those aged 15 years and under.

The extent of substance use varied significantly among schools (Fig. 1) with regard to prevalence of reported use of

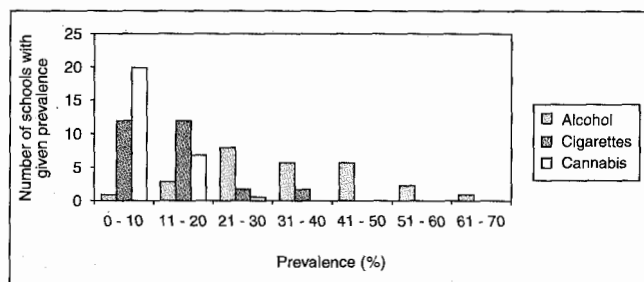


Fig. 1. Variability in reported substance use among schools (N = 28) for alcohol, cigarettes and cannabis.

alcohol ($p < 0.0001$), cigarettes ($p = 0.005$) and cannabis ($p < 0.0001$). At four schools more than half of the pupils reported using alcohol, but few schools had large numbers of cigarette smokers. At the majority of the schools ($N = 20$) less than 10% of pupils reported using cannabis, and the size of the school did not influence the prevalence of reported substance use.

Logistic regression (Table II) showed that the odds of smoking cigarettes and using alcohol and cannabis increased substantially when other drugs were also used.

Table II. Association between pupils' use of tobacco, alcohol, cannabis and other substances

Use of other substance	Unadjusted odds ratio with 95% confidence intervals associated with:		
	Cigarette smoking	Use of alcohol	Use of cannabis
Cocaine	11.11 (5.32 - 22.73)	5.26 (3.12 - 9.09)	33.33 (12.50 - 83.33)
Cannabis	10.18 (5.02 - 20.66)	9.61 (5.20 - 17.75)	
Alcohol	9.18 (4.47 - 18.83)		9.61 (5.20 - 17.75)
Crack	6.25 (3.03 - 12.66)	9.09 (2.33 - 33.33)	9.09 (2.33 - 33.33)
Glue	4.07 (2.36 - 7.02)	6.32 (4.40 - 9.10)	8.53 (4.63 - 15.71)
Thinners	3.71 (1.91 - 7.19)	5.99 (4.16 - 8.64)	9.32 (5.28 - 16.48)
Petrol	2.89 (1.41 - 5.92)	5.26 (3.12 - 9.09)	8.70 (5.26 - 14.20)
Benzine	2.15 (1.03 - 4.50)	4.41 (2.91 - 6.68)	4.87 (2.70 - 8.77)

When all the above drugs were included in a multiple logistical regression analysis to adjust for the effect of the other substances, the odds of being a cigarette smoker continued to be significantly enhanced if use of alcohol (OR 10.23, CI: 5.88 - 17.81) or cannabis (OR 8.59, CI: 3.34 - 22.09) was reported. When alcohol use was the response variable in the multiple regression, the odds of being a crack user were enhanced (OR 7.46, CI: 0.39 - 140.50), but the confidence interval was wide since the sample of reported crack users was small. The OR for pupils who drank alcohol also using benzine was 2.71 (CI: 1.59 - 4.60). When reported use of cannabis was the response variable, the odds of also using cocaine was 8.44 (CI: 1.63 - 43.67), alcohol 2.73 (CI: 1.08 - 6.94), and glue 2.65 (CI: 1.32 - 5.31).



There were no significant differences in the use of alcohol by different age cohorts, defined as < 15 years, 15 - 18 years and > 18 years, but the odds of girls using alcohol were significantly less (OR 0.28, CI 0.19 - 0.43) compared with boys. Girls were also significantly less likely to have ever smoked, to smoke more than one cigarette a day, to smoke cannabis or to use inhalants such as benzine, thinners, petrol or glue ($p < 0.0005$). Girls were also less likely to use cocaine ($p < 0.007$) but there were no gender differences for crack ($p = 0.12$).

There were significant age differences for substance use, as reported in Table III. Cigarette smoking and inhalation of benzine were more likely to occur among the younger pupils, while use of crack and cocaine were reported more frequently among pupils over 18 years of age. Cannabis use was significantly associated with the oldest pupils.

Table III. Association between pupils' use of tobacco, alcohol, cannabis and inhalants by age (compared with pupils under 15 years of age)

Substance	Age (years)	Odds ratio	95% CI	p-value
Cigarettes (ever smoked)	15 - 18	0.65	0.43 - 0.97	0.04
Cigarettes (> 1 day)	15 - 18	0.31	0.16 - 0.56	< 0.001
Benzine	15 - 18	1.38	1.03 - 1.87	0.03
Crack	> 18	7.33	1.65 - 32.47	0.01
Cocaine	> 18	3.64	1.46 - 9.06	0.007
Cannabis	> 21	2.11	1.17 - 3.84	0.02

Of the 19 pupils (2.5%) who reported using crack, 11 also inhaled petrol (OR 26.0, CI: 8.91 - 75.80). The ORs for the other inhalants were also high — for the use of thinners (OR 14.29, CI: 7.18 - 28.46), glue (OR 10, CI: 4.16 - 24.56), and benzine (OR 5.26, CI: 2.72 - 10.20) versus not using these inhalants. There was a significant likelihood that reported cocaine users would also use other inhalants such as thinners (OR 14.29, CI: 7.18 - 28.46), petrol (OR 12.35, CI: 7.34 - 20.78), and benzine (OR 5.2, CI: 2.72 - 10.20) versus not using such inhalants.

Discussion

The results of this study indicate that substance use is a problem in this predominantly rural area of KwaZulu-Natal, with considerable variation among schools in terms of the extent of pupils' reported substance use and the age of pupils involved. To take cognisance of this, interventions would therefore need to adopt various strategies. Female pupils reported significantly less use than male pupils for alcohol and all the other substances investigated in this study. Traditional patterns of behaviour with regard to women smoking

cigarettes in these communities would appear not to have changed. It was also encouraging that fewer pupils under 18 years of age reported smoking cigarettes. The recent antitobacco legislation prohibiting advertising may encourage this trend.¹⁵

Parry⁸ indicates that alcohol is the main substance of abuse in South Africa. This was confirmed in the present study, with alcohol also the most commonly used substance among female pupils. These results for pupils at rural KwaZulu-Natal schools appear to differ from those reported for Cape Peninsula students in 1990, with cigarette and alcohol use being lower, solvent use higher and use of cannabis similar to those in rural KwaZulu-Natal schools.²⁴ The prevalence of cigarette smoking reported in this rural area was also lower than the overall 'ever smoked cigarettes' prevalence reported in the Global Youth Tobacco School-based Survey for South African grade 10 pupils (50.4%).¹⁶ However, the prevalence reported in that study confirmed that black students were significantly less likely to smoke cigarettes, and that girls were also significantly less likely than boys to be cigarette smokers.¹⁶ The results with regard to cigarette smoking would appear to follow the trends reported in other South African studies, with males more likely to be smokers.^{5,6}

A problem identified in our study and also reported in a US study of high school students, was that current smokers were significantly more likely to report concomitant use of other substances.¹⁷ Substantial association between many forms of substance use was also reported by Flisher *et al.*¹² Although our study was also cross-sectional, and we cannot know the time sequence of the association, there may be a 'gateway' effect, with pupils progressing from smoking cigarettes to the use of other drugs. This emphasises the need for targeted interventions to prevent smoking and underlines the importance of the current South African antitobacco legislation that aims to reduce smoking.

The prevalence of reported inhalant use among pupils in this study was higher than that found by Rocha-Silva *et al.*,⁶ who reported a prevalence of 7.4% for youth aged 10 - 21 years. Pupils need to be made aware at a young age of the potential problems that can result from sniffing these substances, and they should be discouraged from initiating such practices. Parry recommends education aimed at high-risk groups, including teenagers.⁸

In their analysis of multivariate relationships among high school students' behaviours, Flisher *et al.*¹² found that alcohol bingeing and smoking cannabis were predictors of sexual intercourse. The problem of sexually active students who use drugs being more likely to engage in high-risk sexual behaviours such as not using condoms, having more partners, and unintended pregnancy has been reported previously,¹⁸ and is of particular concern in KwaZulu-Natal with its high prevalence of HIV/AIDS. This study suggests that it is



important to reach pupils at an early age and to provide age-appropriate education to prevent substance use and to promote healthy lifestyles.

Other studies undertaken in Africa among secondary school pupils corroborate the problem of substance use,¹⁹ the influence of gender^{20,21} and that alcohol is the most commonly abused drug.²¹ The results of this study suggest a problem of multiple drug use among pupils. Young people who start smoking at an early age are also more likely to become regular smokers. Tobacco, alcohol and cannabis have been shown to be 'gateway drugs' leading to increased use of other illicit substances such as cocaine.⁹ Rural areas are not immune to a wider range of drugs, with cocaine and crack mainly used by older pupils in this study. The use of illicit drugs among older pupils over 18 years of age is cause for concern. Removing them from schools may reduce the problem. This was confirmed subsequently at one of the schools where educators reported that older pupils had not been accepted and that this strategy had decreased the drug problem at the school. For pupils, 'information should be factual, realistic and evidence based' to 'put the risks of drug use into perspective'.²² Peer education programmes in schools have been shown to be the most successful interventions.²³

The questionnaire used in this study was based on survey instruments previously used for high school pupils and designed to monitor the prevalence of risk behaviours involving tobacco, alcohol and other drug use. It was adapted to focus on the relevant substances identified by pupils in prior focus group discussions. Confirming the reliability of the data proved difficult since the illegal nature of substances such as cannabis, cocaine and crack necessitated the use of anonymous questionnaires.

The data in this study apply only to youth attending schools and are not representative of all youth — in KwaZulu-Natal it is estimated that over one-quarter of a million of 7 - 18-year-olds are not studying.⁷ These data are from one school circuit in the province, indicating that in rural areas there is substance use of both licit and illicit drugs. The extent to which the results of this study can be generalised to other rural areas in KwaZulu-Natal is not known, but the results suggest that further studies are required. Since a large proportion of youth attend school in KwaZulu-Natal⁷ this creates an opportunity for targeting health promotion interventions that can provide

young people with information, education and the skills to help them avoid risk-taking behaviours.⁸

The study was funded by the Medical Research Council and we express our appreciation. We would also like to thank the principals, educators, parents and pupils at the schools.

References

1. Perry CL, Kelder SH. Models for effective prevention. *J Adolesc Health* 1992; 13: 355-363.
2. Flisher AJ, Ziervogel CF, Chalton DO, Leger PH, Robertson BA. Risk-taking behaviour of Cape Peninsula high-school students. Part III. Cigarette smoking. *S Afr Med J* 1993; 83: 477-479.
3. Flisher AJ, Ziervogel CF, Chalton DO, Leger PH, Robertson BA. Risk-taking behaviour of Cape Peninsula high-school students. Part IV. Alcohol use. *S Afr Med J* 1993; 83: 480-482.
4. Flisher AJ, Ziervogel CF, Chalton DO, Leger PH, Robertson BA. Risk-taking behaviour of Cape Peninsula high-school students. Part V. Drug use. *S Afr Med J* 1993; 83: 483-485.
5. Rutenberg N, Kehus-Alons C, Brown L, McIntyre K, Dallimore A, Kaufman C. *Transitions to Adulthood in the Context of AIDS in South Africa. Report of Wave 1*. New York: The Population Council Inc. 2001.
6. Rocha-Silva L, de Miranda S, Erasmus R. *Alcohol, Tobacco and Other Drug Use Among Black Youth*. Pretoria: Human Sciences Research Council, 1996.
7. Development Bank of Southern Africa. *South Africa's Nine Provinces: A Human Development Profile*. Halfway House: Development Bank of Southern Africa, 1994.
8. Parry C. *Alcohol and Other Drug Use. South African Health Review 2000*. Durban: Health Systems Trust, 2000: 441-454.
9. World Health Organisation. *The Health of Young People. A Challenge and a Promise*. Geneva: World Health Organisation, 1993.
10. Bot M, Wilson D, Dove S. *The Education Atlas of South Africa, 2000*. Johannesburg: The Education Foundation, 2000.
11. Perry CL, Grant M. A cross-cultural pilot study on alcohol education and young people. *World Health Stat Q* 1991; 44: 7-73.
12. Flisher AJ, Ziervogel CF, Chalton DO, Leger PH, Robertson BA. Risk-taking behaviour of Cape Peninsula high-school students. Part X. Multivariate relationships amongst behaviours. *S Afr Med J* 1996; 86: 1094-1096.
13. Epi-Info 6.04 Statistical Package. Centers for Disease Control and Prevention (CDC), USA, World Health Organisation, Geneva, Switzerland.
14. Stata Corporation 2001. *Stata Statistical Software: Release 70*. College Station, Tex.: Stata Corporation USA.
15. South African Tobacco Products Control Amendment Act (12/1999). *Government Gazette*, 29 September 2000.
16. Swart D, Reddy P, Pitt B, Panday S. *The Prevalence and Determinants of Tobacco Use Among Grade 8 - 10 Learners in South Africa. The Global Youth Tobacco School-based Survey*. MRC, Cape Town: Medical Research Council, 2001.
17. Everett SA, Giovino GA, Warren CW, Crossert L, Kann L. Other substance use among high school students who use tobacco. *J Adolesc Health* 1998; 23: 289-296.
18. Massachusetts Department of Education. 1995 *Massachusetts Youth Risk Behaviour — Survey Results*. Malden, Mass: Department of Education. <http://www.doe.mass.edu/doedocs/yrb95111.html> (accessed 21 April 2001).
19. Adelekan ML, Hdom KJ. Trends in prevalence and pattern of substance use among secondary school pupils in Ilorin, Nigeria. *West Afr J Med* 1997; 16: 157-164.
20. Eide AH, Acuda SW. Cultural orientation and use of cannabis and inhalants among secondary school children in Zimbabwe. *Soc Sci Med* 1997; 45: 1241-1249.
21. Kuria MW. Drug abuse among urban as compared to rural secondary schools students in Kenya: a short communication. *East Afr Med J* 1996; 73: 339.
22. Aveyard H. Illicit drug use: information-giving strategies requested by students in higher education. *Health Education Journal* 1999; 58: 239-248.
23. Tobler NS. Meta-analysis of 143 adolescent drug prevention programs: quantitative outcome results of program participants compared to a control or comparison group. *Journal of Drug Issues* 1986; 16: 537-567.

Accepted 23 May 2002.