1.0 INTRODUCTION

Alcohol misuse is one of the most significant public health concerns facing South Africa today. Globally, cannabis is the most widely used illicit drug, with an estimated 144 million people using it annually (1). It constitutes the main drug of abuse in Africa (2). Substance abuse is associated with employee illness, occupational accidents, increased health services utilisation, and decreased productivity (3,4). However, despite the fact that South Africa is one of the major mining countries in the world, local research on alcohol and cannabis use among mineworkers is limited.

1.1 Prevalence of substance use

It is estimated that 6% to 16% of the average workforce is likely to be alcohol dependent and that a further 20% is likely to experience drug related problems (5,6). In South Africa, the prevalence of alcohol dependence among adults is estimated as 10%, while that of risky drinking among workforces such as the mining industry has been estimated at 25% or more (7).

In a South African gold mine, the prevalence of risky drinking among workers was found to be 32% and the majority of these employees were in unskilled or semiskilled occupations (8). In another study carried out in South Africa, the highest rates of alcohol abuse as a household problem (32%) were reported among unskilled manual workers, while the lowest rates (9.1%) occurred among professionals (9). Among miners in Argentina, 34% were found to be weekly alcohol drinkers, while 65% chewed coca leaves daily (10). In 1984, the Addiction Research Foundation in Canada reported that 11% of adults in Ontario above 18 years old used cannabis (11).

1.2 Factors associated with substance use

Historically, practices in the Mining and Agriculture industries such as the “dop” system, migrant labour system, availability of cheap or free alcohol, and availability of alcohol on credit, may have contributed towards increased alcohol use in the South African workforce. The “dop” system, officially prohibited in 1961, entails payment of workers with alcohol in lieu of wages (12,13).

Factors, which may contribute to cannabis use, include the fact that it is inexpensive, easy to procure, prosecution is infrequently enforced, and is perceived by many not to be problematic (1). Poverty, boredom, and inadequate health education, have also been associated with substance use (14). In a South African gold mine the lifestyle of miners such as living apart from families for prolonged periods was found to encourage unhealthy alcohol consumption (14).

Higher rates of alcohol use have been found among miners who have only ever worked underground compared to those who work aboveground, and among miners with a heavy workload (10). Daily use of coca was also found to be significantly higher among miners with a heavy workload (10). Stressful

working conditions as are found underground, and heavy workloads may encourage alcohol and drug use, which may serve as a coping mechanism (15,16). Stress, loneliness, and boredom have also been cited as reasons for alcohol use by South African mine workers (8).

1.3 Effects of substance use

1.3.1 Effects of alcohol use

Absenteeism, sick leave, and accidents have been found to be higher among workers who use excessive alcohol (3,17). In a South African pulp mill, blood alcohol was found to be positive in 18% of cases of injury, while in a copper mine in Zambia, blood alcohol was positive in 30% of accident cases (17,18). Excessive alcohol use is also associated with social problems like violence, and can predispose to illnesses such as hypertension, gastritis, liver cirrhosis, gout, tuberculosis, and physical dependence with withdrawal symptoms, and depression (19).

1.3.2 Effects of cannabis use

Regular cannabis use has been associated with impaired social and occupational functioning (20). The primary psychoactive constituent is delta-9-tetrahydrocannabinoid (THC) (21). Cannabis use results in feelings of euphoria and relaxation, and acute effects include impairment of attention and short-term memory, and loss of coordination (22,23,24). Chronic effects include psychological dependence characterised by deterioration in psychosocial functioning; subtle cognitive deficits, particularly attention, learning, and executive functioning (organising and integrating of information); possible triggering of onset of schizophrenia; increased vulnerability to respiratory illnesses; impaired lung function; and precancerous changes in lung tissue (1,20).

1.4 Screening tools for substance use

1.4.1 Screening tools for alcohol dependence

The Diagnostic and Statistical Manual of the American Psychiatric Association, 4th edition (DSM-IV), defines alcohol abuse as a pattern of use which leads to clinically significant impairment or distress, as manifested by one (or more) of the following in a 12-month period (7):

- Recurrent alcohol use resulting in a failure to fulfil major role obligations at home, school, or work
- Use of alcohol in situations in which it is physically hazardous (e.g. driving a car)
- Recurrent alcohol use leading to legal problems (e.g. drunken driving)
- Continued alcohol use despite persistent or recurrent social or interpersonal problems caused or exacerbated by alcohol.

Screening tools for alcohol misuse include the CAGE, the AUDIT (Alcohol Use Disorder Identification Test), and the brief MAST (Michigan Alcohol Screening Test) questionnaires (25,26,27). They are specific and reliable, and help to screen individuals who require further assessment for alcohol dependence. The brief MAST is an abbreviated version of the original 25-item MAST published by Selzer in 1971, and like the AUDIT, it is also a 10-item questionnaire (7). The CAGE questionnaire was developed by Ewing and Rouse in 1970. Comprised of the following four questions, it is easier to administer (28):

- Have you ever felt you ought to **C**ut down on your drinking?
- Have people **A**nnoyed you by criticising your drinking?
- Have you ever felt bad or **G**uilty about your drinking?
- Have you ever had a drink first thing in the morning to steady your nerves and get rid of a hangover? (**E**ye-opener)

Two or three positive responses are highly suggestive of alcohol abuse and possible dependence, while four positive responses are virtually diagnostic.

Laboratory tests or test combinations that can be used for screening alcohol abuse include mean cell volume (MCV), aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma glutamyl transferase (GGT), and uric acid (28).

Breathalyser testing can be carried out to detect acute intoxication but cannot assess chronic misuse. On ingestion, alcohol is rapidly absorbed from the upper gastrointestinal tract. Peak concentrations of ethanol are attained approximately one hour after ingestion and factors influencing levels attained include the rate at which the drink was taken, whether it was consumed with food, rate of gastric emptying, and body habitus (28). Between 2% to 10% is eliminated in urine and breath (28).

1.4.2 Screening tools for cannabis use

Marijuana is usually smoked but may ingested, either incorporated into food, or as a liquid extract (tea). It is rapidly absorbed from the lungs into the blood with quick onset of effects. When ingested however, onset is slower but effects more prolonged. The natural metabolites of cannabis (cannabinoids) are found in blood, bile, faeces, and urine. It may be detected in the latter within hours of exposure (30). These metabolites being fat soluble, are stored in the body's fatty tissues including the brain, for prolonged periods after use (30). It may be detected in urine months after last exposure, depending on the frequency and intensity of use (31).

Qualitative screening for detecting cannabinoids in urine can be carried out using commercially available rapid tests and laboratory tests with varying levels of reported sensitivity and specificity. However, confirmatory laboratory tests, which also quantify the amount of cannabinoids in the urine, exist, of

which the preferred method is the Gas Chromatography/Mass Spectrometry (GC/MS) method (31).

1.5 Measures for control of substance use among mine workers

The South African Mine Health and Safety Act of 1996 states that an employer must provide conditions for safe operation, and every employee must take reasonable care to protect their own health and safety, and that of other workers who may be affected by an act of omission on their part (32). It also states that no persons in a state of intoxication, or in a state likely to render him incapable of caring for himself or others in his charge, will not be allowed to enter a mine. This is also stipulated in Regulation 4.7.1 of the Minerals Act 50 of 1991 (33).

However, there are no clear guidelines for implementation and the level of interpretation of this responsibility varies from mine to mine; from those in which there are no clear substance use guidelines, to those with draft policies, and to those with policies. Where policies exist, they describe the mine regulations in terms of substance use, under what circumstances testing will be carried out, how it will be carried out, and how results will be dealt with.

In New South Wales most mines have an alcohol policy, which may include random testing, pre-shift self-breathalyser testing, and awareness programs (34). Buy-in of stakeholders is however of utmost importance in any control program.

In 1995, the International Labour Organisation (ILO) adopted a code of practice on the management of alcohol and drug related issues in the workplace (35). This code emphasises a preventive approach and embraces the following principles:

- Joint assessment by employers, workers and their representatives of the effects of drug use on the workplace and their cooperation in developing a written policy for the workplace

- Consideration of alcohol and drug related problems as health problems, and a need to deal with them without discrimination, like any other problem in the workplace

- Recommendation that drug and alcohol policies should cover all aspects of prevention, reduction, and management of alcohol and drug related problems, and integration of relevant information, education and training programs where feasible, into broad-based human resources development, working conditions, or occupational safety and health programs.

- Establishment of ethical principles which are vital to concerted and effective action, such as confidentiality of personal information, and the authority of the employer to discipline workers for employment-related misconduct, even where it is associated with the use of alcohol and drugs.

- Consideration of fundamental legal, ethical, and moral issues involved in testing body fluids for alcohol and drugs and determination of when it is fair and appropriate to carry out such testing.

The Occupational Alcohol Program (OAP) of the 1970s was one of the earliest attempts at addressing alcohol misuse in the workplace (36). This has been replaced in recent times by Employee Assistance Programs (EAPs) which are broader based and aim at addressing all personal problems that are affecting, or that have a potential to affect an employee (6,37).

1.6 Motivation for this study

Evaluating the prevalence, knowledge, and practice of alcohol and cannabis use among mine workers in South Africa in relation to health and safety, will help to find out more about substance use among this population and assist in development of recommendations to improve health and safety. This is of importance to the mining industry as this ultimately impacts on productivity and finances. The cost of alcohol and drug abuse to South Africa has been estimated at R 2 Billion per year (38, 39). This study aims to provide evidence on which health intervention strategies can be based.

1.7 Study aim and objectives

1.7.1 Overall Aim

To determine the prevalence and factors which influence alcohol and cannabis use among mineworkers in South Africa.

1.7.2 Specific objectives

- To determine the prevalence of alcohol and cannabis use.

- To determine the knowledge, attitudes, and practice regarding alcohol and substance (cannabis) use amongst miners, and its relationship to health and safety.

- To determine factors which influence alcohol and cannabis use.

- To make the findings available to all stakeholders, so that appropriate recommendations can be implemented.

2.0 METHODS

2.1 Study design

This is a cross-sectional analytic study.

2.2 Study site description

2.2.1 Selection of study sites

Eleven mines were purposively selected to represent the major commodities mined in South Africa, size and geographical distribution, and were classified into five commodity groups namely platinum, diamond, gold, coal, and 'other' category comprising a granite mine. These mines comprised three platinum mines, three gold mines, two diamond mines, two collieries, and one granite mine.

Of these eleven mines, four mines declined participation (one each in the gold, platinum, diamond, and coal category), bringing the total number of mines in which the study was carried out to seven i.e. two platinum mines, two gold mines, one diamond mine, and one colliery, and one granite mine. Although the mines that declined participation did not officially state reasons for doing so, their reasons may not have been unrelated to concerns about anonymity and job security of participants, raised during consultation with employee representatives (section 2.6.3.1). The mines in the gold and platinum categories were not replaced as the number of consenting mines in these categories was deemed adequate. The mines in the other categories were not replaced due to logistics of finding replacement mines within the timeframe of this project.

In order to ensure confidentiality of information obtained from this study, individual names of mines and their geographical locations are not described in this report and have been coded as follows:

Platinum commodity
Mine P1 (small size)
Mine P2 (large size)
Gold commodity
Mine G1 (small size)
Mine G2 (large size)
Diamond commodity
Mine D1 (small size)
Coal commodity
Mine C1 (small size)
Other commodity (granite)
Mine O1 (small size)

2.2.2 Background information on study mines

Table 2.1 displays a summary of background information on study mines.

Table 2.1: Summary of background information on study mines

Background information	Mine						
	P1	**P2**	**G1**	**G2**	**D1**	**C1**	**O1**
When commissioned	1992	1989	1996	1952	1992	1980	1996
Underground (UG) or opencast (OC)	OC	UG	OC	UG	OC	UG	OC
Employee size	1500	7543	500	5568	886	860	656
Type of employee lodging	All live in surrounding towns	Hostels available	All live in surrounding towns	Hostels available	All live in surrounding towns	Hostels available	All live in surrounding towns
Substance use policy	Draft policy	Code of conduct	Code of conduct	Policy document	Policy document	Policy document	Code of conduct

2.2.3 Substance use policies of study mines

While some mines have substance use policy documents, others have informal codes of conduct, which govern their practice concerning substance use among employees.

2.2.3.1 Mine P1

Draft policy guidelines at this mine govern substance use among employees. Possession or use of substances of abuse in the workplace is prohibited. The suggested alcohol limit for employees reporting for duty is 0.2 mg/1000ml of breath and employees under the influence of substances that may impair performance of normal duties are not permitted to work.

Tests for alcohol and other drugs are carried out as part of pre-employment screening, following incidents at work involving fatal injuries and damage to property, on reasonable suspicion of intoxication, when employees are found in possession of substances, and following computerized random selection at the mine entrance. However, employees who suspect they are under the influence of substances may request voluntary testing before the start of their shift.

Disciplinary measures are meted out to employees who violate this code of conduct depending on the circumstances. Where an employee refuses to be tested, an inference of positive use of substances is made and such evidence can be used against such an employee during any disciplinary hearing that may follow.

Employees with substance use problems can voluntarily inform management of such a problem (before it is discovered during any testing procedure) and enroll in an Employee Assistance Program (EAP), sponsored by the mine. Should there be a relapse, costs of a repeat rehabilitation program are borne by the mine, after which the employee assumes financial responsibility in cases of future relapse. Costs are also borne by the employee where they are found to be non-cooperative with rehabilitation or where they were "caught out" e.g. following random selection at the mine gate for drug tests.

2.2.3.2 Mine P2

Alcohol is not allowed on the mine premises except for special functions for which prior official permission has been obtained, and a mine official is present to take responsibility. A code of conduct allows for testing of employees who are suspected to be under the influence of substances. Where the result is positive, appropriate disciplinary action is instituted. The legal breath alcohol driving limit for non-professional drivers of 0.24mg/1000ml of breath in section 65 (5b) of the National Road Traffic Act 93 of 1996 is regarded as the limit for positive breathalyser results for alcohol (40). There is no system in place for pre-employment or random testing of employees. However, testing is carried out following accidents at work.

Employees who are found to have chronic substance misuse problems may be considered for rehabilitation programs.

2.2.3.3 Mine G1

There is a code of conduct operational at this mine whereby employees who are suspected to be under the influence of substances are taken to the security department where tests are carried out. Should result be positive, a hearing is held and disciplinary procedures instituted.

There is no random testing for substances, however testing of involved employees is carried out following accidents at the mine. The mine alcohol limit of 0.24 mg/1000ml (i.e. 0.05% Blood Alcohol Concentration) is the same as the legal driving limit of non-professional drivers.

2.2.3.4 Mine G2

A policy existent in this mine since August 2000 addresses substance abuse among drivers and heavy machinery operators. It reiterates the mine's commitment to ensuring a safe working environment and the responsibility of employees to their fellow workers in achieving this aim. Based on the Road

Traffic Act of 1996, the Mine Health & Safety Act of 1996, the Occupational Health & Safety Act of 1993, and the Labour Relations Act of 1995, this policy encompasses routine screening for chronic alcohol and cannabis abuse (and other drugs of abuse where necessary) in drivers and heavy machinery operators.

Education of employees in this job category about substance abuse is incorporated into initial induction. Screening is carried out during pre-employment and periodical medical testing, but random testing may be carried out if required. Consent is obtained before testing is carried out, and refusal to consent may result in inability to determine an employee's fitness for the job. The limit for positive breathalyser tests is 0.24 mg/1000ml.

Drivers found to be misusing alcohol or drugs may be declared temporarily or permanently unfit to carry out their duties. EAPs exist for rehabilitation and the costs of a first time rehabilitation are borne by the medical aid. Once cleared by EAP, the employee is retested before being declared fit to return to work. Thereafter, testing is undertaken at random intervals. If there is any relapse, the employee is declared permanently unfit to drive. Testing for acute alcohol intoxication whilst on duty is not covered by this policy but by a disciplinary code of practice.

2.2.3.5 Mine D1

A substance use policy has been existent at this mine since August 2001. It states that according to the Minerals Act, no person in a state of intoxication, or in a state likely to render him incapable of caring for himself or others in his charge, will be allowed to enter a mine. Employee testing is carried out following suspicion of being under the influence of substances at work, on discovery of substances in an employee's possession, and after involvement in work related accidents. A breathalyser result of 0.24 mg/1000ml of breath is regarded as the limit for breath alcohol results at this mine.

Though the right of an individual to refuse testing is acknowledged, a negative inference may be drawn in such an instance. Evidence obtained from testing may lead to disciplinary action. Financial assistance for a rehabilitation program at a rehabilitation centre is provided for employees who request treatment of medically documented dependence on substances, and for employees identified to have such problems. This assistance, which is for one course of treatment, is only repeated in exceptional circumstances.

2.2.3.6 Mine C1

The mine policy states that employees and visitors must not enter the workplace in a state of intoxication. Voluntary as well as random breathalyser tests are carried out to assess alcohol levels. Any reading higher than 0.00 mg/l is considered positive and sets a disciplinary procedure in motion. Employees with positive results are not allowed to work on the day of the test unless a second test performed an hour later, is negative. Should the second

test also be positive, the employee is asked to leave the premises and faces disciplinary action consequent to being absent from work without permission.

2.2.3.7 Mine O1

In terms of the Mines Health and Safety Act (1993) the mine reserves the right to do the following:

- Conduct random breathalyser tests on any of its employees during working hours, at times and places and in a manner as decided by management to ensure compliance by the employees to the above requirements.

- Have the necessary tests conducted on any employee suspected of being under the influence of an intoxicating substance thus ensuring that such individual is not wrongly accused.

Any positive breathalyser result irrespective of the level of alcohol is regarded as positive by the mine. Where an individual refuses to be tested under these conditions it is assumed that the individual is in a state of intoxication and necessary disciplinary action is taken. However, there is at present no routine in place at this mine to carry out the above.

2.3 Sampling

2.3.1 Sample size calculation

The sample size for each of the five commodity categories (i.e. platinum, gold, diamond, coal, and other) was calculated as 385 by assuming 50% prevalence of drug use, 95% precision, and 5% margin of error (Appendix 1). An additional 20% of 385 (i.e. 77) was added to this sample size in case of refusals from the study, bringing the sample size per commodity to 462. However as there was only one mine in the other category, half of this sample size (i.e. 231) was allotted to it, bringing the total sample size of all the mines in the five commodities to 2079 [i.e. (462 X 4) + 231].

The sample size of 462 was proportionally distributed between the different mines in the four commodity groups (platinum, gold, diamond, and coal) with respect to the employee size in each mine at the onset of the study (January 2002). In each mine, the sample size was then proportionally distributed between contract workers and fulltime workers.

In mines P1, G1, and D1, the sample size was adjusted, to ensure that the number of contract workers would not be less than 30 per mine so as to have adequate sample size for meaningful analysis of data.

Though one platinum mine (P3), one diamond mine (D2), and one coal mine (C2) eventually declined to participate, they had been included in the sample size calculation for their commodity group at the commencement of data collection. Due to lengthy negotiation process to obtain buy-in of stakeholders (section 2.6.3.1), data collection was commenced at some consenting mines, while negotiations continued at other mines in the same commodity category, some of which later declined participation, making it too late to increase the sample size of other mines in the same category. The third gold mine (G3) was not included in the calculation because there was an early indication that buy-in of stakeholders would not be obtained within the timeframe of this project.

However, with the exception of coal commodity, the sample size of mines in other commodity groups were not unduly affected as adjustments had been earlier made to increase their estimated sample sizes due to smaller numbers of contract workers in comparison to full-time employees in these mines.

Table 2.2 shows the sample sizes of study mines.

Table 2.2: Summary of sample size of study mines

Mine	Contract workers	Fulltime workers	Total
P1	35	75	110
P2	30	199	229
G1	57	57	114
G2	53	371	424
D1	46	274	320
C1	72	198	270
O1	Nil	231	231
Total	293	1405	1698

2.3.2 Selection of subjects

A systematic sampling method was utilised. A register of all mine employees including management staff was obtained from each mine authority. Contract workers were grouped together on a separate list from fulltime workers. Where possible, employees were grouped together according to job category and workstation. Every nth employee was selected. This n^{th} factor was determined by dividing the total employee size of each mine by the estimated sample size. However, due to withdrawal of certain sections of the mine from the study in mines P1 and O1, the n^{th} factor was determined using an employee size of 716 and 400 respectively instead of 1500 for mine P1 and 656 for mine O1, as described in table 2.1 above.

2.3.3 Inclusion / exclusion criteria and replacement technique

The four mines that declined to participate were excluded from the study. The eleven participants of a pilot study at mine P1 (section 2.5) were excluded from the main study that was carried out at a later date at this mine. Participants in sections of mine P1 and mine O1 who declined to participate were also excluded. All other employees were eligible to participate in the study including management staff and contract workers. Employees selected by systematic sampling were included in the study. Where an employee was unwilling to participate, the next name immediately below this employee on the employee register was selected.

2.4 Instruments of Measurement

These include questionnaire, urine testing for cannabis, and breathalyser testing for alcohol.

2.4.1 Questionnaire

Face-to-face structured interviews were carried out using a questionnaire (Appendix 5), administered by a trained team of interviewers who speak local languages. This questionnaire helped to determine the prevalence of alcohol and cannabis use among miners as well as their knowledge and practices with regard to alcohol and substance use, and their perception of its health and safety risks. It was structured to eliminate biases as far as possible. Quality and consistency were achieved through keeping the questions mainly closed and simple.

2.4.2 Breathalyser testing for alcohol

Blood alcohol was assessed with the Alcatest 7410 plus RS breathalyser, the calibration of which has been verified against another breathalyser (Alcatest 7110), certified by the Council for Scientific and Industrial Research (CSIR), and the South African Bureau of Standards (SABS). This device uses disposable mouthpieces with one-way valves, such that air breathed into the instrument can only flow into the breathalyser, and cannot be inhaled by the participants, thus preventing transmission of infection.

To avoid legal or ethical implications, where interviewers might be faced with the dilemma of allowing miners with excess breath alcohol levels to commence their work-shifts, the reading on the breathalyser screen was permanently set on a “pass” mode (i.e. normal blood alcohol level). Breath alcohol levels were automatically stored in the instrument, and actual results were downloaded onto a computer and read off after the interviews.

2.4.3 Urine cannabis testing

Initial testing for Tetra-Hydro-Cannabiniod (THC), a metabolite of cannabis, was carried out using a THC test kit on-site. Further tests were carried out on randomly selected samples using the COBAS integra laboratory method.

Where there were discrepancies between results of the test-kit and the COBAS method, further tests were carried out using the gas chromatography method, which is the gold standard for THC testing. Having determined the sensitivity of the test kit to be 80% and specificity to be 97% in this manner, the use of this test kit was discontinued and further samples were tested at the laboratory using the COBAS method, which had a higher accuracy.

2.5 Pilot study

A pilot study was carried out in mine P1 among 11 employees to pre-test the questionnaire and other data collection tools. The questionnaire was then modified as necessary.

2.6 Data collection

Consent to carry out the research was obtained collectively from employee and management representatives in each mine through a consultative process with the research team (Appendix 2A) and from individual participants by trained research assistants (Appendix 2B). The purpose of the study was carefully explained to participants and written informed consent (Appendix 4) was obtained before interviews commenced. Anonymity was preserved, by excluding participants' names on questionnaires, and keeping information obtained confidential. Participants were reassured that specimens obtained would only be tested for alcohol and cannabis.

To facilitate the data collection process, trained research assistants were each given a pamphlet highlighting salient points in the process (Appendix 2B). The average data collection period per mine was 5 days.

2.6.1 Accessing of employees

At all mines, selected employees were not aware beforehand that they would be asked to participate in the research and were only informed at the time of the test. Mine management representatives and in some cases Union officials, were notified about the day of our arrival so as to facilitate logistics for the data collection process.

In order to facilitate accessing of employees, it was requested that employee lists classify workers according to workstation and shifts. Information about the number of shifts, time of commencement of shift and other information that would facilitate the data collection process was obtained for each mine (Appendix 3), and data collection spanned all shifts in study mines. Shifts range from one to four per 24-hour cycle depending on the mine, with some morning shifts commencing around 3.45am and some night shifts commencing around 10pm.

While some employees are employed as part of a shift that works permanently at night or permanently during the day, some shifts rotate between morning, afternoon, and night duty. A list, classifying workers according to the shift facilitated accessing of workers who, though they may work at different times

of the day, usually rotate with their shift group. At some mines, aside from the shifts working at any point in time, there was an additional shift that was currently on a rest cycle of a few days to one week. To facilitate accessing of workers in all shifts during the data collection period, information was obtained about the two consecutive days that all shifts could be accessed at work (i.e. the days when the current rest shift is resuming duty and the new rest shift is going on break).

2.6.1.1 Accessing of workers at mines with electronic access gates

At surface and underground mines where electronic access gates were available, workers were accessed by "parade" technique. This implies that prior to the commencement of the shift, selected employees' names were entered into the company computer system. On clocking in for duty, such employees were not allowed access into the mine and were requested by the mine Human Resource Officers controlling access into the mine to meet the research team waiting nearby, where they were invited to participate.

2.6.1.2 Accessing of workers at mines without electronic access gates

At surface mines where no electronic access gates were available, employees were accessed shortly before their shifts at their workstations.

2.6.2 Timing of data collection

The data collection process consisted of three parts (i.e. administration of a questionnaire and obtaining of breath and urine samples), which were to be carried out pre-shift without disruption of mine productivity. It was however thought that should it be impossible to carry out all three parts pre-shift due to time constraints, data collection could be split such that breathalyzer testing, the most crucial as alcohol could be metabolized in the body within hours (cannabis may still be detectable up to a month after use), would be done pre-shift while employees would be requested to report post-shift for structured interviews and urine samples.

2.6.2.1 Timing of data collection at surface mines

At mines P1, O1, G1, even though the plan was to carry out the study pre-shift, it was sometimes necessary to continue data collection into the shift. This was due to time constraints in completing the process pre-shift as some employees arrived at work shortly before their shift, with concerns arising from the supervisor about interviewing several people at the same time and possible lateness of employees for pre-shift briefing and affectation of productivity.

Requesting participants to arrive early on the day of the interview could lead to bias in the results of the breathalyser testing with possible modification of alcohol consumption the night before the interview. Hence, in instances where there was inadequate time to complete interviews before commencement of the shift, interviews started pre-shift and were sometimes staggered into the shift (i.e. when the persons being interviewed returned to work on completion of their interviews to relieve other employees, the next set of selected

participants were requested by the shift supervisor to come for interviews). However, delay of commencement of shift after blasting at the shaft sometimes facilitated pre-shift completion of data collection, when this occurred during the data collection period.

At mine D1 where the available pre-shift period was only adequate to carry out breathalyzer testing, breathalyzer testing was done pre-shift by "parading" selected participants, while structured interviews and urine sampling were carried out during the shift.

2.6.2.2 Timing of data collection at underground mines

Timing of data collection was more crucial at underground mines where employees are transported underground in an enclosure that runs on a strict schedule. The culture was different from shaft to shaft. At some shafts, the majority of workers arrived early and spent time chatting with fellow workers while awaiting commencement of their shift. However at other shafts employees arrived at work shortly before they were due to go underground leaving inadequate time to explain the study to participants in order to obtain breath samples pre-shift, while postponing structured interviews and urine sampling post-shift.

At mines C1 and G2, all three parts of data collection were carried out at the shaft pre-shift as employees arrived early enough to complete the process. However, in mine P2, 15% of all respondents were seen post-shift due to logistic difficulties in accessing employees pre-shift. The alternative plan of carrying out breathalyser testing pre-shift, and structured interviews and urine testing post-shift could not be carried out as there was inadequate time to explain the study and obtain consent before employees had to go underground to resume their shifts.

2.6.3 Challenges encountered

2.6.3.1 Lengthy consultation process

A lengthy consultation process led to delayed commencement of data collection due to concerns of employees about anonymity, fairness in random selection of participants without involvement of management, victimisation and job security, and perceptions that samples obtained may be tested for Human Immunodeficiency Virus (HIV). These issues were addressed during several meetings with stakeholders at participating mines.

2.6.3.2 Logistics of accessing employees

Parading of employees at underground mines was not a foolproof method as some employees did not respond to the "parade" despite several attempts, and there was no other means of contacting them at the time. Such employees were subsequently replaced, though some of these replacements did not respond as well.

2.6.3.3 Unavailability of urine sample at time of interview

Employees were each given a specimen bottle and asked to fill it with urine in a nearby sanitary facility at the end of the structured interviews. Though they had initially consented to providing urine samples, when it came time to give the sample, a few participants said they did not feel like passing urine at the time. While some returned later to give a urine sample, it was in the main difficult to obtain these samples as most participants who did not give a urine sample in the first instance said they still did not feel like passing urine after further visits to their workstations at different times during the data collection period. A handful of samples were obtained from participants that resembled clear tap water.

2.6.4 Facilitating factors

2.6.4.1 Cooperation of stakeholders

The natural hierarchy of employee representatives was acknowledged and early buy-in of Union officials was obtained at the national, regional, and mine levels respectively. Some of the Union officials at mine level joined the research team during the data collection period, while others made their Union offices available for interviews, giving the team credibility with participants.

Assistance of management through introduction to relevant personnel and in some cases releasing of an employee known and trusted by workers to chaperone the team during the data collection period, facilitated the process.

2.6.4.2 Masking of results on breathalyser screen

The fact that the breathalyser screen did not reflect results making interviewers and participants unaware of results at the time of the test allayed some of participants' fears about confidentiality.

2.6.4.3 Non-invasive nature of requested tests

Participants were relieved that tests were painless and that samples requested did not include blood and saliva as they felt these could possibly be tested for HIV without their knowledge.

2.6.4.4 Experience gained by research team from mine to mine

The data collection process became more efficient from mine to mine with experience gained from each mine.

2.7 Quality assurance

2.7.1 Breathalyser testing

2.7.1.1 High repeatability of tests

Repeatability of tests carried out using the Alkatest 7410 plus RS breathalyser is high as only 1cc of breath is analysed every time a test is carried out irrespective of the amount of air that is blown into the mouthpiece.

2.7.1.2 Calibration of breathalyser

The breathalyser was regularly re-calibrated during the data collection period to ensure accuracy of results obtained.

2.7.1.3 Pre-test mini questionnaire

A mini questionnaire (Appendix 6) was designed to find out if participants had recently used substances (such as mouth sprays and cough syrups containing alcohol) that could affect accuracy of breathalyser testing so that adequate waiting time could be observed before testing.

2.7.2 Urine testing

2.7.2.1 Selection of urine testing method

As discussed in section 2.4.3 above, comparison was made between the accuracy of dipstick testing and laboratory COBAS testing for cannabis. The latter test with a higher accuracy was selected for testing of samples.

2.7.2.2 Collection of urine specimen

Participants were instructed to collect the first part of their urine stream into the sample bottle (Appendix 2B), as this is the part that is most suitable for THC testing.

2.7.2.3 Storage of urine samples

Onsite, urine samples were stored in cooler boxes in which the temperature was maintained below 4?C for no longer than 48 hours, after which they were stored frozen in a freezer while they awaited analysis. This was to ensure that should THC be present in any urine sample, it remained biochemically stable till detection at the laboratory.

2.8 Data analysis

Data was analysed using Excel and SPSS. Responses were coded and descriptive statistics were carried out. Cross tabulations yielding p-values were performed with chi-squares.

2.9 Possible limitations

Ensuring truthful responses from the study population was the greatest challenge. This was addressed by early buy-in of all stakeholders including employee representatives and assuring participants of precautions taken to ensure confidentiality.

The questionnaire was drawn up in English and translated to local languages in the field and there might have been small differences in meaning. However, the use of well trained local researchers well able to translate the questions into the language of the participant, and able to understand the answers (with the nuances of the different languages) ensured that participants' responses were accurately represented.

Although breathalyser and urine testing may be established ways of screening alcohol and drug abuse, a negative breathalyser test does not rule out chronic alcohol use (as the breathalyser only measures short-term use), and a positive test for cannabis does not mean that the worker is impaired at the time the sample is taken as metabolites of cannabis may remain in the urine long after the drug's effects have subsided (31).

This study was carried out as a pilot study to find out information about alcohol and cannabis use among mine workers in South Africa. Results may not be generalisable to all the mines in South Africa, but will provide valuable information about alcohol and cannabis use among this population.

3.0 RESULTS OF BREATHALYSER AND URINE TESTING

3.1 Response rate

Response rate varied from mine to mine between 84% and 99% and the replacement rate was between 3% and 8%. An additional 20% had however been added to the sample size from the onset in case of refusals. Non-respondents include refusals & replacements not found at their workstations after several attempts.

Within mines, there was a variation in the proportion of questionnaires administered and breath and urine samples obtained. The lowest is the number of urine samples obtained because some participants were unable to produce urine at the time of the interview. Table 3.1 describes response rate by mine.

Table 3.1: Response rate by mine

Mine	Estimated sample size	Questionnaires administered	Breath samples collected	Urine samples collected
P1	110	108 (98.2%)	108 (98.2%)	108 (98.2%)
P2	229	200 (87.3%)	200 (87.3%)	199 (86.9%)
G1	114	111 (97.4%)	111 (97.4%)	110 (96.5%)
G2	424	359 (84.7%)	359 (84.7%)	358 (84.4%)
D1	320	318 (99.4%)	318 (99.4%)	305 (95.3%)
C1	270	267 (98.9%)	266 (98.5%)	262 (97%)
O1	231	208 (90%)	204 (88.3%)	200 (86.6%)
Total	1698	1571 (92.5%)	1566 (92.2%)	1542 (90.8%)

Breathalyser and urine results are presented in sections 3.2 and 3.3, respectively. Results describe findings of individual mines and mean finding for all mines.

3.2 Breathalyser results

The results in sections 3.2.1 to 3.2.7 below, describe all samples that contained alcohol irrespective of the level. All other samples not described contained no alcohol whatsoever (i.e. 0.00mg/1000ml). In the absence of a legislated alcohol limit in the mining industry for mine workers on duty, the current South African legal driving limit of 0.10mg/1000ml of breath for

professional drivers as described in section 65 (6) of the National Road Traffic Act of 1996 (40) was used as a benchmark for determining levels at or above which impairment of judgement is expected (. This is because heavy and complex machinery is often used in mines. In results presented, breath samples containing alcohol below this driving limit have a suffix ?, those with breath alcohol levels equal to the driving limit of 0.10mg/1000ml are assigned ? , while those above the limit are assigned ?.

3.2.1 Breathalyser results for mine P1

Of the 108 breath samples obtained at this mine, only one sample (0.9%) contained alcohol, and it was below the legal driving limit for professional drivers of 0.10mg/1000ml. This result is displayed in table 3.2.

Table 3.2: Positive breathalyser result for mine P1

Day of sample collection	Time of sample collection	Positive breath alcohol result (mg/1000ml)
Wednesday	8.50am	0.04 ?

3.2.2 Breathalyser results for mine P2

Of the 200 breath samples obtained from this mine, 4 samples (2%) contained alcohol. Three of these samples (1.5%) contained alcohol at or above the 0.10mg/1000ml driving limit. One of the samples obtained contained alcohol at a level (0.50mg/1000ml) five times the 0.10mg/1000ml limit. Positive breath alcohol results are displayed in table 3.3.

Table 3.3: Positive breathalyser results for mine P2

Day of sample collection	Time of sample collection	Positive breath alcohol results (mg/1000ml)
Saturday	1.53am	0.27?
Monday	9.17pm	0.07?
Tuesday	2.15pm	0.10?
Tuesday	2.48pm	0.50?

3.2.3 Breathalyser results for mine G1

Of the 111 samples obtained at this mine, 3 samples (2.7%) contained alcohol and one of these (0.9%) contained alcohol above the 0.10mg/1000ml limit as described in table 3.4.

Table 3.4: Positive breathalyser results for mine G1

Day of sample collection	Time of sample collection	Positive breath alcohol results (mg/1000ml)
Tuesday	10.28pm	0.08?
Thursday	6.30am	0.13?
Thursday	10.30am	0.07?

3.2.4 Breathalysers results for mine G2

Of the 359 breath samples obtained, 12 samples (3.3%) contained alcohol, and the alcohol level in 7 of these samples (1.9%) was above the driving limit of 0.10mg/1000ml as depicted in table 3.5.

Table 3.5: Positive breathalyser results for mine G2

Day of sample collection	Time of sample collection	Positive breath alcohol results (mg/1000ml)
Monday	7:46pm	0.09 ?
Monday	8:27pm	0.15 ?
Monday	8:41pm	0.05 ?
Tuesday	7:20pm	0.05 ?
Wednesday	4:29am	0.27 ?
Wednesday	4:58am	0.08 ?
Wednesday	12:16pm	0.13 ?
Wednesday	12.20pm	0.12 ?
Wednesday	7.32pm	0.24 ?
Wednesday	8.11pm	0.25 ?
Friday	4.16am	0.05 ?
Friday	6.52am	0.14 ?

3.2.5 Breathalyser results for mine D1

318 breath samples were obtained at this mine. Of the 5 samples (1.6%) that contained alcohol, 3 samples (0.9%) contained alcohol above the 0.10mg/1000ml driving limit, as described in table 3.6.

Table 3.6: Positive breathalyser results for mine D1

Day of sample collection	Time of sample collection	Positive breath alcohol results (mg/1000ml)
Wednesday	6.53am	0.04?
Wednesday	7.07am	0.24?
Thursday	6.46am	0.04?
Thursday	6.52am	0.22?
Thursday	8.00am	0.16?

3.2.6 Breathalyser results for mine C1

266 breath samples were obtained at this mine. As described in table 3.7, 6 of these samples (2.3%) contained alcohol. 3 samples (1.1%) contained alcohol at or above the legal driving limit of 0.10mg/1000ml.

Table 3.7: Positive breathalyser results for mine C1

Day of sample collection	Time of sample collection	Positive breath alcohol results (mg/1000ml)
Tuesday	12.14pm	0.06?
Wednesday	6.26am	0.07?
Wednesday	10.13am	0.07?
Wednesday	10.55am	0.22?
Friday	9.45am	0.10?
Friday	9.56am	0.11?

3.2.7 Breathalyser results for mine O1

204 breath samples were obtained from this mine. 16 of these samples (7.8%) contained alcohol, with 12 samples (5.9%) containing alcohol at or above the 0.10mg/1000ml legal limit as described in table 3.8, five of these 12 samples contained alcohol at more than four times the 0.10mg/1000ml limit with the highest reading of 0.88mg/1000ml being almost nine times the limit.

Table 3.8: Positive breathalyser results for mine O1

Day of sample collection	Time of sample collection	Positive breath alcohol results (mg/1000ml)
Monday	7.45am	0.48 ?
Monday	7.51am	0.37 ?
Monday	7.54am	0.11 ?
Monday	7.58am	0.43 ?
Monday	8.27am	0.21 ?
Monday	9.07am	0.20 ?
Monday	9.10am	0.10?
Monday	9.18am	0.09 ?
Monday	9.49am	0.06 ?
Monday	9.51am	0.44 ?
Monday	9.53am	0.03 ?
Monday	10.51am	0.55 ?
Monday	1.24pm	0.04 ?
Monday	1.25pm	0.24 ?
Monday	1.55pm	0.88 ?
Monday	3.50pm	0.03 ?

3.2.8 Summary of breathalyser results of all study mines

Overall, while 1.1% of samples obtained from all study mines contained alcohol below the 0.10mg/1000ml legal driving limit, 1.9% contained alcohol equal to or above this limit. 0% to 7.9% of all samples contained alcohol above the stipulated mine alcohol limit. According to the mine limit, all samples containing alcohol in mines C1 (2.2%) and O1 (7.9%) would be regarded as failed tests. Table 3.9 categorises the alcohol content of samples obtained from all mines with respect to the 0.10mg/1000ml legal driving limit and the mine alcohol limit.

Table 3.9: Summary of breathalyser results by mine

Mine	Number of samples obtained	% of samples with alcohol below 0.10mg/1000 ml legal driving limit	% of samples with alcohol equal to or above 0.10mg/1000 ml legal driving limit	Individual mine alcohol limits (mg/1000ml)	% of sampl with alcoho equal to or above the mine alcoh limit
P1	108	0.9% (1)	0% (Nil)	0.2	0% (Nil)
P2	200	0.5% (1)	1.5% (3)	0.24	1% (2)
G1	111	1.8% (2)	0.9% (1)	0.24	0% (Nil)
G2	359	1.4% (5)	1.9% (7)	0.24	0.8% (3)
D1	318	0.6% (2)	0.9% (3)	0.24	0.3% (1)
C1	266	1.1% (3)	1.1% (3)	0.00	2.2% (6)
O1	204	2.0% (4)	5.9% (12)	0.00	7.9% (16)
Mean	**1566**	**1.1% (18)**	**1.9% (29)**		**1.8% (28)**

3.3 Results of urine cannabis testing

9.1% of urine samples collected from all study mines tested positive for cannabis. Table 3.10 displays a summary of all positive results by mine.

Table 3.10: Summary of urine test results by mine

Mine	Number of urine samples collected	% of samples positive for cannabis
P1	108	4.6% (5)
P2	199	7.5% (15)
G1	110	13.6% (15)
G2	358	5.6% (20)
D1	305	7.2% (22)
C1	262	7.6% (20)
O1	200	21.5% (43)
Mean	**1542**	**9.1% (140)**

Table 3.11 shows the proportion of cannabis positive urine samples in mines in the same commodity group.

Table 3.11: Comparison of proportion of cannabis positive urine samples between commodity mines.

Commodity Mine	Proportion of cannabis positive urine samples
P (n=307)	6.5% (20)
G (n=468)	7.5% (35)
D (n=305)	7.2% (22)
C (n=262)	7.6% (20)
O (n=200)	21.5% (43)

4.0 RESULTS OF STRUCTURED INTERVIEWS

Results of individual mines and mean of all mines are presented in sections 4.1, 4.2, and 4.3, which describe the socio-demographic profile of participants, results of alcohol use related variables, and results of cannabis use related variables, respectively*. In sections 4.2 and 4.3, participants were classified according to their substance use status (see glossary). Except where otherwise indicated (such as sections 4.2.3 and 4.3.3), responses displayed refer to all participants irrespective of their substance use status.

4.1 Socio-demographic profile of all participants

4.1.1 Age

Almost half of respondents in all mines (42.8%) were below 36 years of age. Table 4.1 describes the age distribution of participants by mine

Table 4.1: Age distribution of participants by mine

Age group (years)	P1 (n=108)	P2 (n=198)	G1 (n=111)	G2 (n=346)	D1 (n=318)	C1 (n=259)	O1 (n=208)	Mean (N=1548)
16-20	2.8% (3)	1.5% (3)	Nil	0.6% (2)	0.6% (2)	2.7% (7)	1.4% (3)	**1.3% (20)**
21-25	8.3% (9)	9.1% (18)	5.4% (6)	4.3% (15)	6.0% (19)	6.6% (17)	8.7% (18)	**6.6% (102)**
26-30	12.0% (13)	9.1% (18)	33.3% (37)	12.4% (43)	18.2% (58)	12.4% (32)	20.7% (43)	**15.8% (244)**
31-35	15.7% (17)	20.7% (41)	11.7% (13)	21.4% (74)	14.8% (47)	20.9% (54)	24.0% (50)	**19.1% (296)**
36-40	18.5% (20)	19.2% (38)	13.5% (15)	24.6% (85)	26.1% (83)	12.0% (31)	13.9% (29)	**19.4% (301)**
41-45	20.4% (22)	18.2% (36)	20.7% (23)	15.3% (53)	16.0% (51)	18.2% (47)	13.5% (28)	**16.8% (260)**
46-50	9.3% (10)	14.7% (29)	9.9% (11)	13.6% (47)	10.7% (34)	20.5% (53)	8.2% (17)	**13.0% (201)**
51 & >	13.0% (14)	7.6% (15)	5.4% (6)	7.8% (27)	7.6% (24)	7.0% (18)	9.6% (20)	**8.0% (124)**

**Due to rounding of numbers to one decimal place, percentages may not always add up to exactly 100% in results displayed.*

The mean age of participants in all mines is 37 years, as described in table 4.2.

Table 4.2: Mean age of participants by mine

Mine	Mean age (years)
P1 (n=108)	38
P2 (n=198)	38
G1 (n=111)	36
G2 (n=346)	38
D1 (n=318)	37
C1 (n=259)	39
O1 (n=208)	36
Mean (N=1548)	**37**

4.1.2 Sex

The majority of study participants (95.7%) were males, as shown in table 4.3.

Table 4.3: Sex of participants by mine

Mine	Male	Female
P1 (n=108)	98.2% (106)	1.9% (2)
P2 (n=203)	99.5% (202)	0.5% (1)
G1 (n=111)	94.6% (105)	5.4% (6)
G2 (n=348)	99.1% (345)	0.9% (3)
D1 (n=315)	87.0% (274)	13.0% (41)
C1 (n=260)	95.8% (249)	4.2% (11)
O1 (n=208)	98.6% (205)	1.4% (3)
Mean (N=1553)	**95.7% (1486)**	**4.3% (67)**

4.1.3 Country of origin

More than three quarters of all participants (77.6%) are South Africans, while most other participants are from neighbouring countries in Southern Africa. Table 4.4 shows the country of origin of participants in all mines in descending order of frequency of responses in the mean column.

Table 4.4: Country of origin of participants by mine

Country of origin	P1 (n=108)	P2 (n=203)	G1 (n=111)	G2 (n=345)	D1 (n=317)	C1 (n=259)	O1 (n=205)	Mean (n=1548)
South Africa	99.1% (107)	71.0% (144)	95.5% (106)	50.1% (173)	95.9% (304)	81.9% (212)	75.6% (155)	**77.6% (1201)**
Mozambique	Nil	15.8% (32)	0.9% (1)	17.7% (61)	0.3% (1)	2.7% (7)	19.0% (39)	**9.1% (141)**
Lesotho	Nil	11.3% (23)	Nil	23.8% (82)	Nil	10.4% (27)	1.1% (2)	**8.7% (134)**
Swaziland	Nil	1.5% (3)	Nil	4.9% (17)	Nil	1.2% (3)	Nil	**1.5% (23)**
Zimbabwe	0.9% (1)	Nil	1.8% (2)	Nil	1.9% (6)	0.8% (2)	2.9% (6)	**1.1% (17)**
United Kingdom	Nil	Nil	0.9% (1)	0.6% (2)	1.0% (3)	2.3% (6)	0.5% (1)	**0.8% (13)**
Botswana	Nil	Nil	Nil	2.6% (9)	0.3% (1)	0.4% (1)	Nil	**0.7% (11)**
Malawi	Nil	0.5% (1)	Nil	0.3% (1)	0.6% (2)	Nil	0.5% (1)	**0.3% (5)**
Namibia	Nil	Nil	0.9% (1)	Nil	Nil	0.4% (1)	0.5% (1)	**0.2% (3)**

4.1.4 Main languages spoken

The main languages spoken varied across mines due to the cultural diversity of employees as displayed in table 4.5. Responses in the mean column are arranged in descending order of frequency.

Table 4.5 Participants' main language by mine

Language	P1 (n=110)	P2 (n=174)	G1 (n=111)	G2 (n=349)	D1 (n=317)	C1 (n=256)	O1 (n=184)	Mean (N=1501)
Sotho	8.2% (9)	24.2% (42)	3.6% (4)	32.4% (113)	2.5% (8)	22.7% (58)	6.0% (11)	**16.3% (245)**
Tswana	2.7% (3)	16.7% (29)	70.3% (78)	8.6% (30)	3.2% (10)	Nil	35.3% (65)	**14.3% (215)**
Pedi	32.7% (36)	4.6% (8)	0.9% (1)	1.4% (5)	31.2% (99)	4.3% (11)	6.0% (11)	**11.4% (171)**
Xhosa	2.7% (3)	20.7% (36)	Nil	20.9% (73)	0.3% 1)	13.3% (34)	0.5% (1)	**9.9% (148)**
Tsonga	13.6% (15)	16.1% (28)	0.9% (1)	9.2% (32)	6.3% (20)	2.0% (5)	13.6% (25)	**8.4% (126)**
Zulu	2.7% (3)	6.3% (11)	3.6% (4)	8.0% (28)	1.6% (5)	24.6% (63)	3.8% (7)	**8.1% (121)**
English	0.9% (1)	0.6% (1)	8.1% (9)	0.9% (3)	21.1% (67)	8.6% (22)	7.1% (13)	**7.7% (116)**
Venda	3.6% (4)	Nil	9.9% (11)	0.3% (1)	25.2% (80)	0.8% (2)	9.2% (17)	**7.7% (115)**
Afrikaans	24.6% (27)	5.8% (10)	Nil	3.7% (13)	0.3% (1)	16.8% (43)	2.2% (4)	**6.5% (98)**
Swazi	2.7% (3)	1.7% (3)	2.7% (3)	3.7% (13)	7.3% (23)	3.1% 8)	0.5% (1)	**3.6% (54)**
Other	5.5% (6)	3.5% (6)	Nil	10.9% (38)	1.0% (3)	3.9% (10)	15.8% (29)	**6.1% (92)**

4.1.5 Marital status

Almost three quarters of all participants (71.5%) are married, while about one quarter of them (22.8%) are single as described in table 4.6.

Table 4.6: Marital status of participants by mine

Mine	Single (never married)	Married	Living together	Divorced	Separated	Widow/ Widower
P1 (n=108)	20.4% (22)	76.9% (83)	2.8% (3)	Nil	Nil	**Nil**
P2 (n=203)	22.2% (45)	73.4% (149)	2.0% (4)	1.5% (3)	Nil	**1.0% (2)**
G1 (n=111)	45.1% (50)	49.6% (55)	2.7% (3)	1.8% (2)	Nil	**0.9% (1)**
G2 (n=347)	12.4% (43)	84.7% (294)	1.7% (6)	0.3% (1)	Nil	**0.9% (3)**
D1 (n=318)	20.8% (66)	72.3% (230)	0.3% (1)	44.0% (14)	0.9% (3)	**1.3% (4)**
C1 (n=260)	21.5% (56)	70.0% (182)	2.3% (6)	2.3% (6)	1.9% (5)	**1.9% (5)**
O1 (n=208)	35.1% (73)	56.7% (118)	4.3% (9)	2.4% (5)	1.06% (2)	**0.5% (1)**
Mean (N=1555)	22.8% (355)	71.5% (1111)	2.1% (32)	2.0% (31)	0.6% (10)	**1.0% (16)**

4.1.6 Type of accommodation

Three of the seven study mines (P2, G2, C1) had mine hostels. Other accommodation category includes all other forms of lodging apart from mine hostels, such as shared housing and own housing. About a quarter of all participants (26.9%) live in mine hostels, as displayed in table 4.7.

Table 4.7: Type of participants' accommodation by mine

Mine	Mine hostel	Other accommodation
P1 (n=108)	Nil	100.0% (108)
P2 (n=203)	53.2% (108)	46.8% (95)
G1 (n=111)	Nil	100.0% (111)
G2 (n=350)	73.1% (256)	26.9% (94)
D1 (n=317)	Nil	100.0% (317)
C1 (n=259)	20.9% (54)	79.2% (205)
O1 (n=208)	Nil	100.0% (208)
Mean (N=1556)	**26.9% (418)**	**73.1% (1138)**

4.1.7 Cohabitation status of participants with family members

About half of all participants (57.5%) live with their families. In mines with no hostels (P1, D1, G1, O1), up to three quarters or more of participants (80.8%, 82.1%, 66.4%, 73.2% respectively), live with their families as described in table 4.8.

Table 4.8: Cohabitation status of participants with family members by mine

Mine	Does any member of your family live with you?	
	Yes	**No**
P1 (n=104)	80.8% (84)	19.2% (20)
P2 (n=199)	34.2% (68)	65.8% (131)
G1 (n=110)	66.4% (73)	33.6% (37)
G2 (n=341)	17.3% (59)	82.7% (282)
D1 (n=308)	82.1% (253)	17.9% (55)
C1 (n=253)	73.9% (187)	26.1% (66)
O1 (n=205)	73.2% (150)	26.8% (55)
Mean (N=1520)	**57.5% (874)**	**42.5% (646)**

4.1.8 Level of education

As displayed in table 4.9, the level of education of about half of all respondents (53.4%), is between standard 6 and 10, while 13.2% have some post-matric qualification such as technikon diploma or university degree.

Table 4.9: Level of education of participants by mine

Level of education	P1 (n=97)	P2 (n=191)	G1 (n=105)	G2 (n=341)	D1 (n=293)	C1 (n=246)	O1 (n=181)	Mean (N=1454)
No formal schooling	6.2% (6)	4.2% (8)	4.8% (5)	10.0% (34)	1.7% (5)	4.5% (11)	13.3% (24)	**6.4% (93)**
Std 1-5	15.5% (15)	45.6% (87)	20.0% (21)	41.1% (140)	6.8% (20)	21.5% (53)	32.6% (59)	**27.2% (395)**
Std 6-10	68.0% (66)	46.1% (88)	64.8% (68)	42.8% (146)	61.4% (180)	56.1% (138)	48.6% (88)	**53.2% (774)**
Post-matric qualification	10.3% (10)	4.2% (8)	10.5% (11)	6.2% (21)	30.0% (88)	17.9% (44)	5.5% (10)	**13.2% (192)**

4.1.9 Nature of employment

About one sixth of all participants (16%) were contract workers as displayed in table 4.10.

Table 4.10: Nature of employment of participants by mine

Mine	Fulltime workers	Contract workers
P1 (n=108)	76.9% (83)	23.2% (25)
P2 (n=202)	84.2% (170)	15.8% (32)
G1 (n=110)	64.6% (71)	35.5% (39)
G2 (n=346)	89.0% (308)	11.0% (38)
D1 (n=317)	84.5% (268)	15.5% (49)
C1 (n=258)	74.8% (193)	25.2% (65)
O1 (n=208)	100.0% (208)	Nil
Mean (N=1549)	**84% (1301)**	**16.0% (248)**

4.1.10 Job category of participants

Employees' jobs were classified into four categories – officials, artisans, grade 5 to 8 employees, and grade 3 to 4 employees. Officials include employees in leadership positions such as managers, engineers, and certain employees who carry out administrative work such as human resource officials. Artisans include boilermakers, electricians, fitters and turners. Grade 5 to 8 employees include those in supervisory positions such as team leaders and team supervisors, while grade 3 to 4 employees are those in the lowest category who actually carry out the more labour intensive jobs such as truck drivers, drillers, operators, and cleaners.

In all study mines, 32 (49.2%) of 65 females were officials/administrative workers, 28 (43.1%) were in grade 3 to 4 category, 4 (6.2%) were artisans and 1 (1.5%) was in grade 5 to 8. The majority of females in grade 3 to 4 category were cleaners.

About half of all participants (59.1%), male and female, were in the grade 3 to 4 category, while about a fifth of them (22.9%) were officials, as described in table 4.11.

Table 4.11: Job category of participants by mine

Mine	Officials	Artisans	Grade 5 to 8	Grade 3 to 4
P1 (n=107)	19.6% (21)	14.0% (15)	3.7% (4)	62.6% (67)
P2 (n=200)	21.5% (43)	3.0% (6)	16.5% (33)	59.0% (118)
G1 (n=107)	24.3% (26)	6.5% (7)	5.6% (6)	63.6% (68)
G2 (n=335)	17.9% (60)	11.0% (37)	8.7% (29)	62.4% (209)
D1 (n=295)	33.6% (99)	13.6% (40)	2.4% (7)	50.5% (149)
C1 (n=247)	31.6% (78)	18.2% (45)	4.1% (10)	46.2% (114)
O1 (n=207)	7.7% (16)	9.2% (19)	5.8% (12)	77.3% (160)
Mean (n=1498)	**22.9% (343)**	**11.3% (169)**	**6.7% (101)**	**59.1% (885)**

4.1.11 Location of participants' workstations

Almost half of all respondents (40.5%) work underground as shown in table 4.12. Mines P1, G1, D1, and O1 are surface mines.

Table 4.12: Location of participants' workstations

Mine	Underground	Aboveground	Both above & below ground
P1 (n=108)	Nil	100.0 (108)	Nil
P2 (n=203)	68.0% (138)	28.6% (58)	3.5% (7)
G1 (n=111)	Nil	100.0% (111)	Nil
G2 (n=349)	92.0% (321)	6.9% (24)	1.0% (4)
D1 (n=322)	Nil	100.0% (322)	Nil
C1 (n=255)	67.1% (171)	30.2% (77)	2.8% (7)
O1 (n=208)	Nil	100.0% (208)	Nil
Mean (N=1556)	**40.5% (630)**	**58.4% (908)**	**1.2% (18)**

4.1.12 Participants' perception of level of danger associated with their jobs

About half of respondents (45.98%) felt their jobs were sometimes dangerous, while 14.98% felt they were always exposed to danger at work as described in table 4.13.

Table 4.13: Participants' perception of level of danger associated with their jobs

Mine	Would you say your job is dangerous?			
	Never	**Sometimes**	**Most times**	**Always**
P1 (n=107)	19.6% (21)	40.2% (43)	10.3% (11)	29.9% (32)
P2 (n=202)	17.3% (35)	44.1% (89)	13.9% (28)	24.8% (50)
G1 (n=110)	24.55% (27)	50% (55)	15.45% (17)	10% (11)
G2 (n=344)	24.1% (83)	48.0% (165)	13.4 (46)	14.5% (50)
D1 (n=315)	47.9% (151)	39.7% (125)	7.3% (23)	5.1% (16)
C1 (n=206)	21.4% (44)	49.5% (102)	13.1% (27)	16.0% (33)
O1 (n=258)	19.0% (49)	50.4% (130)	15.5% (40)	15.1% (39)
Mean (N=1542)	**26.6% (410)**	**46.0% (709)**	**12.5% (192)**	**15.0% (231)**

4.2 Results of alcohol use-related variables

4.2.1 Classification of participants according to reported alcohol use status

4.2.1.1 Identification of never-users, ever-users, current users, and ex-users of alcohol in study population*

Almost half of all respondents (53.3%) reported that had used alcohol before (ever-users) as described in table 4.14.

Table 4.14: Never-users and ever-users of alcohol by mine

Mine	Never-users	Ever-users
P1 (n=108)	30.6% (33)	69.4% (75)
P2 (n=201)	46.3% (93)	53.7% (108)
G1 (n=109)	45.9% (50)	54.1% (59)
G2 (n=348)	57.5% (200)	42.5% (148)
D1 (n= 310)	43.9% (136)	56.1% (174)
C1 (n=256)	43.4% (111)	56.6% (145)
O1 (n=206)	46.1% (95)	53.9% (111)
Mean (N=1538)	**46.7% (718)**	**53.3% (820)**

*(*See glossary for definitions)*

Of the 820 ever-users of alcohol, 46.9% responded that they currently use alcohol (current users), while 6.4% said they had stopped (ex-users), as displayed in table 4.15.

Table 4.15: Current users, ex-users, and never-users of alcohol by mine

Mine	Current users	Ex-users	Never users
P1 (n=108)	60.2% (65)	9.3% (10)	30.6% (33)
P2 (=201)	48.8% (98)	5.0% (10)	46.3% (93)
G1 (n=109)	46.8% (51)	7.3% (8)	45.9% (50)
G2 (n=348)	35.1% (122)	7.5% (26)	57.5% (200)
D1 (n=310)	51.0% (158)	5.2% (16)	43.9% (136)
C1 (n=256)	48.0% (123)	8.6% (22)	43.4% (111)
O1 (n=206)	51% (105)	2.9% (6)	46.1% (95)
Mean (N=1538)	**46.9% (722)**	**6.4% (98)**	**46.7% (718)**

4.2.1.2 Reported alcohol use status of respondents' fellow workers

Almost three quarters of participants (70.6%) said their fellow workers use alcohol as shown in table 4.16.

Table 4.16: Reported alcohol use status of respondents' fellow workers

Mine	Do your fellow workers use alcohol?		
	Yes	**No**	**Don't know**
P1 (n=106)	81.1% (86)	5.7% (6)	13.2% (14)
P2 (n=202)	70.3% (142)	14.9% (30)	14.9% (30)
G1 (n=111)	76.6% (85)	6.3% (7)	17.1% (19)
G2 (n=349)	57.0% (199)	13.8% (48)	29.2% (102)
D1 (n=309)	66.7% (206)	12.6% (39)	20.7% (64)
C1 (n=260)	76.5% (199)	11.5% (30)	11.9% (31)
O1 (n=208)	83.7% (174)	6.7% (14)	9.6% (20)
Mean (N=1545)	**70.6% (1091)**	**11.3% (174)**	**18.1% (280)**

4.2.1.3 Participants who display signs suggestive of alcohol dependence

Current users were asked the four questions in the CAGE questionnaire, which is a screening tool for alcohol misuse (Section 1.4.1). Table 4.17 describes current users of alcohol in each study mine who gave positive responses to two or more of these questions, and who may be dependent on alcohol. The percentage of participants with possible alcohol dependence ranges between 10.7% (mine D1) and 24.8% (mine G1), with a mean of 15.3% for all study mines.

Table 4.17: Participants who display signs suggestive of alcohol dependence by mine, with regard to the CAGE criteria

Mine	Percentage of respondents who may be dependent on alcohol
P1 (n=108)	19.4% (21)
P2 (n=201)	16.4% (33)
G1 (n=109)	24.8% (27)
G2 (n=348)	12.4% (43)
D1 (n=310)	10.7% (33)
C1 (n=256)	16.8% (43)
O1 (n=206)	17.0% (35)
Mean (N=1538)	**15.3% (235)**

Table 4.18 shows the mean proportion of respondents who may be dependent on alcohol across mines in the same commodity group.

Table 4.18: Comparison of proportion of estimated alcohol dependent respondents between commodity mines.

Commodity Mine	Mean of respondents who may be dependent on alcohol
P (n=309)	17.5% (54)
G (n=457)	15.3% (70)
D (n=310)	10.7% (33)
C (n=256)	16.8% (43)
O (n=206)	17.0% (35)

4.2.2 Profiling of participants according to alcohol dependence status

Participants who are likely to be dependent on alcohol according to the CAGE criteria have been described as “CAGE positive” while those who are unlikely to be dependent are referred to as “CAGE negative”.

4.2.2.1 Socio-demographic profile of participants who may be dependent on alcohol

The CAGE positive participants were predominantly male. As shown in table 4.19 and figure 1, the percentage of CAGE positive males (16.3%) was about 11 times that of CAGE positive females (1.5%).

Table 4.19: Alcohol dependence status of participants by sex

	Male	Female
CAGE positive	16.3% (233)	1.5% (1)
CAGE negative	83.7% (1198)	98.5% (66)
Total	100.0% (1264)	100.0% (67)

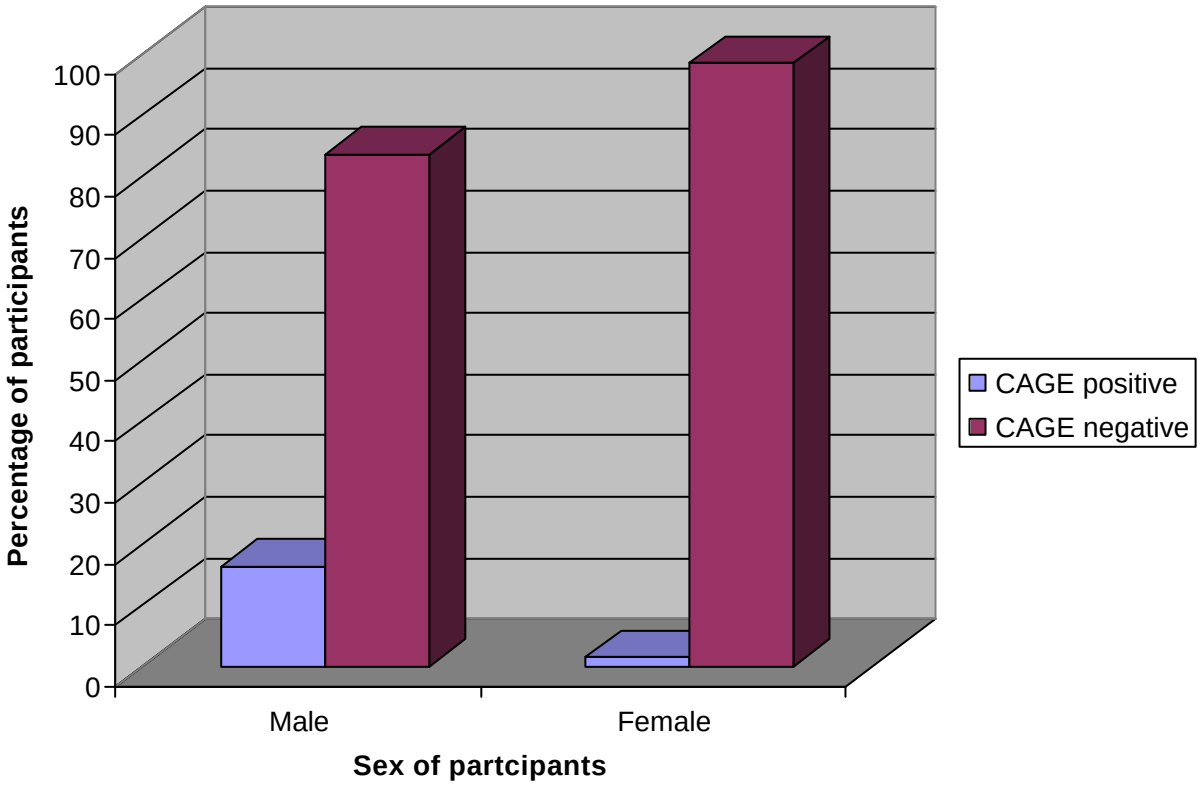

Figure 4.1: Alcohol dependence status of participants by sex

Table 4.20 compares socio-demographic profile of respondents who may be dependent on alcohol to those who are unlikely to be dependent, and also displays which variables are statistically significant for alcohol misuse. In order to determine socio-demographic variables which are statistically significant for alcohol use, mine O1 which did not have contract workers at the time of this study (2002) was excluded from 'nature of employment' category, while mines P1, G1, D1 and O1 which do not have underground shafts or mine hostels were excluded from 'location of workstation' and 'type of accommodation' categories. Yates corrected chi-square tests were carried out and variables with p-values <0.05 were regarded as statistically significant.

The percentage of CAGE positive employees with matric qualification or less (17.0%) is higher than that of employees who have post-matric qualification (10.4%). There is an increase in the percentage of CAGE positive employees from officials (11.7%) to group 3-4 employees (17.1%). Low levels of education ($p=0.028$) and low job categories ($p=0.009$) were found to be statistically significant for alcohol misuse. While living in hostels was also statistically significant ($p=0.02$), it had a protective influence from alcohol misuse ($0.41<OR<0.93$). Nature of employment ($p=0.83$) and location of workstation ($p=0.055$) were not statistically significant.

Table 4.20: P-values of socio-demographic variables in relation to alcohol misuse

Mines with contractors only (i.e. all mines except O1)		**CAGE positive** (n=198)	**CAGE negative** (n=1143)
Nature of employment (n=1341) **p=0.83**	**Contract** (n=280)	43 (15.4%)	237 (84.6%)
	Fulltime (n=1061)	155 (14.6%)	906 (85.4%)
All mines		**CAGE positive** (n=234)	**CAGE negative** (n=1220)
Level of education (n=1454) **P=0.028*** OR**=1.76 (1.06<OR<2.95)***	**Matric & <** (n=1262)	214 (17.0%)	1048 (83.0%)
	Post-matric (n=192)	20 (10.4%)	172 (89.6%)
All mines		**CAGE positive** (n=227)	**CAGE negative** (n=1271)
Job category (n=1498) **p=0.009***	**Officials** (n=343)	40 (11.7%)	303 (88.3%)
	Union men (n=169)	20 (11.8%)	149 (88.2%)
	Group 5-8 (n=101)	16 (15. 8%)	85 (84.2%)
	Group 3-4 (n=885)	151 (17.1%)	734 (82.9%)
Underground mines only (i.e. P2, G2, C1)		**CAGE positive** (n=118)	**CAGE negative** (n=689)
Location of workstation (n=807) **P=0.055**	**Aboveground** (n=159)	32 (16.5%)	127 (79.9%)
	Belowground (n=630)	83 (13.2%)	547 (86.8%)
	Both (n=18)	3 (16.7%)	15 (83.3%)
Mines with hostels only (i.e. P2, G2, C1)		**CAGE positive** (n=119)	**CAGE negative** (n=693)
Type of accommodation (n=812) **P=0.02*** OR**=0.61 (0.41<OR<0.93)***	**Hostel** (n=418)	49 (11.7%)	369 (88.3%)
	Other (n=394)	70 (17.8%)	324 (82.2%)

*(*Statistically significant variables)*
*(**OR = odds ratio)*
*(***95% confidence limit)*

4.2.3 Practice of alcohol use

4.2.3.1 Drinking partners of current alcohol users

While about a fifth of current alcohol users, drink alcohol alone (22.8%), the majority drink with their friends (72.7%) as displayed in table 4.21.

Table 4.21: Drinking partners of current alcohol users

Mine	Who do you usually drink with?					
	Alone	**With friends only**	**With family members only**	**Alone & with friends**	**Alone & with family members**	**With family members & friends**
P1 (n=65)	20% (13)	64.6% (42)	4.6% (3)	7.7% (5)	1.5% (1)	1.5% (1)
P2 (n=111)	34.2% (38)	61.3% (68)	Nil	3.6% (4)	0.9% (1)	Nil
G1 (n=51)	31.4% (16)	68.6% (35)	Nil	Nil	Nil	Nil
G2 (n=122)	26.2% (32)	73.0% (89)	0.8% (1)	Nil	Nil	Nil
D1 (n=167)	15.0% (25)	79.0% (132)	3.0% (5)	2.4% (4)	Nil	0.6% (1)
C1 (n=123)	14.6% (18)	79.7% (98)	2.4% (3)	Nil	3.2% (4)	Nil
O1 (n=98)	26.5% (26)	73.5% (72)	Nil	Nil	Nil	Nil
Mean (N=737)	**22.8% (168)**	**72.7% (536)**	**1.63% (12)**	**1.8% (13)**	**0.8% (6)**	**0.3% (2)**

4.2.3.2 Frequency of alcohol consumption by current users

About one third of current alcohol users (28.9%) drink alcohol five to six days in a week, while almost one tenth of participants (9.3%) drink alcohol everyday, as shown in table 4.22.

Table 4.22: Frequency of current users' alcohol consumption by mine

Mine	Every day	5-6 days / week	3-4 days / week	1-2 days / week	1-3 days / month	Less often
P1 (n=64)	25.0% (16)	Nil	6.3% (4)	26.6% (17)	35.9% (23)	6.3% (4)
P2 (n=95)	23.2% (22)	Nil	2.1% (2)	23.2% (22)	44.2% (42)	7.4% (7)
G1 (n=49)	4.1% (2)	32.7% (16)	10.2% (5)	Nil	28.6% (14)	24.5% (12)
G2 (n=118)	4.2% (5)	29.7% (35)	10.2% (12)	1.7% (2)	46.6% (55)	7.6% (9)
D1 (n=149)	10.8% (16)	32.9% (49)	14.1% (21)	2.7% (4)	28.2% (42)	11.4% (17)
C1 (n=113)	Nil	51.3% (58)	14.2% (16)	1.8% (2)	17.7% (20)	15.0% (17)
O1 (n=88)	2.3% (2)	42.1% (37)	10.2% (9)	3.4% (3)	10.2% (9)	31.8% (28)
Mean (N=676)	**9.3% (63)**	**28.9% (195)**	**10.2% (69)**	**7.4% (50)**	**30.3% (205)**	**13.9% (94)**

4.2.4 Knowledge of hazards of alcohol use in the workplace

4.2.4.1 Participants' awareness of relationship between alcohol consumption and mine accidents

All participants were asked if they felt that there was a link between alcohol use and mine accidents. The majority of them (97%) were aware of this link as shown in table 4.23.

Table 4.23: Participants' awareness of relationship between alcohol consumption and mine accidents

Mine	Do you think drinking alcohol can lead to accidents in the mine?		
	Yes	**No**	**Don't know**
P1 (n=104)	97.1% (101)	2.9% (3)	Nil
P2 (n=200)	98.5% (197)	1% (2)	0.5% (1)
G1 (n=110)	98.2% (108)	1.8% (2)	Nil
G2 (n=345)	98.8% (341)	0.6% (2)	0.6% (2)
D1 (n=310)	98.1% (304)	1.9% (6)	Nil
C1 (n=260)	98.5% (256)	0.8% (2)	0.8% (2)
O1 (n=207)	88.4% (183)	11.1% (23)	0.5% (1)
Mean (N=1536)	**97.0% (1490)**	**2.6% (40)**	**0.4% (6)**

4.2.5 Perceptions of participants about alcohol use

4.2.5.1 Participants' perceptions of reasons why mineworkers drink alcohol

About one fifth of participants (20.5%), said the reason mineworkers use alcohol was to relieve stresses related to their jobs (such as perceived danger at work, and heavy workload), finances and families, while 5.7% said it was used to relieve boredom, as shown in table 4.24. The mean column displays responses in ascending order of frequency. Reasons categorised in the 'other' category include 'irresponsibility', 'influence of friends', 'because they have money', 'because alcohol is available', and 'ignorance about dangers of alcohol'.

Table 4.24: Participants' perceptions of reasons why mineworkers drink alcohol*

	P1 (n=104)	P2 (n=202)	G1 (n=111)	G2 (n=347)	D1 (n=309)	C1 (n=228)	O1 (n=208)	Mean (N=1509)
Don't know	34.6% (36)	49.5% (100)	38.7% (43)	59.4% (206)	45.0% (139)	21.1% (48)	36.5% (76)	**42.9% (648)**
Reduce stress (dangerous/demanding jobs, financial, family)	5.8% (6)	11.9% (24)	21.6% (24)	17.9% (62)	20.7% (64)	36.4% (83)	22.1% (46)	**20.5% (309)**
Relax / unwind	51.0% (53)	25.3% (51)	8.1% (9)	8.1% (28)	14.9% (46)	14.9% (34)	15.9% (33)	**16.8% (254)**
Have fun / socialise / entertainment	3.9% (4)	9.9% (20)	28.8% (32)	11.0% (38)	16.2% (50)	17.1% (39)	26.0% (54)	**15.7% (237)**
Reduce boredom	2.9% (3)	5.5% (11)	1.8% (2)	4.9% (17)	6.8% (21)	11.0% (25)	3.4% (7)	**5.7% (86)**
Habit / Addiction	Nil	2.5% (5)	2.7% (3)	0.9% (3)	1.9% (6)	1.3% (3)	0.5% (1)	**1.4% (21)**
Other	Nil	1.5% (3)	1.8% (2)	0.6 (2)	0.3% (1)	0.9% (2)	Nil	**0.7% (10)**

*(*Multiple response question, so responses do not add up to 100%)*

4.2.5.2 Participants' perceptions of how to control alcohol use among mineworkers

About one fifth of participants (21.2%) felt that awareness programs about dangers of alcohol could help control alcohol use among mine workers, while 4.6% felt those who use alcohol need to exercise self-discipline and take responsibility for controlling their use of alcohol. Table 4.25 describes participants' responses, with the mean column depicting responses in ascending order of frequency.

Table 4.25: Participants' recommendations for control of alcohol use by mine*

	P1 (n=92)	P2 (n=183)	G1 (n=108)	G2 (n=344)	D1 (n=294)	C1 (n=220)	O1 (n=204)	Mean (N=1445)
Don't know	Nil	1.1% (2)	41.7% (45)	57.3% (197)	17.4% (51)	8.6% (19)	28.4% (58)	**25.7% (372)**
Awareness programs	37.0% (34)	22.4% (41)	21.3% (23)	9.9% (34)	18.7% (55)	35.0% (77)	20.6% (42)	**21.2% (306)**
Breathalyser testing	30.4% (28)	27.3% (50)	11.1% (12)	7.9% (27)	17.0% (50)	30.9% (68)	10.3% (21)	**17.7% (256)**
Rehabilitation programs	2.2% (2)	9.8% (18)	15.7% (17)	6.1% (21)	17.0% (50)	9.6% (21)	11.7% (24)	**10.6% (153)**
Disciplinary measures	4.4% (4)	23.5% (43)	4.6% (5)	2.0% (7)	5.1% (15)	2.7% (6)	14.2% (29)	**7.5% (109)**
Recreational facilities	4.4 (4)	6.0% (11)	1.9% (2)	2.9% (10)	7.1% (21)	6.8% (15)	2.9% (6)	**4.8% (69)**
Self-discipline	13.0% (12)	9.3% (17)	3.7% (4)	1.7% (6)	5.1% (15)	1.8% (4)	4.4% (9)	**4.6% (67)**
Security checks to detect users	9.8% (9)	2.7% (5)	Nil	2.3% (8)	7.1% (21)	1.8% (4)	2.9% (6)	**3.7% (53)**
Nothing can be done	Nil	0.6% (1)	1.9% (2)	4.7% (16)	2.4% (7)	3.6% (8)	2.9% (6)	**2.8% (40)**
Reduce access to alcohol	Nil	2.2% (4)	Nil	4.4% (15)	0.3% (1)	1.4% (3)	1.5% (3)	**1.8% (26)**
Happy, stress free workplace	Nil	2.2% (4)	0.9% (1)	0.9% (3)	3.1% (9)	1.4% (3)	1.0% (2)	**1.5% (22)**

(Multiple-response question, so responses do not add up to 100%)*
*(**EAP = Employee Assistance Program)*

4.3 Results of cannabis use-related variables

4.3.1 Classification of participants according to reported cannabis use status

4.3.1.1 Identification of ever-users, never-users, current users, and ex-users of cannabis in study population*

While 7.2% of participants said they had used cannabis before (ever-users), the majority (92.8%) said they had not (never users), as displayed in table 4.26.

Table 4.26: Never-users and ever-users of cannabis by study mine

Mine	Never-users	Ever-users
P1 (n=107)	87.9% (94)	12.2% (13)
P2 (n=202)	92.67% (187)	7.4% (15)
G1 (n=111)	91.9% (102)	8.1% (9)
G2 (n=347)	93.4% (324)	6.6% (23)
D1 (n= 317)	94.0% (298)	6.0% (19)
C1 (n=260)	95.0% (247)	5.0% (13)
O1 (n=207)	90.3% (187)	9.7% (20)
Mean (N=1551)	**92.8% (1439)**	**7.2% (112)**

(See glossary for definitions)*

Of the 112 respondents (7.2%) in all study mines who said that they had ever used cannabis before, about a third of them currently use cannabis while about two-thirds reported that they had stopped. Table 4.27 below displays current users and ex-users of cannabis at each mine.

Table 4.27: Current users, ex-users, and never users of cannabis by mine

Mine	Current users	Ex-users	Never users
P1 (n=107)	2.8% (3)	9.4% (10)	87.9% (94)
P2 (n=202)	2.5% (5)	5.0% (10)	92.6% (187)
G1 (n=111)	3.6% (4)	4.5% (5)	91.9% (102)
G2 (n=347)	0.6% (2)	6.1% (21)	93.4% (324)
D1 (n=317)	1.9% (6)	4.1% (13)	94.0% (298)
C1 (n=260)	1.9% (5)	3.1% (8)	95.0% (247)
O1 (n=207)	5.3% (11)	4.8% (10)	89.9% (186)
Mean (N=1551)	**2.3% (36)**	**5.0% (77)**	**92.7% (1438)**

4.3.1.2 Reported cannabis use status of respondents' fellow workers

All participants were asked if they knew of fellow workers who use cannabis. More than a quarter of all respondents (27.6%), reported that their fellow workers use cannabis as shown in table 4.28.

Table 4.28: Reported cannabis use status of respondents' fellow workers

Mine	Do your fellow workers use cannabis?		
	Yes	**No**	**Don't know**
P1 (n=99)	30.3% (30)	41.4% (41)	28.3% (28)
P2 (n=201)	40.3% (81)	36.8% (74)	22.9% (46)
G1 (n=111)	38.7% (43)	18.0% (20)	43.2% (48)
G2 (n=348)	16.1% (56)	27.6% (96)	56.3% (196)
D1 (n=316)	15.2% (48)	38.0% (120)	46.8% (148)
C1 (n=260)	26.9% (70)	40.8% (106)	32.3% (84)
O1 (n=207)	47.3% (98)	23.7% (49)	29.0% (60)
Mean (N=1542)	**27.6% (426)**	**32.8% (506)**	**39.6% (610)**

4.3.I.3 Comparison of proportion of self-reported cannabis users and urine positive cannabis users

Table 4.29 below compares the proportion of respondents who, during the structured interviews, said they currently use cannabis with those who tested positive for cannabis with objective laboratory testing. Self-reported users were consistently lower than urine positive users in all mines. Urine positive users were between two times (mine P2) and 10 times (mine G2) more than self-reported users across study mines.

Table 4.29: Self-reported cannabis users and urine positive cannabis users

Mine	Number of respondents	Percentage of cannabis users from structured interviews	Number of urine samples	Percentage of cannabis users from urine testing
P1	107	2.8% (3)	108	4.6% (5)
P2	202	2.5% (5)	199	7.5% (15)
G1	111	3.6% (4)	110	13.6% (15)
G2	347	0.6% (2)	358	5.6% (20)
D1	317	1.9% (6)	305	7.2% (22)
C1	260	1.9% (5)	262	7.6% (20)
O1	207	5.3% (11)	200	21.5% (43)
Mean	**1551**	**2.3% (36)**	**1540**	**9.1% (140)**

4.3.2 Profiling of participants according to cannabis use status

Participants who tested positive for cannabis are referred to in sections 4.3.2.1 and 4.3.2.2 as “urine positive”, while those who tested negative are referred to as “urine negative”.

4.3.2.1 Socio-demographic profile of cannabis users

The percentage of males who tested positive for cannabis (9.4%) was about six times the percentage of urine positive females (1.5%) as displayed in table 4.30.

Table 4.30: Cannabis use status of participants by sex

	Male	Female
Urine positive	9.4% (139)	1.5% (1)
Urine negative	90.6% (1337)	98.5% (66)
Total	100.0% (1476)	100.0% (67)

As in section 4.2.2.1, mine O1 which did not have contract workers at the time of this study (2002), was excluded from ‘nature of employment’ category, while mines P1, G1, D1 and O1 which do not have underground shafts or mine hostels were excluded from ‘location of workstation’ and ‘type of accommodation’ categories. Yates corrected p-values above 0.05 were regarded as statistically significant.

As shown in table 4.31, the percentage of urine positive contract workers (12.2%) was about twice that of urine positive fulltime workers (5.8%). This was statistically significant at a p-value of 0.0006. There were about three times as many cannabis users among employees with level of education of matric or less (9.8%) as those among employees with post-matric qualification (3.0%) and this was statistically significant (p=0.0026). Cannabis use was more common among employees in lower job categories (11.7% in group 3-4) than those in higher categories (4.7% in officials) and was found to be statistically significant (p=0.00002). No association was detected between cannabis use and ‘location of workstation’ (p=0.30) and ‘type of accommodation’ (p=0.22), although there was a higher percentage of cannabis users among hostel dwellers (7.7%) than participants who lived in other types of accommodation (5.3%).

Table 4.31: P-values of socio-demographic variables in relation to cannabis use

Mines with contractors only (All mines except O1)		**Urine positive (n=93)**	**Urine negative (n=1247)**
Nature of employment (n=1340) **P*=0.0006** **OR**=2.26** **1.39<OR<3.66*****	**Contract (n=247)**	30 (12.2%)	217 (87.9%)
	Fulltime (n=1093)	63 (5.8%)	1030 (94.2%)
All mines		**Urine positive (n=137)**	**Urine negative (n=1408)**
Level of education (n=1545) **P*=0.0026** **OR**=3.51** **1.47<OR>8.94**	**Matric & < (n=1344)**	131 (9.8%)	1213 (90.3%)
	Post-matric (n=201)	6 (3.0%)	195 (97.0%)
All mines		**Urine positive** (n=134)	**Urine negative** (n=1368)
Job category (n=1502) **P=0.00002***	**Officials (n=344)**	16 (4.65%)	328 (95.4%)
	Union men (n=170)	9 (5.3%)	161 (94.7%)
	Group 5-8 (n=101)	5 (5.0%)	96 (95.1%)
	Group 3-4 (n=887)	104 (11.7%)	783 (88.3%)
Underground mines only (i.e. P2, G2, C1)		**Urine positive** (n=54)	**Urine negative** (n=754)
Location of workstation (n=808) **P=0.30**	**Aboveground (n=159)**	7 (4.4%)	152 (95.6%)
	Belowground (n=616)	45 (7.3%)	571 (92.7%)
	Both (n=33)	2 (6.1%)	31 (93.9%)
Mines with hostels only (i.e. P2, G2, C1)		**Urine positive** (n=53)	**Urine negative** (n=758)
Type of accommodation (n=811) **P=0.22**	**Hostel (n=418)**	32 (7.7%)	386 (92.3%)
	Other (n=393)	21 (5.3%)	372 (94.7%)

*(*Statistically significant variables)*
*(**OR=odds ratio)*
*(***95% Confidence limit)*

4.3.3 Practice of cannabis use

4.3.3.1 Frequency of cannabis use by current users

Almost two thirds of current cannabis users (60.6%) use it daily as described in table 4.32.

Table 4.32: Frequency of cannabis use by current users

	Every day	5-6 days / week	3-4 days / week	1-2 days / week	1-3 days / month	Less often
P1 (n=3)	33.3% (1)	Nil	Nil	Nil	Nil	66.7% (2)
P2 (n=4)	50.0% (2)	Nil	Nil	25.0% (1)	Nil	25.0% (1)
G1 (n=4)	75.0% (3)	Nil	Nil	Nil	25.0% (1)	Nil
G2 (n=2)	Nil	Nil	50.0% (1)	Nil	50.0% (1)	Nil
D1 (n=5)	20.0% (1)	Nil	Nil	60.0% (3)	20.0% (1)	Nil
C1 (n=4)	75.0% (3)	Nil	Nil	25.0% (1)	Nil	Nil
O1 (n=11)	90.9% (10)	Nil	Nil	9.1% (1)	Nil	Nil
Mean (N=33)	**60.6% (20)**	**Nil**	**3.0% (1)**	**18.2% (6)**	**9.1% (3)**	**9.1% (3)**

4.3.4 Knowledge of hazards of cannabis use in the workplace

4.3.4.1 Participants' awareness of relationship between cannabis use and accidents

Participants were asked if they felt that using cannabis could lead to accidents in the mine. While the majority of participants (85.6%) were aware of the relationship between cannabis use and mine accidents, 12.9% said that cannabis could not lead to accidents at work, as shown in table 4.33.

Table 4.33: Participants' awareness of relationship between cannabis use and accidents

Mine	Do you think cannabis use can lead to accidents on the mine?		
	Yes	No	Don't know
P1 (n=101)	92.1% (93)	5.0% (5)	3.0% (3)
P1 (n=198)	91.4% (181)	6.6% (13)	2.0% (4)
G1 (n=111)	88.3% (98)	10.8% (12)	0.9% (1)
G2 (n=346)	80.6% (279)	18.8% (65)	0.6% (2)
D1 (n=305)	90.5% (276)	9.2% (28)	0.3% (1)
C1 (n=248)	94.8% (235)	3.6% (9)	1.6% (4)
O1 (n=202)	64.9% (131)	31.2% (63)	4.0% (8)
Mean (N=1511)	**85.6% (1293)**	**12.9% (195)**	**1.5% (23)**

4.3.5 Participants' perceptions about cannabis use

4.3.5.1 Participants' perceptions of reasons why mineworkers use cannabis

Participants who knew fellow workers who used cannabis (see table 4.29) were asked why they felt their co-workers used cannabis. As shown in table 4.34, about a quarter of respondents (27.8%) said it gives strength and helps to work better. Reasons grouped into the 'other' category include 'experimentation', 'to be high', 'lack of morals', and 'as an alternative to alcohol because it is difficult to drink on duty'. Responses in the mean column are displayed in descending order of frequency.

Table 4.34: Participants' perceptions of reasons why mine workers use cannabis*

	P1 (n=20)	P2 (n=63)	G1 (n=41)	G2 (n=49)	D1 (n=50)	C1 (n=68)	O1 (n=98)	Mean (N=389)
Gives strength (work better)	(7)	(29)	(9)	(9)	(10)	(8)	(36)	**27.8% (108)**
Don't know	(Nil)	(Nil)	(16)	(16)	(6)	(9)	(36)	**21.3% (83)**
Relieve stress/forget problems	(3)	(16)	(5)	(7)	(6)	(9)	(9)	**14.1% (55)**
To enjoy / have fun	(3)	(3)	(4)	(8)	(14)	(17)	(5)	**13.9% (54)**
Addiction	(2)	(3)	(1)	(3)	(6)	(9)	(6)	**7.7% (30)**
Helps think & plan strategically	Nil	(2)	(2)	(3)	Nil	(7)	(1)	**5.4% (21)**
Medicinal / cultural value (eyesight, insomnia)	(2)	(1)	(4)	Nil	(1)	(3)	Nil	**2.8% (11)**
Boredom / far from home	Nil	(3)	Nil	(2)	(1)	(1)	(2)	**2.3% (9)**
Makes job easier	Nil	3	Nil	Nil	1	2	Nil	**1.5% (6)**
Because their friends smoke	(2)	Nil	Nil	Nil	Nil	(2)	(1)	**1.3% (5)**
Reduces fear of going underground	Nil	1	Nil	Nil	1	1	2	**1.3% (5)**
Other	1	2	Nil	1	4	Nil	Nil	**2.1% (8)**

*(*Multiple-answer question so responses do not add up to 100%)*

5.0 DISCUSSION

This chapter draws conclusions in line with the aims and objectives of this study. It also makes comparison between the findings of this study and local and international literature.

5.1 Prevalence of substance use

5.1.1 Prevalence of alcohol use

The prevalence of alcohol use among the study population as determined from the structured interviews varied from mine to mine between 35.1% in mine G2 and 60.2% in mine P1, with a mean of 46.9% for all study mines.

The estimated prevalence of alcohol misuse as determined by the CAGE questionnaire, a screening instrument for alcohol misuse, varied between 10.7% (mine D1) and 24.4% (mine G1). The mean for all study mines is 15.3%, and is within the range of 6% to 16% prevalence that has been estimated for alcohol dependence among the average workforce, and also similar to the prevalence of 10% in a study carried out among South African adults (5,7). The estimated prevalence of misuse of 24.4% for mine G1, is lower than that of 32% in a study among some South African gold mine workers but is similar to an estimate of 25% or more, for workforces such as the mining industry (7,8). This may suggest variation in patterns of alcohol misuse across different mines in the country, and also across different commodities.

However, results of estimated alcohol misuse prevalence obtained from this study may be an underestimation because, despite reassurance about confidentiality and job security, participants may not have revealed that they use alcohol during the structured interviews. Such participants would not have been eligible to answer the CAGE questions that were used to identify respondents who were possibly alcohol dependent.

The breathalyser testing, being only a “snapshot” of alcohol use at a specific point in time, cannot assess chronic alcohol misuse. From comparison of the results of prevalence of cannabis testing obtained through the structured interviews and from objective urine testing (table 4.29), it was apparent that reported cannabis use status was not adequate to determine use because of the lower values of reported use compared to objective laboratory testing. Alcohol misuse status may also have been underestimated due to similar reasons.

Also significant is the fact that about 3% to 8% of selected employees declined participation or did not respond to “parades” (section 2.6.1.1). Although specific reasons were not given for refusal, it is not impossible that this population included employees who used substances.

5.1.1.1 Level of sobriety of respondents on duty

Although breathalyser testing was carried out for only a few days per mine and may not provide adequate information about chronic alcohol misuse in employees, it might help to give some information about the level of sobriety of employees on duty.

The percentage of breath samples containing alcohol above the legal limit of 0.10mg/1000ml of breath over an average period of five days, varied across mines between 0% and 5.9% with a mean of 1.9%. At a breath alcohol level above this driving limit, judgment is impaired, with increased risk taking behaviour and increased risk of accidents, which in the workplace exposes the individual concerned and his fellow workers to danger (29).

In mine O1 which had the highest percentage of breathalyser results above the driving limit for professional drivers (5.9%), all abnormal results (some between two to almost nine times the limit) were obtained on a Monday while all results on other days were normal. Although breathalyser testing was only carried out over a few days making it difficult to establish a pattern, this may suggest excessive alcohol use over the weekend at this particular mine, and the need for further investigation so that this can be taken into account when planning control measures.

5.1.2 Prevalence of cannabis use

The prevalence of cannabis use obtained from structured interviews varied between 0.6% and 4.9% with a mean of 2.3%, while the prevalence from objective laboratory testing varied between 4.6% and 21.5% with a mean of 9.1%. In a survey among grade 11 learners in Cape Town and Durban the lifetime prevalence of cannabis use was found to be 11% to 16% for males and in Port Elizabeth, a lifetime prevalence of 12% was reported (20). This is also similar to a prevalence of drug related problems of 20% estimated among a workforce but lower than findings of a study among Argentinean mineworkers, 65% of whom chewed coca leaves daily (6,10). It is however similar to the prevalence of 11% among adults above 18 years old in Ontario in 1984 (11).

5.1.3 Comparison of possible influence of substance use policies on prevalence of substance use in study mines

Most mines which have substance use policies (P1, D1, C1) have lower levels of breathalyser results above the legal driving limit (0%, 0.9%, and 1.1% respectively), than some mines (P2, O1) which abide by a general code of conduct (1.5%, and 5.9% respectively). As part of the alcohol policy in mines P1, D1, and C1, employees may be randomly selected for breathalyser testing when they report for work and this among other factors may well serve as a deterrent for alcohol misuse at work.

There does not appear to be any differences between the percentage of employees who may be alcohol dependent in mines P1, D1, C1, and G1

(19.4%, 10.7%, 16.8%, and 12.4% respectively) which have substance use policies, than mines P2, G1, and O1 (16.4%, 24.8%, and 17% respectively) which do not. This may suggest that while random testing and other measures may help modify alcohol misuse in the workplace, alcohol misuse outside the workplace still constitutes an issue among employees that needs to be addressed by programs such as EAPs which focus not only on the workplace but also on the social environment and factors which may encourage alcohol misuse.

There does not seem to be any clear trend in the prevalence of cannabis use among mines P1, D1, C1, and G1, which have policies (prevalence rates 4.6%, 7.2%, 7.6%, and 13.6 respectively), compared to mines P2, G1, and O1 which do not (prevalence rates 7.5%, %, 5.6%, 21.5% respectively). Less attention seems to be paid by most mines to the control of cannabis (e.g. random cannabis testing) compared to alcohol and this may have an influence on prevalence of cannabis use among employees. The highest rate of cannabis use (21.5%) and alcohol breathalyser results above the driving limit (5.9%) were, however, obtained at mine O1, which has a code of conduct, but no mechanisms in place to implement control measures.

Due to unavailability of previous data for comparison, it is difficult to determine if the prevalence rates of cannabis use and alcohol misuse obtained from this study are actually improvements on previous rates at individual mines. However, present findings may suggest variations in control of substance use achieved among mines with policies. It may also suggest that a mine policy does not guarantee adequate control of substance use among employees if the policy does not contain essential elements that are effectively implemented.

5.2 Socio-demographic profile of participants who use substances

Lower job categories were found to be associated with alcohol misuse (p=0.009) as has also been found in other studies (8,9). Low levels of education were also positively associated with alcohol use (p=0.028). This may be related to the fact that alcohol is said to be used by mineworkers to relieve stresses related to their jobs (20.5%). Employees with lower levels of education are more likely to be employed in lower job categories, which may be more physically stressful than that of employees with post-matric qualifications, and so may misuse alcohol if they feel it will help them cope with stress. This may also explain the association between cannabis use and low levels of education (p=0.0026) and low job categories (p=0.00002) as 27.8% of participants said cannabis gives strength to help cope with heavy workload.

The percentage of contract workers who tested positive for cannabis (12.2%) was about double that of fulltime workers (5.8%) who tested positive (p=0.0006). It is possible that in some mines, a quick turnover of contract workers may have led to inadequate dissemination of information about mine policies and may suggest a need to adequately incorporate this population into control programs.

There were more cannabis users among hostel dwellers (7.7%) than respondents who lived in other types of accommodation (5.3%) but this was not found to be statistically significant (p=0.22). Although living in hostels was statistically significant for alcohol misuse (p=0.02), it had a protective effect with an odds ratio of 0.61(0.41<OR<0.93), unlike a previous study among some South African gold mine workers where living apart from families for prolonged periods was found to encourage alcohol consumption (14). This may suggest a more complex relationship between type of accommodation of mineworkers and substance use, which requires further investigation. 16.8% of employees said alcohol is used to socialise and have fun. It may be that some mine hostels have more organised programs or recreational facilities that entertain employees and may discourage alcohol use as a major source of socialising. 17.7% of mineworkers who live in other types of accommodation aside from hostels were likely to be dependent on alcohol. It may well be that some employees who do not live in hostels, live apart from their families anyway in self sponsored accommodation (migrant labour) and may actually feel more isolated from family support structures than those who live in hostels in the company of co-workers.

Location of workstation was not found to be statistically significant for alcohol use (p=0.055) or cannabis use (p=0.30), although higher rates of alcohol use have been found among those who have only ever worked underground (10). Since participants of this study were not asked if they had only ever worked underground or aboveground, it is possible that employees in this study have not necessarily always worked aboveground or underground. However, the highest level of cannabis and breath alcohol results above legal driving limit in this study occurred in a surface mine with no mechanisms in place to control substance use, once again suggesting that there may be multiple factors which affect substance use among employees.

5.3 Reasons why mineworkers use substances

5.3.1 Reasons for alcohol use

About one fifth of participants in all mines (20.5%) felt that mineworkers drink to relieve stresses related to their jobs, finances, and families. Other reasons for drinking include relaxation/unwinding (16.8%), for fun/socializing (15.7%), and boredom (5.7%). These factors may not be unrelated as employees may be bored because they live apart from their families and may have a greater need to socialize with peers to relax and relieve stresses in their environment. These reasons are similar to those found among mine workers in a gold mine in South Africa, where the majority of participants used alcohol to cope with stresses of living, and to relieve boredom and loneliness (8). These conditions may encourage alcohol use, which may serve as a coping mechanism (15,16). It may suggest the need to look for effective ways to assist employees to deal with stresses of heavy workload, living away from their families, and financial problems such as Employee Assistance programs (6,37). It may also suggest the need to find other ways mineworkers can socialise.

5.3.2 Reasons for cannabis use

More than a quarter of participants (27.8%) felt that cannabis could give strength that could help to cope with heavy workload, while 5.4% felt it could help to think and plan better, and 1.54% said it helped to make work easier. Inadequate health education about substances has been found to encourage substance use (14). Cannabis may also be seen to have medicinal properties linked to cultural beliefs, as 2.8% of respondents said cannabis could give better eyesight and help to sleep in insomnia. These findings suggest misconceptions about cannabis that need to be further evaluated so that any myths may be corrected and accurate information disseminated about the effects of cannabis, as perceived beneficial effects especially in relation to coping with work, may encourage its use.

14.1% of respondents said cannabis could help to relieve stress, suggesting the need to find other ways in which employees can cope with stressors. 13.9% of respondents, said cannabis is used to have fun, suggesting the need for effective entertainment programs.

Though only 1.3% of respondents said cannabis is being used to bolster courage to go underground, it may raise the question of how psychologically prepared employees are before they commence work underground. It may suggest a need to review systems to determine any additional assessment or support required to ensure employees are not only physically but also psychologically suited to their work and the environment in which it is being carried out, as it may contribute to job related stress.

Though only 1.3% of participants said mineworkers use cannabis because their friends do, it may suggest that prominent employees who do not use substances may be used as role models in control programs.

5.4 Knowledge and practice of substance use

More respondents seem to be aware of the relationship between alcohol use and workplace accidents (97%), than cannabis and accidents (85.6%). 12.9% of respondents did not think that cannabis use could lead to accidents This may suggest a need to also increase awareness about cannabis use and accidents among mineworkers.

Almost three quarters of respondents (72.7%) in this study drank alcohol with their friends. This may suggest a need to find other activities during which employees can socialise. 22.8% of all respondents drink alone, similar to a study among South African mineworkers in which 28% of respondents drank alone, a practice thought to be associated with alcohol dependence (8).

In this study, 60.6% (n=20) of self-reported cannabis users use it everyday. This may imply use on workdays with possible impairment of concentration, potentially exposing them and their fellow workers to accidents in the workplace.

5.5 Participants' recommendations for controlling substance use

Recommendations cited by respondents for control of alcohol misuse include breathalyser testing (17.7%), rehabilitation programs for those who misuse alcohol (10.6%), disciplinary measures (7.5%), recreational facilities (4.8%), and checks by security officials to detect those who use alcohol at work (3.7%). About one fifth of participants (21.2%) said there should be awareness programs about the dangers of alcohol including display of signs prohibiting use of alcohol at work. However, the majority of participants (97%) are already aware of the relationship between alcohol use and accidents at work. This may suggest that awareness programs disseminating information on adverse effects of alcohol are not adequate to control its use, but that there should be a multi-approach system incorporating several factors as also reiterated by the International Labour Organisation (35).

Of interest is the fact that some participants (4.6%) feel that those who misuse alcohol also have to take some responsibility and exercise self control. This highlights the fact that control of substance use is not only the responsibility of mine management and that those with misuse problems also have a role to play in order to achieve success in any control program.

Although only 1.5% of participants said that provision of a happy stress free environment by mine management was important in controlling alcohol use, it may be help alleviate stresses in the workplace. Employee Assistance Programs can assist in addressing problems which may potentially become stressors in an employees' environment including the home, in a timely manner (6,37).

6.0 CONCLUSIONS

This study shows that 46.9% of respondents use alcohol. Although there was a variation across mines between 10.7% and 24.4%, a mean of 15.3% of respondents are likely to be dependent on alcohol according to the CAGE criteria. Between 0% and 5.9% of all breath samples collected contained alcohol equal to or above the legal driving limit for professional drivers of 0.10mg/1000ml, with a mean of 1.9% for all mines. The prevalence of cannabis use varied between 4.6% and 21.5% across mines, with a mean of 9.1%. Mines with alcohol policies where random breathalyser testing of employees is carried out at work had lower levels of breathalyser results above the legal driving limit for professional drivers of 0.10 mg/l, compared to mines with codes of conduct. There was no clear difference in prevalence of alcohol misuse (according to the CAGE criteria) and cannabis use, between mines that have policies and those that have codes of conduct, although the highest cannabis use prevalence (21.5%) and breathalyser results above the legal driving limit (5.9%), occurred at mine O1 which has no mechanisms in place to implement the measures in its code of conduct.

Low levels of education and low job categories were found to be positively associated with alcohol misuse ($p=0.028$ and $p=0.009$ respectively) and cannabis use ($p=0.0026$ and $p=0.00002$ respectively). Being a contract worker was positively associated with cannabis use ($p=0.0006$).

Alcohol is said to be used to cope with stresses, to relax, socialise, and relieve boredom. Cannabis is also said to be used to cope with stress and misconceptions seem to exist about its effects as some participants said it gives strength which helps to cope with the physical demands of mine work, and that it helps to think and plan better.

Although the majority of respondents were aware of a link between substance use and workplace accidents, 12.9% of respondents did not feel cannabis use could lead to workplace accidents.

Participants felt that alcohol and cannabis use can be controlled among mineworkers through awareness programs, substance use testing, rehabilitation programs to assist those who use substances, disciplinary measures for offenders, and recreational facilities to relieve boredom.

7.0 TECHNOLOGY TRANSFER

7.1 Training of research assistants

Research assistants who speak local languages were trained to administer questionnaires with transfer of expertise on research and fieldwork. Two of these participants were also trained to capture data on excel statistical package.

7.2 Training of postgraduate students

This research was split into several portions and served as research projects for five postgraduate students from University of the Witwatersrand School of Public Health, with transfer of project management skills.

7.3 Provision of background information on alcohol and cannabis use among mineworkers in South Africa

Feedback on the findings of this research will be given to participating mines and other stakeholders. It will provide valuable information for researchers, and also for stakeholders in the mining industry that will assist in policy formulation to improve health and safety.

7.4 Provision of information on planning future research

Lessons learnt in carrying out this research may assist future researchers in planning similar studies.

7.5 Dissemination of information on resource centers dealing with substance-related issues

Each participant was given a pamphlet with information about support structures for substance-related issues in their area. This served as an immediate resource to participants who could also share the information with other people in their community.

7.6 Determination of validity of rapid test kit for cannabis testing

This study also provided information on the sensitivity and specificity of a rapid test kit, which may guide future users in selection of screening methods for cannabis.

8.0 RECOMMENDATIONS

Alcohol and cannabis use among mineworkers has a potential to increase workplace accidents, morbidity, mortality, and health care utilisation, with estimated loss to industry of millions of Rands. (38). Though further research needs to carried out to find out more about alcohol and cannabis use among mineworkers, the findings of this study suggest the need for a multi-approach control system with the objective of preventing and reducing substance use among mine workers, while also managing substance use related problems. This may be achieved through industry-regulated guidelines on how to control substance use, with emphasis on essential components which need to be included in a policy document to be implemented by mines, such as that outlined by the ILO (35). However other components may be added depending on the special needs of each mine. Programs should be designed such that employees with low levels of education and job categories and those in contract jobs are properly indoctrinated into control programs.

Essential components that should be included in these guidelines include the following:

- Early involvement of stakeholders in program development
- Information gathering about substance use among mineworkers
- Awareness programs
- Protocols for substance use testing
- Disciplinary procedures
- Employee Assistance Programs
- Leisure activities
- Monitoring and evaluation
- Compilation of policy document and dissemination of information

8.1 Early involvement of stakeholders

It is important that all stakeholders including the tripartite alliance of employees through their representatives, employers, and Government, be involved in the control process. There should be clear roles, objectives, and open lines of communication with designated channels for information dissemination and feedback.

While existing health and safety/Union representatives may be utilised as employee representatives, it may be advisable to also include in committees steering substance use related issues at mines, champions such as recovered

substance users with a passion for substance use issues. Other partners would include Non-Governmental-Organisations (NGOs), which deal with substance use related issues. The approach should not be dictatorial or punitive, but should view substance use as a health/social issue.

8.2 Gathering of information about substance use

There is a need to find out more information about cannabis use among mineworkers through further research (focus groups will be carried out as an adjunct to this research), informal information gathering from employees, literature search about specific strategies that have worked or failed in similar situations, and information sharing between mines. This will assist in developing programs that are more likely to succeed.

8.3 Awareness programs

It is important to ensure that information is disseminated to all employees in local languages (in easy to understand formats), about the effects of substance use in the workplace which not only puts themselves at risk, but also their colleagues. Gaps in knowledge should be filled for example debunking of myths about cannabis being able to give strength. Awareness programs should be continuous and not once off.

8.4 Protocols for substance use testing

Protocols should exist on issues surrounding testing such as when testing should be done (pre-employment, random, and post-incident), how it should be done, who should be present during the test (including employee representatives), what values constitute a positive test, and what will be done should a result be positive. Although there is currently no industry benchmark for breath alcohol levels of miners at work, it may be advisable for industry to stipulate a limit that will be adhered to by all mines. Currently some mines use the legal driving limit for non-professional drivers of 0.24mg/1000ml of breath. However, it may be necessary to consider stipulating the legal limit of 0.10mg/1000ml for professional drivers, as heavy and complex machinery is often used in mines.

Ethical issues need to be considered such as obtaining consent for testing, what inferences will be drawn should an employee refuse to be tested, and how employees will be selected for random testing such that employees in all job categories are eligible for selection (e.g. computerised random selection at mine entrance).

Security officials, supervisors, and team leaders also need to more vigilant in detecting signs of substance use in employees.

8.5 Disciplinary procedures

Decisions should be taken on how to deal with employees who use substances. Disciplinary procedures could include disciplinary hearings, suspension, and expulsion following a laid down progression.

8.6 Employee Assistance Programs

While the mining industry can do a lot to minimise stresses in the workplace, it is important to note that employees cannot be treated in isolation from the broader community in which they live, and that events in employees' social environment can also act as stressors that may encourage substance use. It is important to try to address root causes of substance use through EAPs which should not only be about rehabilitation of those who use substances in terms of counselling to stop using substances, but should target stressors in employees' environment (including those who do not use substances) such as financial and family problems that may encourage substance use.

Efforts should be made to provide a happy, healthy working environment and employees should be encouraged to voluntarily discuss their problems, and measures should be put in place to ensure confidentiality. Assistance should be given as required and could include teaching ways of handling stresses, educational programs to help workers advance in their careers, and scholarship funds for some employees' children based on laid down criteria.

Those who misuse substances however also need to make a firm commitment towards change and a buddy system may be established whereby co-workers can encourage those who use substances to seek help for their problems, and support them.

8.7 Leisure activities

As employees live apart from their families in some mines, boredom needs to be addressed and avenues where employees can socialise need to be developed such as sports facilities featuring activities that will be enjoyed by the majority of employees. Where recreational facilities already exist, there may be a need to find innovative ways to ensure that they are being maximally utilised such as inter-mine sporting competitions with award of prizes etc. Although some mines already have married quarters in their hostels allocated to some married mineworkers, there may be a need to move towards this type of accommodation for married miners in all mines that have hostels, as this will provide a more stable support system.

8.8 Monitoring and evaluation of programs

The programs above need to be audited both internally by individual mines, and externally by industry appointed bodies to evaluate, on a continuous basis, to identify necessary modifications for improvement. This evaluation process should include periodic research projects so that comparison can be made with baseline data initially obtained from the initial information gathering

process (such as decrease in rates of substance use). Successes and challenges should be shared with employees so as to encourage and challenge them to achieve more.

In mines where policies are already in existence and assessments of programs have not been carried out, it may be time to evaluate what has been achieved progress and what needs to be done differently to achieve better results in controlling alcohol and cannabis misuse among employees. This evaluation process should assess input, process, and output related to the program, and where possible economic evaluations may be carried out to determine the cost effectiveness of intervention programs.

8.9 Compilation of policy document and dissemination of information

After the elements of a policy as discussed above have been agreed upon by stakeholders through a consultative approach, it is important to document this, summarise the information, and disseminate it to employees through appropriate forum. Posters and flow charts can be designed to explain components of the policy in local languages.

APPENDIX 1

Table of minimum sample sizes for prevalence studies at 95% precision

Margin of error	Maximum expected prevalence rate (%)*							
	1%	**2.5%**	**5%**	**10%**	**20%**	**30%**	**40%**	**50%**
0.5%	1 522	3 746	7 300	13 830	-	-	-	-
1%	381	937	1 825	3 458	6 147	8 068	9 220	9 604
2%	-	235	457	865	1 537	2 017	2 305	2 401
5%	-	-	73	139	246	323	369	385
10%	-	-	-	35	62	81	93	97
15%	-	-	-	-	28	36	41	43

*(*If the prevalence is greater than 50%, use 100 minus the percentage)*

APPENDIX 2A

Obtaining collective consent from mine management and Union representatives

1. Establishing contacts with stakeholders

1.1 Obtaining contact details of stakeholders

1.1.1 Obtaining contact details of mine management

Contact details of mine management representatives may be obtained from the SIMRAC offices or from researchers who have previously carried out some research at the mine in question. Most mines usually co-ordinate Health and Safety research through a management representative in their Safety section.

1.1.2 Obtaining contact details of Union representatives

There are usually different Union groups representing different groups of employees in each mine. Some Union groups have representatives at the National, Regional, and mine levels. It is advisable to ask about the different Union groups in each mine from the mine management and how to approach them, so as to assist in contacting representatives according to the natural hierarchy of each Union group. Contact details of National Union of Mineworkers (NUM) representative in charge of Health and Safety issues at the National level may also be available from the SIMRAC offices, but can be obtained by phoning the NUM offices in Johannesburg. Contact details of regional NUM representatives can be obtained from National representatives, and contact details of NUM representatives at the mine level are available from the regional representative. Contact details of other Union groups are usually obtainable from mine management representatives.

1.2 Contacting stakeholders

Phone the management representative and email or fax letter describing the study, introducing the study team, and asking for permission to carry out the study on their mine. Attach abridged research protocol, questionnaire, consent form, and other data collection tools. Also include team contact details. Contact Union representatives at the different levels with similar information.

1.3 Scheduling of meetings with stakeholders

While it is essential to schedule separate meetings with the Union representatives at the National level, meetings with regional and mine representatives may be scheduled for the same date as sometimes regional representatives may actually be based at the mine in question.

Initial personal contact with mine management and Union representatives at a particular mine can be made at a date agreed on by all parties for a presentation by the research team to both parties to discuss the research. However, at some mines, Union representatives may prefer to have a separate presentation without management representatives present as this may facilitate free discussion among the Union representatives after the presentation. A separate presentation for stakeholders may also be necessary because Union representatives and mine management

representatives may not be able to arrive at a suitable date when both parties would be available. Obtain adequate information about how to get to the mine (maps where available) from management representatives.

Note that some mines require first time visitors to fax a copy of their identification document at least 48 hours before a visit to the mine for clearance purposes. Details about mine clearance protocols can be obtained from the management representative.

2. Reaching a consensus about mine participation in study

Following the presentation, ask stakeholders about way forward. This usually differs from mine to mine. Team members may be required to come for another presentation to a larger Union group e.g. Shop Steward Council, Unions officials present may want to discuss further with other representatives not at the meeting or a decision may be taken by the Unions right after the presentation to participate in the research. It is however, more usual for Union representatives to request for time to discuss the issues further at their executive committee. Find out the date of their next Union meeting and negotiate for early feedback about outcome. There may be a need to contact Union representatives before the date of the Union meeting to confirm that the research has been included on their meeting agenda to avoid delays due non-inclusion on the agenda.

There may be a need to pay several visits to stakeholders at the mine for further meetings with Union representatives before consensus is reached. Should stakeholders agree to participate, set a target date for commencement of data collection and commence preparations.

APPENDIX 2B

INTRODUCTORY REMARKS FOR INTERVIEWER

1) Obtain signed consent from participant.
   - Introduce yourself.
   - Explain that you have come to find out more about alcohol and dagga use among mine workers and its relation to health and safety, and that recommendations will be made to stakeholders to improve health and safety of mine workers.
   - Inform about random selection of participants.
   - Assure of confidentiality and anonymity.
   - Explain samples: urine for dagga and breath for alcohol only. Breathalyser will not reflect results on monitor.
   - Explain need for **signed** consent (requirement by Wits Ethics Committee to protect rights of participant and ensure participation is voluntary).

2) Number questionnaire as directed and fill other details at beginning of form (time and date of interview etc).

3) Read notes for interviewers in questionnaire and follow prompts as appropriate.

4) In multiple-answer questions with "other" option, always ask participant if there's anything else.

5) Where specified, write in responses clearly.

6) Ensure all questions that apply to participant are filled. Where respondent declines to answer any question, indicate as such.

7) Thank each participant after interview and give letter about where to get more information on alcohol and dagga use.

8) Give each participant a urine sample bottle. Instruct to collect "first catch" and fill three quarters of sample bottle with urine.

9) Accompany participant to interviewer in charge of breathalyser testing and wait till procedure is completed.

APPENDIX 3

Information required to facilitate planning of data collection

The following information can be obtained from the mine management representative and will assist in giving background information on the mine as well as facilitate the data collection process. Where information is required about numbers of employees and job categories, request for updated lists. Information required include the following:

- Documents on the history and type of the mine.
- Mine substance use policy. Should there be no policy document, ask for the current code of practice concerning substance use.
- If the mine clinic has adequate facilities to serve as one of the support structures for employees with substance use problems that want to seek help, information about which will be given to all participants on a pamphlet. Also find out from the management official or clinic staff about other centres in the area, which may provide similar services.
- Total employee size (including management) and how many full-time workers and contract workers there are.
- Number of shafts in the mine
- Number of shifts that work at the mine (i.e. morning, afternoon, or night), and if there is an extra off-duty shift and the time each shift starts and stops working.
- If employees work permanently on one shift e.g. permanent morning shift staff or if they belong to a specific team or "gang" but rotate between shifts along with other team members.
- The two days all the "gangs" can be accessed at the shaft i.e. the days when some gangs are going off duty and the gangs who were previously off duty are coming back to work. This will assist in planning data collection days to include these days as missing these two days may delay data collection for a week just to access the workers who were off shift during data the initial data collection period.
- If the shafts operate on weekends and if so, if it is throughout the weekend or either Saturday or Sunday (to know if you data collection can be scheduled to include weekends)
- If employees stay in the hostel and are brought to work by bus or if they stay in the surrounding locations and arrange for their own transportation, and their arrival times at the shaft as this will assist in planning arrival time of data collection team at the shaft.

- Rooms that can be used for interviews to ensure privacy. Space that could be utilised includes disused tearooms, training centres, computer/record rooms, or big halls which can be partitioned off to give some privacy. Put the number of research assistants who will be collecting data into consideration when requesting rooms.

- Human Resource officers at the shaft whose help is invaluable in “parading” selected employees (i.e. selected employee numbers are entered into a computer such that they are not initially allowed entrance into the mine through an electronic gate. They are then introduced to the research team and are invited to participate).

APPENDIX 4

Subject Information form for participants

Dear Worker,

Hello, my name is …… I have come to conduct a study in your mine. The aim of this Study is to investigate the prevalence of alcohol and substance use, and the knowledge, attitudes and practice regarding its relationship with health and safety on the mines in South Africa. There will be analysis of the quantity and type of accidents experienced on the study mines. A correlation between alcohol and cannabis use and mining accidents at the study mines will be determined.

The method of study will include the following:

- Trained interviewers will conduct interview.
- Randomly selected participants who have consented to take part in the study will answer anonymous questionnaires.
- Testing the urine, and breath samples of the same participants. These will not be linked to the participants. These tests are non invasive and will not cause any discomfort to the participant. The urine will be tested for cannabis and the breath for alcohol. No other tests besides these will be carried out on your samples. The results of these tests cannot be linked to the participant.

  The medical services of the mine will provide medical and social services for any participant that may subsequently request to investigate or manage their cannabis or alcohol use or any other health issue.

A review of mine records to analyse the quantity and type of mine accidents in 2000

The results of the study will be anonymous i.e. not linked to the participant or study mine. This is because the person interviewing you and taking samples from you will not be the same person analyzing the questionnaire that you will answer and tests that have been done on you. All written documents regarding you will not carry your name and therefore the answers on the questionnaire and the results of the tests cannot be traced back to you.

The results of the study will be made available to all stakeholders involved in the accident prevention and promotion of health and safety in the mines in South Africa so that relevant policy to provide safer working environment will be developed.

Participation in this study is voluntary and you are free to refuse to participate or to withdraw your consent and to discontinue participation at any time. Such refusal or discontinuance will not affect your status and benefits as an employee.

Participation in the study will take about thirty minutes. This time has been negotiated with the mine so that it is considered as working time. If you agree to participate in the study, please answer the questions as honestly as you can. Your opinions are very important, so feel free to express them.

I have fully explained the procedures, identifying those, which are investigational, and have explained their purpose. I have asked whether or not any questions have arisen regarding the procedures and have answered the questions to the best of my ability.

Date _____ Researcher _____

Date _____ Participant _____ OR Thumb print _____

Consent form for participants

I have been fully informed as to the aim, objective and procedures to be followed in this study, including those that are investigational.

In signing this consent, I agree to participate in this study by:

- Answering a questionnaire that will ask me about my knowledge, attitudes and practice regarding alcohol and cannabis use and how these are related to mine accidents.
- One sample of urine to test for cannabis, and a sample of my breath to test for alcohol, will be collected from me. No other samples or tests will be performed.

I understand that I am free to participate or not participate in this study.
Any information about me is confidential and cannot be traced back to me.
Questions that I have had regarding this study have been answered to my satisfaction and I understand that if I have any questions at any time they will be answered.
I am also free to withdraw from this study at any time and this will not influence my status and benefits as an employee.

Date _____ Researcher _____

Date _____ Participant _____ OR Thumb print _____

APPENDIX 5: ALCOHOL AND SUBSTANCE USE QUESTIONNAIRE

Questionnaire No: _____ Date: ___/___/ 2002 Day: _____

Time: _____am/ pm Interviewer: _____

Interviewer, please CIRCLE appropriate responses, and FILL IN participant's responses where specified.

SECTION 1: DEMOGRAPHIC INFORMATION

(1) What was your age at your last birthday? _____ (years)

(2) Is participant
- (1) Male?
- (2) Female?

(3) Are you a
- (1) Contract worker?
- (2) Full-time employee?

(4) What is your country of origin? _____

(5) What is your main language?
- (1) Zulu
- (2) Tswana
- (3) Sotho
- (4) Pedi
- (5) Tsonga
- (6) Venda
- (7) Xhosa
- (8) Swazi
- (9) English
- (10) Afrikaans
- (11) Other ***(specify)*** _____

(6) What is your religion?
- (1) Christian
- (2) Islam
- (3) Traditional worship
- (4) Hindu
- (5) Other ***(specify)*** _____

(7) What is your highest level of education? ***(Interviewer, if high school, please specify last standard passed)*** _____

(8) What is your marital status?
- (1) Single, **NEVER MARRIED**
- (2) Married
- (3) Living together
- (4) Divorced
- (5) Separated
- (6) Widow/widower

(9) What type of sleeping accommodation do you have?

(1) Hostel
(2) Single hired room
(3) More than one hired room
(4) Own housing
(5) Shared off site accommodation
(6) Other ***(specify)*** _____

(10a) Does any member of your family live with you?

(1) Yes
(2) No

(10b) If yes, please specify relationship ***(Interviewer, circle more than one response, if appropriate)***

(1) Wife
(2) Husband
(3) Child/Children
(4) Brother/Sister
(5) Parent
(6) Other ***(specify)***

_____

(10c) If no, how often do you see your family? (specify) _____

(11) Where do you work?

(1) Underground
(2) Aboveground

(12) Tell me in your own words what type of job you do _____

_____

(13) How long have you been doing your present work? _____

(14a) Would you say your job is dangerous? ***(Interviewer, read out options)***

(1) Never
(2) Sometimes
(3) Most of the Time
(4) All of the Time

(14b) Why? ***(Interviewer, also probe for reasons such as previous accidents experienced by participant or co-workers, and specify type of accident)***

_____

SECTION 2: ALCOHOL USE INTERVIEW

(15a) Most of us have tried alcohol at one time or the other for different reasons. Have you ever used alcohol for any reason such as experimentation, relaxation? ***(Interviewer, probe for all kinds of alcohol including home-made brew such as umqombothi, sorghum beer etc)***

(1) Yes ? Why? (specify)_____
(2) No ***(If no, please go to Q28 on page 5)***

(15b) If yes, do you currently drink alcohol?

(1) Yes (***If yes, please go to Q16 below)***
(2) No

(15c) If no, how long ago did you stop? _____

(15d) Why did you stop? ***(Interviewer, probe for reasons such as health effects, advice of friends/health worker, accidents etc)***

_____

(16) For how long have you been using/did you use alcohol? ***(Interviewer, ask respondent to estimate)*** _____

(17) Did you start taking alcohol

(1) Before starting work on this mine, or any other mine?
(2) After starting work on this mine, or any other mine?

(Interviewer, if respondent has stopped taking alcohol, go to Q28)

(18) Who are you usually with when you drink?

(1) Alone
(2) With friends
(3) Other ***(specify)*** _____

(19) Where do you usually go for a drink? _____

(20) What type or types of alcohol do you drink? ***(Interviewer, read out options and circle more than one, if appropriate)***

(1) Beer (such as castle etc),
(2) Wine
(3) Spirits (such as whisky)
(4) **TRADITIONAL** beer
(5) Other ***(specify)*** _____

(21) When do you usually drink?

(1) Evenings
(2) Weekends
(3) Daytime
(4) Other ***(specify)*** _____

(22a) How often do you have a drink containing alcohol?

(1) _____times per day
(2) _____times per week
(3) _____times per month
(4) Other ***(specify)*** _____

(22b) Estimate as accurately as possible, how much and what type of alcohol you have drunk in the last two weeks. *(Interviewer, in communal drinking, try to estimate. Show participant containers provided to assist estimation).*

DAY (fill in day of week)	**Beer-cans (specify if 450mls/ 340mls)**	**Beer-bottles (750mls)**	**Wine-bottles (750mls)**	**Wine**	**Traditional beer**	**Other e.g. spirits, sorghum beer (specify)**
(Wk 2)						
(Wk 1)						
yesterday						

(23) Have you ever felt you ought to cut down on your alcohol drinking?

(1) Yes
(2) No

(24a) Have people criticized your drinking of alcohol?

(1) Yes
(2) No

(24b) If yes, does it annoy you?

(1) Yes
(2) No

(25) Have you ever felt bad or guilty about your drinking of alcohol?

(1) Yes
(2) No

(26) Have you ever had a drink of alcohol first thing in the morning to steady your nerves and get rid of a hangover/"babalas"? ("eye-opener").

(1) Yes
(2) No

(27) **<u>Interviewer, if respondent answered yes to any of the questions above (Q23 to Q26) ask him this:</u>** Have you ever sought help to decrease your use of alcohol?

(1) Yes (please specify type of help)_____
(2) No

(28) Do your fellow workers use alcohol?

(1) Yes
(2) No
(3) Don't know

(29) Are there specific times when miners drink a lot of alcohol? ***(Please explain)*** _____

(30) Why do you think mine workers take alcohol? ***(Please explain)***

_____
_____

(31a) Do you think that drinking alcohol can lead to accidents in the mine?

(1) Yes
(2) No

(31b) Do you think anything can be done to influence alcohol use among miners?

(1) Yes
(2) No
(3) Don't Know

(31c) Please explain your answer. _____
_____
_____

SECTION 3: SUBSTANCE USE INTERVIEW FORM

I am now going to ask you questions about dagga. Remember that all the answers you give are anonymous and cannot be traced back to you.

(32a) Some people have used dagga at one time or the other for reasons such as experimentation, treatment of illnesses. Have you ever used dagga *(pache, lebake)?*

(1) Yes.?
Why?(specify)_____
(2) No ***(If no, please go to Q41)***

(32b) If yes, do you currently use dagga?

(1) Yes ***(If yes, please go to Q33 below)***
(2) No

(32c) If no, how long ago did you stop? _____

(32d) Why did you stop? ***(Interviewer, probe for reasons such as health effects, advice of friends, accidents etc)*** _____
_____

(33) For how long have you been taking/did you take dagga? ***(Interviewer, ask respondent to estimate)*** _____

(34) Did you start taking dagga
- (1) Before starting work in this mine, or any other mine?
- (2) After starting work in this mine, or any other mine?

(Interviewer, if respondent has stopped taking dagga please go to Q41)

(35) How often do you take dagga?
- (1) _____times per day
- (2) _____times per week
- (3) _____times per month
- (4) Other ***(specify)*** _____

(36) When do you usually use dagga? ***(Please explain)*** _____
_____

(37) Can you stop using dagga if you want to?
- (1) Yes
- (2) No

(38) Do you ever feel bad or guilty about using dagga?
- (1) Yes
- (2) No

(39a) Have people complained about your use of dagga?
- (1) Yes
- (2) No

(39b) If yes, does this annoy you?
- (1) Yes
- (2) No

(40) **Interviewer, if respondent answered yes to any of the questions in 37 to 39 above, ask him this**: Have you ever sought help to stop the use of dagga?
- (1) Yes (please specify type of help)_____
- (2) No

(41a) Do your fellow workers use dagga?
- (1) Yes
- (2) No
- (3) Don't know

(41b) If yes, why do you think they use it? ***(Please explain)***
_____
_____

(41c) If no, why do you think they do not use it? ***(Please explain)***
_____
_____

(42) Are there specific times when miners take **A LOT OF** dagga? ***(Please explain)*** _____

(43a) Do you think that using dagga can lead to accidents in the mine?
(1) Yes
(2) No

(43b) Do you think anything can be done to influence dagga use among miners?
(1) Yes
(2) No
(3) Don't know

(43c) Please explain your answer _____
_____

(44a) Do you think that working in the mines is dangerous to your health?
(1) Yes
(2) No
(3) Don't Know

(44b) If yes, how is it dangerous to your health? ***(Interviewer, also probe for reasons such as previous accidents in participants and colleagues and ask for type of accident)***
_____
_____

(45a) Are there any recreation facilities (such as sports fields) available at your mine?
(1) Yes
(2) No
(3) Don't know

(45b) If yes, please specify type _____
_____

(46a) Do you think that sport and recreation facilities influence the use of alcohol and dagga?
(1) Yes
(2) No
(3) Don't know

(46b) Give an explanation for your answer _____
_____

THANK YOU FOR YOUR COOPERATION AND YOUR TIME.

APPENDIX 6
Mini questionnaire for breathalyser testing. Questionnaire No _____

Interviewer, please ask participant the following questions, and follow instructions as appropriate.

Question 1

Alcohol residues in the mouth may give false measurements, and in high concentrations can shorten the lifespan of breathalyser sensor. Such residues may be left in the mouth in the circumstances described below. It is therefore important to ask participants about this before breathalyser measurements are taken.

1) Have you used/done any of the following in the past 15 minutes?

a) Mouth sprays (1) Yes (2) No

b) Medicines and drops such as cough syrups or QUIT (1) Yes (2) No
c) Vomited (1) Yes (2) No

(Interviewer, note, "QUIT" is a spray, which is used to assist in quitting cigarette smoking and contains considerable amounts of alcohol. If respondent answers yes to any of the above, ensure that an interval of at least 15 minutes has elapsed since the activity/last use, before you take a reading).

Question 2

As tobacco smoke in expired air may damage the breathalyser, it is important to ask about the following:

2) Have you smoked any tobacco products in the last 2 minutes? (1) Yes (2) No

(Interviewer, if the response is yes, please ensure an interval of at least 2 minutes has elapsed since last use, before you take a breathalyser reading).

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