CHAPTER 1

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

1.1.1 Alcohol

Alcohol has played a major role in the socio-cultural and religious lives of people in most parts of the world. In Africa, the consumption of alcohol predates the colonial era as beer was used to celebrate various religious ceremonies and feasts as recorded by oral and written tradition.[1]

There were guiding norms that controlled the use of alcohol and these norms were largely effective. These norms restricted the use of alcohol to adult males as drinking was largely communal and only took place on special occasions.[1]

The advent of colonialism brought a change to these norms as alcohol was seen by the colonial masters as a means of mobilizing and controlling the cheap labour force in the agricultural sector. This led to the introduction of the "dop" or "tot" system.[2]

The advent of gold mining in South Africa led to the extension of this practice to the mining industry.[2]

Alcohol consumption in the mines has been on the increase.[3] Social problems such as violence and medical problems associated with excessive alcohol use such as hypertension, gastritis, liver cirrhosis and depression have also increased alarmingly.[4]

1.1.2 Cannabis

Cannabis is the most widely used illicit drug in the world with an estimated 144 million people using it annually.[5] It is the main drug of abuse on the African continent.[6] Its use has been linked to occupational accidents, an increase in health care services utilisation and costs as well as decreased productivity.[7,8]

1.2 STATEMENT OF THE PROBLEM

Alcohol misuse is a significant public health challenge in today's South Africa. It is estimated that 6-16% of the workforce is likely to be alcohol-dependent and that a further 20% might likely experience drug or drug-related problems.[9,10]

Cannabis (46%) and alcohol (32%) have been implicated as causative factors in patients with trauma injuries.[11] They have been shown to cause road traffic accidents [12, 13] as well as increased mortality, morbidity, accidental injury, homicide, assault and suicide.[14, 15,16]

Alcohol and to a lesser degree Cannabis are popular drugs in the mining industry and have been shown to contribute to employee illness, injury, increase in health service utilisation and costs.[17] They have also been shown to be related to several workplace outcomes such as decreased productivity and poor labour market performance.[18]

The impact of the high prevalence of alcohol and Cannabis on the medical services and the economy of the mines can be quite negative as it imposes a substantial financial burden on mine management in particular and the society at large.[13, 18]

Alcohol and Cannabis use lead to an increase in sickness, absence and absenteeism, which for the mines increases costs and decreases productivity. It has been shown that significant costs incurred for medical reasons in the mining industry are directly attributable to alcohol abuse.[17] Thus, for effective cost containment being currently emphasized in the mining industry to be realizable, one of the factors amongst others that have to be reduced might be the high prevalence of alcohol and Cannabis.

In South Africa, 77% of patients attending the Tygerberg Hospital Trauma Unit and 65.9% of adults that were involved in fatal collisions in Cape Town Municipal area had blood alcohol levels higher than the legally accepted normal of 0.08g/100ml at the time.[13]

1.3 JUSTIFICATION FOR THE STUDY

Anecdotal evidence suggests the use of alcohol and cannabis to be widespread in the general population. Though this is suspected to hold true for the working population, a paucity of published data on cannabis and alcohol use and abuse in the mining industry currently exists. Alcohol has been recognised as a problem in the workplace since the 1940's [24] but few studies have documented the magnitude of this problem, particularly with regards to the mining industry.

Although certain factors such as boredom, poverty and weak legislation [25] as well as poor social support [26] have been implicated as contributory factors to high alcohol consumption in the general populace, the underlying social and economic determinants that drive miners, particularly on diamond mines, to smoke cannabis and use alcohol

before and/or during working hours have not been extensively investigated. Alcohol and cannabis use lead to psychomotor disturbance, thus workers under their influence are not only a danger to themselves but also to others.[27] Also, the costs that result from lost shifts due to alcohol abuse as well as treatment costs for alcohol-related problems run into millions of Rand per annum.[17] These high costs and the potential risks to the public health of workplace alcohol and cannabis abuse are now of major concern to the mining industry. [8]

This study aims to determine the knowledge, attitudes, practices and prevalence of alcohol and cannabis use on a South African diamond mine. By doing this, it is hoped that the extent of the problem will be estimated, and that appropriate intervention strategies which can be integrated into existing social programmes/structures to help combat the threat that alcohol and cannabis use poses to the health and safety of the employee, productivity and the overall cost-effectiveness of the industry will be determined.

It is also hoped that information gathered from this study will help form the basis of a uniform policy framework and ultimately to laws that will make the mining industry free from the adverse consequences resulting from the misuse of alcohol and the use of cannabis and other illicit drugs. In the absence of readily available national survey data, the United Nations has often relied on reports of treatment seeking, convenience samples and narcotics trafficking to estimate the intensity of international drug use .[28]

This study will therefore not only contribute to the formation of a reliable data base, but will also help establish a baseline of reference for other studies as well as a reference point for monitoring intervention programmes that may be instituted in the South African mining industry.

1.4 LITERATURE REVIEW

For many years, the abuse of alcohol and mood altering drugs (amongst them cannabis) has been a major source of concern in the workplace.[29] This is because the prevalence figures for alcohol and drug use have been alarming both locally and internationally. The consequences of this for business and the workforce could be dire if not checked in time. Negative effects of such abuse such as absenteeism from work, increase in use of medical benefits and workers compensation claims, poor productivity, high job turnover, interpersonal conflicts, workplace injuries and damage to workplace property have all been documented.[30]

1.4.1 Alcohol Use

The rise in the prevalence of alcohol consumption in the general populace has been attributed to a lack in public knowledge towards the use of alcohol and drinking guidelines.[31] In a New Zealand study, 74% of the population did not know about drinking guidelines and felt that it was not publicised enough.[31]

In the workplace, adverse working conditions such as high job demands, high hazardous physical working conditions as well as other stressful circumstances have been associated with high levels of alcohol intake. [32] This study noted that although there was significant linear association between alcoholism and workplace accidents, the subject of an association between work stress and alcoholism remains inconclusive. Bennett and Lehman [21] in their study showed that employee exposure to co-worker alcohol use have been associated with lack of work group cohesion and increased accidents amongst other problem indicators. They also stated that social drinking sometimes serves as a primary means of support for employees who work under stressful conditions. It has been argued that adverse working conditions are associated with excessive or problematic alcohol use, and that the stressful condition extends outside the work-life of the individual. [19, 32] Support for the 'spill over effect' of adverse working conditions being associated with problematic alcohol use has been weak [19] This weakness has been explained by numerous reasons which include under-reporting and denial by drinkers. [8 26,21] Greenberg [23] noted that despite the volume of studies conducted in this field, results are often contradictory.

Alcohol use in the workplace

The highest percentage of alcohol abuse and indeed alcohol-related deaths in the industry were recorded amongst industries associated with wholesale trade, transportation/utilities, mining and manufacturing. [33]

With regards to the contribution of alcohol to injuries in the workplace, the Centres for Disease Control in the USA reported in 1991 that 7% of workers are injured annually (because of alcohol) in an occupational setting in the USA. [34]

Between 1872-1973, alcohol was implicated in 19% of industrial injuries treated at the University Central Hospital in Helsinki, Norway. [35]

In 1978, a study on fatally injured workers in various jobs reported that about 11% of the deaths had a blood alcohol level greater than 0.08mg% in Maryland, USA [36] In a study of fatal workplace injuries in Pennsylvania (USA) between 1983 and 1984, the prevalence of workplace injuries associated with blood alcohol levels greater than 0.08mg% was estimated to be 17%. [37]

A retrospective study of reported fatal occupational injuries in North Carolina from 1978 to 1984 showed a positive blood alcohol level in 11% of the injured workers. This included both motor vehicle fatalities and homicides. [38] In Alberta, Canada, a study of 373 fatal work-related injuries between 1979 and 1986 revealed a 10.7% [8] prevalence of blood alcohol level equal to or greater than 0.08mg%.

In West Germany, a study carried out between 1963 and 1974 implicated alcohol in about 10% of all industrial accidents. It was also found out in the same country that all fatal injuries in industrial settings had a blood alcohol level greater than the accepted level for that country of 0.05mg% between 1962 and 1970. [39]

In Argentina, studies carried out amongst high altitude miners between 1976 and 1977 showed that 34% of the respondents consumed alcohol on a weekly basis, [40] the same study reported a prevalence of 30% amongst accident cases and 64% for cases referred for disciplinary purposes.

Alcohol use in South African mines

In South Africa, a study on a Free State Gold mine reported the prevalence of alcohol abuse to be 32%. [17] This same survey also showed a prevalence that is higher amongst mine workers than what is obtained for the general populace, at between 10 to 35%. [41] In a 1994 survey of another Free State gold mine, it was reported that the main reasons for drinking alcohol amongst miners were to deal with worries, loneliness and boredom as well as for recreation and socialization. [3] In this study, 42% of the respondents who took alcohol reported drinking in order to deal with the stress of living. Rocha Silva et al. in 1995 reported that a majority of the respondents in their study i.e. 49.6% drank for the purposes of enjoyment, fun and entertainment. [42]

Kew in his 1994 study of alcohol consumption patterns on a gold mine in South Africa, reported that high-risk drinkers preferred to drink alone.

Alcohol use in the South African populace

With regards to the knowledge of the dangers of alcohol misuse, Mbombo et al. reported that most people in the general populace saw alcohol as potentially harmful to the individual, family and community. [43] Of particular concern to the participants was the danger alcohol misuse posed to pregnant women. The participants also believed that European alcohol was more dangerous than traditional beer. With regards to attitudes and practices towards alcohol consumption, the researchers in this study also reported that people drank in order to feel better, to socialize and to cope with problems. The problems enumerated were general problems, health problems and oppression. It was however worthy of note that several participants, although reporting that they drank alcohol as a coping mechanism towards problems, still believed that their problems did not go away and that even more problems were created by their drinking.

Most studies have shown that people drink in the company of friends or relatives. Rocha Silva et al. reported that 71.3% of drinkers drink in the company of friends. [42]

In the studies of Rocha Silva et al. in 1992 [42] and Mbombo et al. in 1994, [43] shebeens were reported to be the most popular places to drink in both studies. Other places such as bars, bottle stores, houses of friends and own homes were also reported as preferred places for drinking.

These studies have shown that most people drink alcohol in the company of other people and usually do so outside their own homes. They also show that alcohol is used as a coping mechanism to combat stresses of living, loneliness and boredom.

These different studies therefore advance the same reasons for drinking in both miners and the general populace.

1.4.2 Cannabis Use

A New Zealand survey revealed that 41.3% of male respondents and 43.3% of the female respondents began to smoke cannabis whilst at school. [31] Similarly, the high prevalence in the general populace with regards to cannabis use was blamed on peer pressure and lack of knowledge of its side effects. [44]

Cannabis use has been shown to produce impairment in a wide range of cognitive and behavioural performances. It has also been shown to lead to a "slowing of reaction time and information processing, impairment of motor coordination and performance, short-term memory attention, signal detection as well as tracking behaviour and time perception". [45] These effects are dose-dependent and are larger and more persistent on tasks that require sustained attention.[45] The dose-dependent relatedness of cannabis use and the production of these effects as well as the varying effects it produces on different individuals may well be responsible for the contradictory findings recorded in different studies. This has led to the suggestion that cannabis use may play different roles in different occupational and cultural settings. [46]

Cannabis use in the workplace

The use of cannabis and other mind-altering drugs in the workplace have been reported for quite a long time.

At the end of the 19th Century, it was reported that the majority of Egyptian labourers used cannabis and "relied on its stimulating properties to compensate for underfeeding, to combat fatigue and as a means of escape from their dreary lives". [48] Relatively little is known about the role of cannabis in the workplace and its association with occupational

injury has not been fully established. [46] However, the major concern about the effects of cannabis use in the workplace has to do with the possibility of accidents if users drive or operate machinery. [48]

Safety concerns in the workplace as well as the rising use of cannabis in the general populace led the United States government to institute the National Household Survey on drug abuse from 1971 to 1972. The result from this survey showed that 6% of the American workforce used illicit drugs and that cannabis was the most abused drug..[46]

In 1999, a survey carried out in the USA showed that 5.1% of full time and 6.8% of part-time employees aged 18 years or older used cannabis. This result showed cannabis to be the most commonly used illicit drug in the workplace. [18] Also in the USA, 3.4 million workplace drug tests were conducted from January to June 2000 for various reasons which included random, post-accident, periodic, pre-employment and return to duty. The prevalence for drug use was 4.7% and cannabis accounted for 65% of these positive tests.[18]

In Europe, concerns over workplace safety also led to the institution of workplace drug testing even though it was not as efficient and as widespread as that of the USA. [49]

In Greece, pre-employment testing done from 1998 to 2000 showed 7% prevalence of drug use. Of these, cannabis made up 87% [49] In the United Kingdom, a survey of British railway workers between 1994 and 1997 returned positive drug results for approximately 0.36% of the workforce. Cannabis was the number one drug detected and accounted for 68% of the positive results. [49]

In France, a survey of the Petrochemical industry revealed that 57% of workers used cannabis.[50] A 1998 Swedish survey amongst 24,000 workers from 25 companies recorded a cannabis abuse rate of 2.7%, which was the highest of all drugs of abuse. [51]
In 1999, Germany recorded a prevalence of approximately 9% drug use in the chemical industry. Of all the drugs of abuse recorded in this study, cannabis was the most frequently encountered. [52]

With regards to cannabis use and occupational fatalities, Lew et al [53] reported a prevalence rate of 3.1% whereas Alleyne et al [8] reported a prevalence of 8.5%. Although many studies have reported that cannabis use leads to impaired mental function, this has not been shown to be the case with occupational fatalities as cannabinoids are cleared slowly from the body and clear relationships between metabolite levels and effects are difficult to establish.

1.5 STUDY AIM AND OBJECTIVES

1.5.1 Study Aim

The aim of this study is to evaluate the knowledge, attitudes, practices and prevalence of alcohol and cannabis use by anonymous interview and unlinked, non-invasive biochemical tests among South African diamond miners.

1.5.2 Study Objectives

- To determine the factors that may predispose miners to alcohol and cannabis use on a South African diamond mine.

- To determine the prevalence of alcohol and cannabis use on a South African diamond mine.
- To evaluate the knowledge, attitudes and practices regarding alcohol and cannabis use amongst miners on a South African diamond mine.
- To make the results, findings and recommendations available to all stakeholders for relevant intervention strategies.

CHAPTER 2

2.0 METHODOLOGY

2.1 DEFINITION OF TERMS

With regard to this study the terms knowledge, attitudes, practices and prevalence were defined as follows by Webster's Third New International Dictionary [54] and by the textbook of Epidemiology, Biostatistics and Preventive Medicine Review. [55] The terms use, misuse and abuse were defined by Oxford Dictionary Thesaurus. [56]

Knowledge: The fact or condition of knowing something with a considerable degree of familiarity gained through experience of or contact or association with the individual or thing so known. [54] It is also the fact or condition of being cognisant, conscious, or aware of something. [54]

Attitudes: This is behaviour representative of feeling or conviction. It is also a disposition that is primarily grounded in affect and emotion and is expressible of opinions rather than belief. [50]

Practices: To do something habitually. It also means habitual conduct that is socially, ethically or otherwise unacceptable. [54]

Prevalence: The number of persons in a defined population who have a specified condition at a point in time, usually the time a survey is done. [55]

Abuse: The wrong use of something. In this study, this means the wrong use of alcohol or the use of cannabis. [56]

Misuse: Use wrongly [56] as with abuse in this study.

Use: Consume, drink, eat. With regards to this study it means to drink alcohol or smoke cannabis [56].

The "CAGE screening questions" [57] have been validated as a screening tool for chronic alcohol use. It is made up of four questions (see questions 23-26 of the questionnaire). Two or more positive responses to these questions suggest possible dependence on alcohol.

2.2 STUDY DESIGN

The study was a cross sectional analytical study. The knowledge, attitudes and practices of the miners to alcohol and cannabis use were done through face-to-face interviews of those selected for the study.

The prevalence of alcohol and cannabis on the mine was done by biological testing of breath for alcohol and urine for cannabis.

2.3 STUDY METHODS

2.3.1 Study Site Description

The study was carried out on a diamond mine in the Republic of South Africa. The mine was randomly selected from a list of mines. As a pre-condition for approval of this study, the Committee for research on human subjects (medical) of the University of the Witwatersrand stipulated that the mine should not be mentioned by name. As a result of this, the mine will be referred to as mine X in this report.

Mine X is a conventional open cast mine with two adjoining kimberlite pipes covering an area of about 18 hectares. The mine was officially opened in the early 1990's but its history dates back to 1903 when diamond-bearing gravels were discovered on high grounds close to a nearby river. The mine is located at about thirty-four kilometres from a small farming town and about eighty kilometres from the nearest big town. It has a workforce of seven hundred and fourty. Of this number, one hundred and fifty are administrative staff whilst the remaining five hundred and ninety are miners. There are no available hostels on site, but most workers stay in the small farming or the nearest big town. Transportation is provided by mine management.

2.3.2 Alcohol and Drug Testing Policy

Mine X has an existing alcohol and drug policy. The objective of the policy is to facilitate the treatment of alcoholism and drug dependency and to provide for the testing of employees for the presence of alcohol and/or drugs.

The mine's policy states that "no person in a state of intoxication nor any condition likely to render him incapable of taking care of himself or persons under his charge be allowed in the proximity of or allowed to enter a mine or to work on or near any machinery on the surface of a mine or at a works".

In this regard, and recognising that alcohol and drug dependency are complex illnesses and thereby encouraging its early identification and treatment, the company has undertaken to provide financial assistance in terms of rehabilitation and counselling to employees requesting treatment of medically documented alcohol or drug dependence problems or those identified by the company as displaying symptoms in keeping with

problems of this nature. The company bears the financial costs of counselling, treatment and rehabilitation for first offenders. The costs for subsequent consults are borne by the employee. The policy also provides for routine checks as part of a preventative and pro-active measure. This policy applies to all employees of mine X.

2.3.3 Testing Procedures

The alcohol and drug policy of the mine makes the supervisors responsible for detecting employees who are under the influence of alcohol and cannabis. Co-workers although not explicitly mentioned also share in this responsibility. A detection of alcohol or cannabis smell, bloodshot eyes/dilated pupils, unsteady gait, incoherent speech, moody or an aggressive behaviour coupled with an observed consumption of alcohol or cannabis or the possession of these substances on their person in the mine will lead to a request for the employee to submit himself for tests. Employees may also be requested to submit themselves for tests following involvement in an accident or at random when entering or leaving the mine premises.

In the presence of stipulated parties representing the employee and the mine management, a Lion Alcometer test with regards to alcohol and an "On Track" urine test for cannabis are administered on the suspected employee.

A positive test for alcohol is a value equal to or higher than the legal limit of 0.10g per 1000ml of breath. This is the legal limit for driving in South Africa. [58] With regard to cannabis, the employee will be required to undergo a urine test and an additional "Dover" test, which will indicate the employee's reaction speed to various stimuli. The urine

sample is also sent to a laboratory in the provincial capital for a confirmatory test (gas chromatography). Employees refusing to take the test stand the risk of having a negative inference being drawn at any future proceedings that may follow.

2.3.4 Rehabilitation

The company bears the full cost of rehabilitation through the employee's department. The company also bears the transportation costs in terms of the Medical Travel policy to and from the rehabilitation centre.

A leave of absence is also granted to the employee during the duration of his rehabilitation by a company recognised medical practitioner. In addition to all of these, the company arranges for and bears the cost of a counselling session involving the employee, his/her supervisor, his/her representative (if requested), an employee relations official and the senior human resources officer.

Rehabilitation is offered only to permanent employees and is for one treatment only. It is only repeated at the discretion of the head of department in exceptional circumstances. Subsequent costs will have to be borne by the concerned employe.

2.4 STUDY POPULATION AND SAMPLING

2.4.1 Sample Size Estimation

No previous study has been done in this area on diamond mines in South Africa. However, literature that was reviewed showed a prevalence of alcohol use of between 25

to 30% in studies carried out on the general populace in South Africa [25] Also, in a study carried out on a Welkom goldmine a prevalence of alcohol use of 32% was reported. [3]

Assuming a 30% prevalence with a 5% margin of error, the sample size required for the study was 282 at the 95% confidence level. This was calculated with Epi Info version 6.1 using Statcalc. However, to make allowance for non-response, a 20% increase in sample size was deemed adequate. Thus, the sample size calculated was 338.

2.4.2 Sampling Method

A simple random sample of miners was drawn from the mine register. 338 miners were selected to participate from a sampling frame of 740 miners. The sampling frame comprised of all the workers in the general staff list.

Samples were collected pre-shift with the cooperation of the mine management, the access cards of selected participants were inactivated through the computer, a system normally used in this mine for similar purposes and referred to as "parading".

Paraded miners were instructed about the study and written informed consent was sought and obtained for each person that took part in this survey. On obtaining them, they were required to submit to the tests and a urine sample was also required from them at the same time.

In order not to disrupt production at the mine (a condition agreed upon by both parties during prior negotiations) and also in order to keep sampling strictly pre-shift, study

participants were required to submit themselves for the structured interviews during shifts.

Refusals were replaced by the next name on the register. The same individuals undergoing the breath and urine tests also completed the structured interviews.

2.5 DATA COLLECTION METHODS

2.5.1 Structured Interviews

Face-to-face interviews were carried out by means of a structured interview schedule, which was administered by trained interviewers. The team comprised of three undergraduate medical students at the University of the Witwatersrand, one post-graduate engineering student and three matric holders experienced in questionnaire administration from similar studies done in the immediate past. In addition, all the interviewers were trained to administer the questionnaires in relevant local languages to ensure correct interpretation of miners' knowledge, attitudes and practices as regards alcohol and cannabis use and their perception to its health and safety risks.

The questionnaires were anonymous and unlinked to both the breath and urine results. The questionnaire was divided into three parts (see Appendix A) and contained questions relating to the following:

2.5.1.1 Section 1 of the questionnaire

This part contains questions relating to demographic information. Participants were asked to state their age, sex, main language, religion, educational level, type of accommodation they live in and people living with them. They were also asked if they worked above ground or underground. Questions relating to their perception on the dangers associated with their jobs were also asked.

2.5.1.2 Section 2 of the questionnaire

This is the alcohol use interview section. Questions asked here related to current and past use of alcohol. Also questions relating to types of alcohol consumed and quantity of alcohol consumed within two weeks prior to data collection were asked.

Respondents were also required to state who they usually drink with, the times they usually drink more and the reasons behind their taking alcohol. CAGE questions were included to determine the prevalence and attitude of chronic alcohol users.

2.5.1.3 Section 3 of the questionnaire

This was the substance use interview section. Participants were asked about their cannabis usage status. Questions relating to current use, if usage predates work on the mine or started after beginning work on the mine were also asked. Also questions to determine how often respondents used cannabis, their perception of the relationship between cannabis usage and accidents as well as their perception of health risks associated with cannabis usage were asked.

Options to the questions ranged from "yes", "no" to "I don't know". Open-ended questions were also included to further clarify the responses.

2.5.2 Assessments

2.5.2.1 Alcohol assessment

Breath alcohol was assessed using the Alca test 7410 RS breathalysers®, the calibration of which was verified against another breathalyser the Alca test 7110®, certified by the Council for Scientific and Industrial Research (CSIR) and the South African Bureau of Standards (SABS). For each test, one litre of air is blown over a period of two seconds or 1.7 litres over four seconds is blown into a mouthpiece. Each mouthpiece has a unidirectional air valve so that air blown into the instrument can only flow into the screening device and cannot be inhaled by the individual whose test is being done or that of other individuals whose tests will be done later. This is aimed at limiting the transmission of infections. The test uses an electrochemical sensor that is sensitive to the breakdown of ethanol in the liver. Precision of the test is high because whatever the amount of air that is blown into the mouthpiece, only 1cc is analysed every time. Since there is no legislated alcohol limit in the mining industry, the current legal driving limit of 0.10mg/1000ml of breath for professional drivers as contained in section 65(6) of the South African National Road Traffic act of 1996 was used. [58]

Because a very high breath alcohol concentration, thick tobacco smoke and alcoholic mouth sprays, medicines and drops as well as recent vomiting may lead to false

estimation, a standard pre-test questionnaire asking various questions to detect any of these was included (see Appendix D).

For those who smoked immediately prior to the test, an interval of two minutes was allowed before tests were administered. For alcohol mouth sprays, 15 minutes interval was given. These requirements were specified by the manufacturers (Dräger Sicherheitstechnik GmhH, Lűbeck, Germany).

2.5.2.2 Cannabis assessment

Urine specimens were tested for cannabis using the "On Trak Testik THC®". This is an in vitro diagnostic test for the detection of cannabinoids at a level equal to or above 50ng/ml. This test relies on competition between cannabis or its metabolites present in the urine and conjugate immobilized on the membrane for binding to antibody coated coloured micro particles. A negative result is obtained when a blue band forms at the result window. If the test is positive, the result window remains white. There is a control band that forms at the "TEST VALID AREA". A blue band indicates that the test has been completed, the reagents viable and the results valid and ready to be interpreted. As part of a larger study, the sensitivity of the 'On Trak Testik' was calculated to be 80% and specificity calculated to be 97%.

2.6 PILOT STUDY

The pilot for this study was successfully carried out in early February 2002 on eleven mineworkers. The mine where the pilot study was carried out was randomly selected

from a list of mines and it is located in the same province where this study was carried out. The aim of the pilot was to test the instruments used for this study and to refine them where necessary.

2.7 DATA ENTRY, PROCESSING AND ANALYSIS

The questionnaires were coded and data were entered into a computer using Microsoft Excel spreadsheet. The data files comprised 250 variables on which the responses were obtained. These files were converted into SAS format and responses were coded and descriptive statistics carried out. The analysis which included frequency distributions, chi-square analysis and cross tabulations yielding p-values were performed. Tables were also used to present and interpret findings.

2.8 ETHICAL CONSIDERATIONS

Written informed consent was sought and obtained prior to all interviews (see Appendix C). All potential participants were explained the reason for and the methods employed for collecting the data (see Appendix B). Participation was voluntary and any participants who did not wish to continue at any stage of the study were allowed to withdraw without penalty. Results were anonymous and confidentiality was strictly maintained in all cases and at all times.

2.9 POSSIBLE LIMITATIONS AND STEPS TAKEN TO REDUCE THEM

2.9.1 Interviews

Studies involving interviewer-administered questionnaires are fraught with difficulties particularly when it involves translating responses from one language to the other. Certain nuances peculiar to certain languages might be missed out during translation. Also, accurate translation of responses might vary from individual to individual.

This limitation was controlled by rigorously training the interviewers and subjecting them to simulated interview sessions. The trainees were then selected according to pre-set selection criteria. The criteria were strictly adhered to with those not meeting up to set standard left out of the team. In addition, the questionnaires were structured to be very simple and user friendly. The questionnaire was piloted and information gathered through the process utilized in enhancing the tool. Interviewers were people from a similar socio-cultural environment as the miners and spoke the same language as them in order to increase effective communication of questions and answers.

2.9.2 Underestimation of Reported Prevalence

The use of alcohol and especially cannabis in the workplace is a very sensitive and contentious issue. Carrying out this study in a mining environment makes it even more contentious as alcohol, cannabis and other illegal substances are prohibited on the mine premises.

The fear of social stigma associated with cannabis use as well as the fact that cannabis use is a criminal offence in South Africa might have resulted in underreporting of use in

this mine. Also, the fear of legal prosecution and threat to job security might have been a factor as well. The effect of underreporting in this study was reduced by having numerous meetings with workers representatives, unions and management to ensure buy in. Also guaranteeing anonymity and maintaining strict confidentiality throughout the study played a major role in helping to reduce underreporting.

2.9.3 Underestimation of Tested Prevalence

The healthy worker effect might have contributed to this. Workers who probably were absent on the study days might have been suffering from the effects of alcohol and/or cannabis consumption and might have thus been left out of the tested population thereby giving a reduced rate of tested prevalence.

Also, false negative results from rapid metabolism of alcohol or people with impaired liver function might have underestimated the true prevalence.[18] Selection bias could have an effect here as well. Participants who knew that they were positive might have decided to opt out of the study. As mentioned before, this was reduced by having numerous meetings with the workers and their unions to ensure worker buy in. Also maintaining confidentiality and anonymity throughout the duration of the study helped in ameliorating this.

2.9.4 Overestimation of Tested Prevalence

Cannabis test reliability becomes a problem if the urine is allowed to stand for a considerable time period. Tests for cannabis were therefore carried out immediately after

urine samples were obtained. When this was not possible, they were stored in ice-packed containers and were transported to the laboratory for testing as per the instructions of the manufacturers. Cannabis metabolites can remain in the urine long after the effects of the drug have worn off. [53] Thus a positive urine test result does not necessarily translate to current use and possible impairment but might represent past use. Also, unknown use whereby people consume cannabis through substances like herb tea or intermittent use in other ways will return a positive result and hence overestimate the true prevalence. [54]

CHAPTER 3

3.0 STUDY RESULTS

3.1 PARTICIPATION RATES

Mine X has a workforce of 740. Of this number, 590 are miners whilst 150 are administrative staff personnel. The sample size calculated for the study was 338. Of the 338 miners randomly selected into the study sample, the participation rates in the different aspects of the study are as shown in Table 3.1 below.

Table 3.1: Participation Rates

Type of test	Sample Size	Frequency	Percentage
Breathalyser	338	318	94.1
Urine Cannabis Test	338	316	93.5
Questionnaire (Interviews)	338	322	95.2

There were 318 breath samples collected over the five-day period. The total number of questionnaires administered was 322. More questionnaires were administered because four people who did not earlier subject themselves for breathalyser tests turned up for questionnaire interviews. This was not detected during data collection and since it was impossible to link individual questionnaires to breath samples due to the study design, these questionnaires could not be identified in order to be removed so they were included. The total number of urine samples collected was 316.

3.2 FACTORS THAT MAY PREDISPOSE MINERS TO ALCOHOL AND CANNABIS USE

A large majority of the participants (59.35%, 95% CI: 53.7 - 64.9) had secondary school education of between standards 6 to10. This group made up more than half of the participants.28.3% (95% CI: 23.4 - 33.8) of the participants had post-matric education whilst 8.39% (95% CI: 5.6 -12.0) had primary school education between standards 1 to 5. Miners with no formal education made up 3.87% (95% CI: 2.0 - 6.6) of the entire study population (see Table 3.2).

The majority of the participants were male (86.98%, 95% CI: 82.8 - 90.5), as opposed to female participants who made up only 13.02% (95% CI: 9.5 - 17.2). Most of the participants (72.33%, 95% CI: 67.1 - 77.2) were married, whilst 20.75% (95% CI: 16.4 - 25.6) were single. The remainder of the participants (6.92%, 95% CI: 4.4 - 10.3) were either unmarried, divorced/separated or were cohabiting with live-in partners (see Table 3.2).

A majority of the respondents (57.1%, 95% CI: 51.4 - 62.6), owned their accommodation; 42.59% (95% CI: 37.1 - 48.2) either shared off site accommodation or lived in single or more than one hired rooms; A small percentage of the participants (0.32%, 95% CI: 0.01 - 1.7), lived in hostel accommodation. 82.14% (95% CI: 77.4 - 86.3) of the participants had family members living with them whilst 17.86% (95% CI: 13.7 - 22.6) did not have family members living with them (see Table 3.2).

Full-time employees made up 84.54% (95% CI: 80.1 - 88.3) of the participants in the study whilst the rest (15.46%, 95% CI: 11.7 - 19.9), were contract staff. About half of the number of participants (50.51%, 95% CI: 44.7 - 56.4), was group 3-4 employees (these are the employees in the lowest category who carry out labour intensive jobs such as truck drivers, drillers, operators and cleaners). Officials made up 33.56% (95% CI: 28.2 - 39.3) of the participants, whilst 13.56% (95% CI: 9.9 - 18.0) and 2.37% (95% CI: 0.9 - 4.8) were union men and group 5-8 employees (these include staff in supervisory positions such as team leaders and team supervisors) respectively. The age of the participants ranged from 16-65 years. The average age of the participants was 35 years. Most of the participants, 44.65%, were between 31-40 years; 32.7% of the participants were above 40 years whilst 22.6% were below 30 years.

Most of the participants in this study (95.9%, 95% CI: 93.1 - 97.8) were of South African origin as against non-South Africans, which accounted for 4.1% (95% CI: 2.2 -6.9) of the study population. This largely corresponds to the demographic pattern of the entire mine (see Table 3.2).

Table 3.2: Sociodemographic Profile of Participants

Variable	Response	Frequency	Percent
Accommodation	Hostel	1	0.32
	Other	135	42.59
	Own	181	57.1
Total		317	100
Country	Non SA	13	4.1
	SA	304	95.9
Total		317	100
Education	No schooling	12	3.87
	Primary (Std 1-5)	26	8.39
	Secondary (Std 6-10)	184	59.35
	Post Matric	88	28.39
Total		310	100
Gender	Male	274	86.98
	Female	41	13.02
Total		315	100
Marital Status	Single	66	20.75
	Married	230	72.33
	Other	22	6.92
Total		318	100
Member lives with you?	Yes	252	82.14
	No	55	17.86
Total		308	100
Job Category	Officials	99	33.56
	Union Men	40	13.56
	Group 5-8	7	2.37
	Group 3-4	149	50.51
Total		295	100
Type of Work	Contract	49	15.46
	Full time	268	84.54
Total		317	100

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3.3 PREVALENCE OF ALCOHOL USE

Of the 318 participants that were subjected to breathalyser tests, 1.57% (95% CI: 0.58 - 3.84) of the participants tested positive for breath alcohol i.e. they had blood alcohol levels of equal to or greater than 0.10mg/1000ml. The majority (98.42%, 95% CI: 96.37 – 99.49) tested negative.

Of the 318 participants, only 0.94% (95% CI: 0.24 - 2.96) had blood alcohol levels equal to or above the legal limit of 0.10mg/100ml (see table 3.3).

Table 3.3: Tested Prevalence of Alcohol Use (Results of Breathalyser Testing)

Results	Frequency	Percent
No alcohol	313	98.42
Positive	2	0.63
Above Limit	3	0.94
Total	318	100

3.3.1 Reported Prevalence of Alcohol Use

When asked if they had ever used alcohol 48.47% (95%CI: 4 3.2 - 53.8) of the respondents answered in the affirmative. Of this number 90.8% (95% CI: 85.50 - 94.65) admitted to be currently using alcohol. This gives an overall reported prevalence of alcohol use as determined with the administered questionnaires to be 44% (95% CI: 38.8 - 49.3)

3.3.2 Chronic Alcohol Use

The frequency of chronic alcohol use as determined by the use of the CAGE screening questions were as follows:

Of the 322 participants who were assessed with the questionnaire tool, 315 of them responded to the "CAGE" questions. Of these 3.49% (95% CI: 1.76 – 6.16) screened positive for chronic alcohol use. This is in comparison to the breathalyser-screening test, which returned a 1.4% positive rate. This could mean that about 3.49% of the participants are chronic users of alcohol as detected by the "CAGE" questions. The disparity between the breathalyser and the 'CAGE' questions could be explained by the period in time that the tests were conducted. An analysis of the demographic variables of those participants who admitted to ever using alcohol was done with respect to their demographic characteristics.

3.3.3 Lifetime Alcohol Use by Demographic Variables

56.71% of South Africans (95% CI: 50.9 - 62.4) as opposed to 53.58% (95% CI: 25.1 - 80.8) of non-South Africans were found to have responded in the affirmative when asked if they had every used alcohol. This finding was however not statistically significant (p value = 0.8383) (Table 3.4).

With regards to educational qualification, it was found that the likelihood to have ever used alcohol increased with the level of education obtained: 25% (95% CI: 5.5 - 57.2) of the people with no formal education were found to have ever used alcohol as opposed to 71.59%, (95% CI: 61 - 81) of people with post matric qualifications (p value = 0.0013) (Table 3.4).

Overall, full-time employees were found to have a higher likelihood of ever having used alcohol when compared with contract staff, 60.08% (95% CI: 54 - 66) and 37.5% (95% CI: 24% - 53%) respectively (p value = 0.0037) (Table 3.4).

Table 3.4: Lifetime Alcohol Use by Demographic Variables

Demographic Variable	Yes		No	
	Number	Percent	Number	Percent
Country				
South African	169	56.71	129	43.29
Non-South African	7	53.95	6	46.15
Total	176		135	
P value = 0.8383				
Educational Group				
No schooling	3	25	9	75
Primary (Std 1-5)	11	44	14	56
Secondary Std. 6-10)	94	52.51	85	47.49
Post matric	63	71.59	25	28.41
Total	171		133	
P value = 0.0013				
Type of Work				
Contract Worker	18	10.22	30	22.22
Full-time Employee	158	89.77	105	77.77
Total	176		135	
P value = 0.0037				

3.3.4 Current Use of Alcohol by Demographic Variables

Table 3.5 shows an analysis of the responses of those who reported to be currently using alcohol against their demographic profiles. The only statistically significant finding from this analysis is from the type of work done i.e. whether full time or contract work. Full

time employees who had ever used alcohol were still currently using alcohol were 92.76% (95% CI: 87 – 96) as opposed to 76.19% (95% CI: 53 - 92) of contract staff (p value = 0.014).

The country of origin, age, marital status, type of accommodation, educational qualification, the influence of living with a family member, where the staff member works as well as the type of job done when cross tabulated with current use of alcohol was found not to be statistically significant.

Table 3.5: Current Use of Alcohol by Demographic Variables

Demographic Variables	**Current Use**				
	Yes		No		Total
	Number	Percent	Number	Percent	
Country:					
South African	150	90.91	15	9.09	165
Non-South African	7	87.5	1	12.5	8
Total	157		16		173
P value = 0.7451					
Age					
30 and less	43	95.56	2	4.44	45
31 to 40	59	86.76	9	13.24	68
40 and above	56	91.8	5	8.2	61
Total	158		16		174
P value = 0.27					
Type of work: Contract					
Worker	16	76.19	5	23.81	21
Full-time employee	141	92.76	11	7.24	152
Total	157		16		173
P value = 0.014					

Marital status					
Single	41	91.11	4	8.89	45
Married	106	90.6	11	9.4	117
Others	11	91.67	1	8.33	12
Total	158		16		174
P value = 0.989					

Demographic Variables	Current use				
	Yes		No		Total
	Number	Percent	Number	Percent	
Accommodation					
Own	75	88.24	10	11.76	85
Hostel	1	100	0	0	1
Others	82	93.18	6	6.82	88
Total	158		16		174
P value = 0.5044					
Educational group					
No schooling	3	100	0	0	3
Primary (Std 1-5)	9	75	3	25	12
Secondary Std. 6-10)	86	93.47	7	7.53	93
Post Matric	55	91.67	5	8.33	60
Total	153		15		168
P value = 0.225					
Does any member of your family live with you?					
Yes	122	90.37	13	9.63	135
No	29	90.63	3	9.83	32
Total	151		16		167
P value = 0.9649					
Where work					
Underground	11	100	0	0	11
Above Ground	145	90.06	16	9.94	16
Total	156		16		27
P value = 0.272					

Demographic Variables	Current use				
	Yes		No		Total
	Number	Percent	Number	Percent	
Type of job group					
Officials	58	93.55	4	6.45	62
Union Men	17	77.27	5	22.73	22
Group 5-8	3	100	0	0	3
Group 3-4	68	90.67	7	9.33	75
Total	146		16		162
P value = 0.1542					

3.3.5 The Distribution of Drinking Companions

The majority of the participants (46.98%, 95% CI: 41.02 - 52.99) who admitted to drinking said that they did so in the company of their friends. Some of the respondents (8.9%, 95% CI: 5.8 – 12.85) said that they drank alone (Table 3.6).

A small percentage of the respondents (1.78%, 95% CI: 0.58%-4.1%) drank with their family members whilst a few (1.42%, 95% CI: 0.38 - 3.6) drank both alone and with friends. One person (0.3%, 95% CI: 0.009 - 0.02) claimed that he drank with anybody that was available (Table 3.6).

It is however worthy of note that 40.57% (95% CI: 34.8 - 46.6) of the respondents either did not answer this particular question (question number 18) or had incorrectly filled responses.

Table 3.6: Distribution of Drinking Companions

Who with	Frequency	Percent
Not answered	114	40.57
Alone	25	8.9
With Friends	132	46.98
Family Members	5	1.78
Alone and With Friends	4	1.42
Anybody	1	0.36
Total	281	100

3.3.6 Places of Alcohol Usage

The majority of the respondents admitted to drinking at home (63.54%, 95% CI: 56.1 - 70.6). The rest either drank at shebeens or taverns (11.05%, 95% CI: 6.9 -16.5), clubs (9.94%, 95% CI: 6.0 -15.3) or at parties with friends (5.52%, 95% CI: 2.7 - 9.9). A similar number of participants claimed to drink in bars or hostels and everywhere i.e. 1.1% (95% CI: 0.13 - 3.9) for both groups (Table 3.7).

Table 3.7: Places of Alcohol Usage

Where drink	Frequency	Percent
Clubs	18	9.95
Everywhere	2	1.1
Party/Friends	10	5.53
Home	115	63.54
Hostel/Bar	2	1.1
Party	14	7.73
Shebeen/Tavern	20	11.05
Total	181	100

The vast majority of the respondents (89.96%, 95% CI: 83.3 - 94.2) reported using alcohol during the evenings, at weekends or after work; 5.41% (95% CI: 2.4 - 10.4) indicated that they used alcohol only at occasions, such as parties whilst 4.05% (95% CI: 1.5 -8.6) of the people who admitted to currently using alcohol admitted to doing so during the daytime. When the respondents were asked to give reasons why they use alcohol, 43.7% (95% CI: 35.2 - 52.5) of the respondents to this particular question claimed to do so for relaxation and enjoyment. Other reasons included: fun/entertainment and party, a response given by 25.19% (95% CI: 18.11 - 33.4) of the respondents, 5.19% (95% CI: 2.1 -10.4) said they did so for experimentation whilst 0.74% (95% CI: 0.02 - 4.1) said that they drank alcohol only at braais.

The results show that a majority of the respondents i.e. 75% (95% CI: 68 - 81.2) started taking alcohol before commencing work on the mines as opposed to 25% (95% CI: 18.9 - 31.9) who started taking alcohol after commencing work on the mines.

3.4 PREVALENCE OF CANNABIS USE

A total of 316 urine samples were available for cannabis testing. Of these 2.85% (95% CI: 1.31-5.3) were positive for cannabis whilst 97.15% (95% CI: 94.66 - 98.69) were negative. Of the participants, 6% (95% CI: 3.7 - 9.2) admitted to ever using cannabis. However, only 2% (95% CI: 0.7 - 4.1) of the participants admitted to be currently using cannabis - the overall reported prevalence for current cannabis use (Table 3.8).

Table 3.8: Tested Prevalence of Cannabis Use

Urine results	Frequency	Percent
Negative	307	97.15
Positive	9	2.8
Total	316	100

3.4.1 Practice of Lifetime Cannabis Use

Table 3.9 shows the overall reported prevalence for cannabis by demographic variable. From the results, a higher proportion of non-South Africans use cannabis when compared to South Africans: 15.38% (95% CI: 1.92 - 45.3) versus 5.61% (95% CI: 3.3 - 8.8). The difference in proportion was however not statistically significant (p value = 0.1466).

With regards to the influence of education on cannabis use, participants with an educational level of standard 6-10 had the highest rate of cannabis use of 4.2% (13 of 309; 95% CI: 3.8 – 11.8). This was followed by participants with post matric qualifications with a rate of 1.62% (5 0f 309; 95% CI: 1.9 - 12.9). Participants with primary qualification of Standard 1-5 had only a rate of 0.32% (1 of 309; 95% CI: 0.10 - 19.6) (Table 3.9).

People with no formal educational qualification did not admit to ever using cannabis. . Contract workers were more likely to have ever used cannabis. 6.12% (95% CI: 1.35 - 16.8) of them admitted to this when compared to 5.99% (95% CI: 3.5 - 9.5) of full-time employees. This result was also not statistically significant (p value = 0.9719) (Table 3.9).

Table 3.9: Lifetime Cannabis Use by Demographic Variables

	Ever use of cannabis			
Demographic Variable	Yes		No	
	Number	Percent	Number	Percent
Country:				
South African	17	15.38	11	84.62
Non-South African	2	5.61	286	94.39
Total	19		297	
P value = 0.1466				
Educational group				
No Schooling	0	0	12	100
Primary (Std 1-5)	1	3.85	25	96.15
Secondary (Std 6-10)	13	7.07	171	92.93
Post Matric	5	5.75	82	94.25
Total	19		290	
P value = 0.7251				
Type of work:				
Contract Worker	3	6.12	46	93.88
Full-time Employee	16	5.99	251	94.01
Total	19		297	
P value = 0.9719				

3.4.2 Current Cannabis Use

An analysis of the demographic profiles of the participants who admitted to current cannabis use shows that 75% (95% CI: 19.4 - 99.4) of the people living without family members currently use cannabis when compared to 25% (95% CI: 0.63 - 80.6) living with families. For the participants who currently live with family members; 14.29% (95% CI: 1.8 - 42.8) currently use cannabis when compared to 85.71% (95% CI: 57.2 - 98.2) who do not. These results are statistically significant (p = 0.0168). The rest of the analysis of demographic variables against current use did not show any statistically significant findings.

A vast majority of the participants who conceded to using cannabis, claimed to do so with friends (82.35%, 95% CI: 56.5 - 96.2). About 12% of users said they did so in the company of friends, while 5.9% admitted to cannabis use with a family member. A great majority of the participants (72.22%, 95% CI: 46.5 - 90.3) started using cannabis before beginning work on the mines.

3.5 PERCEPTIONS, KNOWLEDGE OF, AND ATTITUDES TOWARDS ALCOHOL

Of 309 respondents 66.67% (95% CI: 61.11 – 71.90) stated that they thought that their fellow workers used alcohol, 12.26% (95% CI: 9.1 - 16.8) of the respondents answered no to this question whilst 20.71% (95% CI: 16.3 - 25.7) claimed not to know if their fellow workers used alcohol.

A majority (32.89%, 95% CI: 26.8 - 39.4) of the participants believe their fellow workers use alcohol when they are off duty or after work hours. 28.51% (95% CI: 22.7 - 34.8) of workers believe that those who use alcohol do so during special occasions or when very happy. Some others i.e. 16.23% (95 CI: 11.7 - 21.7) believe the use of alcohol to be more during month end or on payday.

About 7.02% (95% CI: 4.1 - 11.1) of the respondents believe that their fellow co-workers use alcohol before work or during work; 15.35% (95% CI: 10.9 - 20.7) gave answers that varied from not being sure, no specific times and when having personal problems.

As for their perception of the dangers associated with their work, 50.5% (95% CI: 44.69 – 56.3) reported that they thought their jobs were dangerous. 40.8% of them did not think that their work as being dangerous while 7.8% said they did not know whether their

work was dangerous. With regards to knowledge of alcohol use on duty as a cause of work accident, the vast majority of the participants (98.06%, CI: 95.84 - 98.29) believe that drinking alcohol can lead to accidents on the mine. Only 1.94% (95% CI: 0.7 - 4.2) of the participants think otherwise (Table 3.10 below). When asked if they thought that anything could be done to influence the use of alcohol among miners, 74.5% (95% CI: 69.33 – 78.25) answered in the affirmative, 7.64% (95% CI: 7.61 - 14.8) of the participants thought that nothing can be done to influence the use of alcohol amongst miners whilst 17.83% (95% CI: 13.8 - 22.5) of the participants were uncertain.

Table 3.10: Knowledge of Danger of Alcohol

Do you think that drinking alcohol can lead to accidents on the mine?	Frequency	Percent
Yes	304	98.06
No	6	1.94
Total	310	100

When asked to make suggestions on methods of reducing alcohol use amongst miners, education about the effects of alcohol was the commonest suggestion. This was made by 18.85% (95% CI: 14.9 - 23.2) of the respondents, 13.11% (95% CI: 9.8 - 17.0) of the respondents believe that providing entertainment and recreational facilities was the solution, 16.67% (95% CI: 12.9 - 20.8) of the respondents answered that the introduction of stringent testing procedures will dramatically decrease the use of alcohol amongst miners (Table 3.11).

Table 3.11: Methods of Reducing Alcohol Use

What can be done to influence the use of alcohol amongst miners?	Frequency	Percent
Education	69	18.85
Entertainment	48	13.11
Testing	61	16.67
Others	188	51.37
Total	366	100

However, 51.37% (95% CI: 46.1 - 56.6) of the miners gave reasons such as increasing religious activities on the mines, the shifting of the responsibility of monitoring alcohol consumption to co-workers, to introduce severe disciplinary actions and to totally ban the sale of alcohol beverages around the mine premises as means of reducing alcohol use.

3.6 PERCEPTIONS, KNOWLEDGE OF, AND ATTITUDES TOWARDS CANNABIS

About 15% (95% CI: 11.42 - 19.63) of the participants in this study answered in the affirmative when asked if they thought that their fellow workers used cannabis. Almost forty percent (37.97%, 95% CI: 32.60 - 43.58) of the participants believe that their fellow workers do not use cannabis whilst a majority of the participants (46.84%, 95% CI: 41.2 - 52.5) claimed not to know if their fellow workers used cannabis.

Table 3.12: Perceptions Regarding Use of Cannabis by Fellow Workers

Do your fellow workers use cannabis?		
Response	Frequency	Percent
Yes	48	15.19
No	120	37.92
Don't Know	148	46.84
Totals	316	100

The stated reasons why fellow workers used cannabis include relaxation/to forget their problems (25.53%, 95% CI: 13.9 - 40.4), to relieve stress (17.02%, 95% CI: 7.6 - 30.8), and as a habit (10.64%, 95% CI: 3.6 - 23.11). Some (46.81%, 95% CI: 32.1 - 61.9) of the respondents gave other reasons such as to keep busy and reduce boredom, for fun, to help them avoid stressful situations at the workplace etc (Table 3.13).

Table 3.13: Perceptions of Why Fellow Workers Use Cannabis

Reason	Frequency	Percent	CI
To relax and forget their problems	12	25.53	13.9-40.4
Habit	5	10.64	2.6-23.11
Relieve stress	8	17.02	7.6-30.8
Others	22	46.81	32.1-61.9
Total	47	100	

More than half (56.16%, 95% CI: 44 - 67.8) of the respondents indicated that they thought that fellow miners used cannabis when working hard. 21.92% (95% CI: 13.1 - 33.1) of the respondents felt that miners used cannabis more after work, when off duty and during weekend. About a fifth (21.92%, 95% CI: 13.1 - 33.1) of the respondents gave various other reasons such as to satisfy themselves, usually after meals and at any time.

About half (58.10%, 95% CI: 52.43 - 63.60) of the participants felt that working in the mines is dangerous to their health, 38.10% (95% CI: 32.7 - 43.7) of the respondents do not perceive any danger to their health as a result of working in the mines whilst 3.81% (95% CI: 1.9 - 6.6) claimed not to know if working in the mines posed a danger to their health.

Most of the participants i.e. 90.49% (95% CI: 86.63 - 93.54) agreed that using cannabis can lead to accidents on the mine, 9.18% (95% CI: 6.2 - 13.0) of the respondents disagree whilst 0.33% (95% CI: 0.008 - 1.8) claimed not to know.

When asked if anything could be done to influence cannabis use amongst miners, 77.92% (95% CI: 72.87 - 82.43) of the respondents answered in the affirmative, 6.5% (95% CI: 4.0 - 9.8) of the respondents do not believe that anything could be done to influence cannabis use amongst miners whilst 15.58% (95% CI: 11.7 - 20.1) of the respondents claimed not to know.

When asked to explain what could be done to influence the use of cannabis by miners, 58.97% (95% CI: 53.06 - 64.68) of the respondents cited educating the miners as a means of doing this, it was followed by reasons such as regular testing, which was suggested by 9.66% (95% CI: 6.5 - 13.6) of the respondents, entertainment and sports which was given by 1.38% (95% CI: 0.3 - 3.5) of the respondents. About a third (30%, 95% CI: 24.7 - 35.6) of the respondents gave other reasons such as giving miners enough rest time, rehabilitating those already using or addicted to cannabis, the introduction of sports and recreation facilities etc as methods of influencing the use of cannabis (Table 3.14).

Table 3.14: Opinion on Influencing the Use of Cannabis Amongst Miners

What can be done to influence the use of cannabis amongst miners?		
Response	Frequency	Percent
Education	171	58.97
Entertainment and Sport	4	1.38
Testing	28	9.66
Others	87	30
Total	290	100

3.7 KNOWLEDGE OF SPORT AND RECREATION

Most of the participants (62.10%, 95% CI: 56.48 - 67.49) seemed to be aware of the availability of recreational facilities on the mine. A smaller number (28.66%, 95% CI: 23.7 - 34.0) of the respondents seemed not to be aware of the availability of recreational facilities whilst a few (9.24%, 95% CI: 6.3 - 13.0) did not know if recreational facilities were existent or not on the mine.

An overwhelming majority of the respondents i.e. 79.30% (95% CI: 74.4 - 83.6) answered that they believed that sports and recreational facilities will influence the use of cannabis and alcohol on the mine, 9.87% (95% CI: 6.8 - 13.7) of the respondents did not agree with this as they felt it will have no impact on the use of cannabis and alcohol. Some of the participants (10.83%, 95% CI: 7.0 - 14.8) of the participants were unsure if provision or awareness of sports and recreational facilities will influence the use of alcohol and cannabis on the mine (Table 3.15)

Table 3.15: Opinions Regarding Facilities

Do you think that sports and recreational facilities influence the use of alcohol and cannabis?		
Response	Frequency	Percent
Yes	249	79.30
No	31	9.87
Don't Know	34	10.83
Total	314	100

CHAPTER 4

4.0 DISCUSSION OF RESULTS

This chapter explains the reasons behind the results and draws conclusions in line with the aims and objectives. It also compares the findings in this study with those from local and international studies.

4.1 ALCOHOL

As documented in the methods section, urine samples and breathalyser tests were carried out prior to the administration of questionnaires in this study. The calculated sample size for this study was 338 but a total of 318 people underwent breathalyser testing successfully while 316 urine samples were collected for cannabis testing. Majority (86.98%) of the participants were male with only 13.02% of participants being female. The predominance of male miners is generally representative of the gender distribution of the work force of most mines. Socio-culturally, mining is seen as a very tough occupation meant for males. Most women employed in the mining industry are mainly employed for administrative jobs.

About half i.e. 50 .51% of the participants were employees who did actual mining job. Officials and artisans made up 37.9% whilst Union men made up the rest of the participants. The small proportion of the people who tested positive for alcohol in this study when compared with results from other studies[17, 41] can be attributed to the stringent alcohol policy and the regular testing carried out on this mine.

4.1.1 Prevalence of Alcohol Use

The reported prevalence of ever use of alcohol on Mine X was 48.46% (95% CI: 43.20 - 53.76). Of these, 90% (95% CI: 85.23 - 94.48) admitted to be currently using alcohol. This represents an overall reported prevalence of current alcohol use of 44% (95% CI: 38.83 - 49.32). This finding exceeds the prevalence for the general population which is put at between 10-35% [43] and the prevalence for risky drinking in a South African gold mine which was put at 32%. [41]

In comparison with studies done internationally, the reported prevalence of 44% recorded in this study exceeds that of 34% reported from Argentinean miners[40] and 40% recorded for Zambian copper miners.[59] However, a study on a Free State gold mine recorded a prevalence of reported alcohol use to be 60% in 1997.[17] This far exceeds the value of 44% in this study. Earlier studies done in 1994 gave a prevalence of 10-39%[43] for the general populace and 32% [42] for a South African gold mine. In 1997, a similar study gave the prevalence to be 60%. The differences in prevalence recorded in the different studies could be a reflection of the differences in prevalence of alcohol use in the general population. [25]

Full-time employees were found to have a higher likelihood to have ever used alcohol 60.08% in comparison with contract staff 37.5%. This result was statistically significant with a p-value of 0.004. This might also be as a result of the company policy, which renders help to full-time employees who have alcohol problems. The contract staffs, on

the other hand, were employed by various organisations and policies on alcohol and alcohol-related problems differ for various recruiting company.

71.59% of the participants with post-matric education were more likely to have ever used alcohol when compared to other participants i.e. secondary education 52.51%, primary education 44% and no formal education 25% (p value = 0.0013). This finding of a high prevalence of life time use of alcohol amongst people with higher educational qualifications in comparison with people of lower educational qualification is at variance with results from similar studies in the past [24] which found a higher prevalence amongst people with lower or no educational qualifications. The reason that was put forward for such a finding in the above mentioned study was that people with lower educational qualifications were more likely to perform unskilled work hence the higher incidence among manual labourers in other sectors.

In relation to this study, a more plausible explanation could be that the higher level of reported prevalence of ever use amongst people with higher educational qualifications i.e. skilled workers, could be as a result of the likelihood that those with higher educational qualifications apart from being more likely to be permanent staff members and hence have a higher notion of job security could also be aware that reporting alcohol use outside working hours would not affect their job. The converse is thought to be the case for the participants with a lower educational qualification.

4.1.2 Pattern of Alcohol Use

The majority of the participants who reported to have ever used alcohol, i.e. 75% (95% CI: 67.90 - 81.00) said that they started doing so before commencing work on this or any other mine. About a quarter of the respondents (25%, 95% CI: 19.00 - 32.10) reported that they started drinking after starting work on this mine.

Most (40.57%) of the participants reported that they drank in the company of friends. This finding is in keeping with results from similar South African studies.[3, 46] A small percentage of the participants reported that they drank alone i.e. 8.9% (95%CI; 5.8 - 12.85%). The low prevalence of people drinking alone might represent a socio-cultural norm amongst the participants.[1] It might also represent a small proportion of high-risk drinkers. [52] Most of the participants i.e. 89.86% (95% CI: 83.8 - 94.2) reported drinking alcohol in the evenings, weekends or after meals. A small percentage i.e. 5.4% (95% CI: 2.4-10.4) drank in parties whilst a smaller percentage i.e. 4.05% (95% CI: 1.5 - 8.5) drank in the daytime. A greater percentage of the people who drank alcohol did so in their homes i.e. 63.54% (95% CI: 56.1 - 70.6), when compared to 11.05% (95% CI: 6.9 - 16.5) of the participants who drank in shebeens; whilst 9.94% (95% CI: 6.0 - 15.3) drank in clubs, and 7.73% (95 CI: 4.3 - 12.6) drank at parties etc.

The preferred place of drinking alcohol reported in this study seems to be in the homes. This is at variance with studies done locally which reported shebeens to be the most popular place to drink..[3, 42, 46] This difference could have resulted because of a difference in the setting between the above-mentioned studies and this particular study. One of the

studies was carried out on the general population whilst the other was carried out on a gold mine with the majority of participants living in a hostel.[42] In this study, the participants do not live in hostels. Most of the participants live in their own homes situated far away from the mine premises. This high prevalence of reported alcohol use in own homes outside working hours might be as a result of lack of suitable leisure activities after work.

4.1.3 Knowledge of and Attitudes Towards Alcohol Use

The majority of participants (66.67%, CI: 61.11 - 71.90) responded that they thought that their fellow workers used alcohol. More of the respondents (32.89%, 95% CI: 26.8 - 39.4) indicated that they thought that their fellow workers used alcohol after work and off duty; Some (28.51%, 95% CI: 22.7 - 34.8) thought that their fellow workers used alcohol on special occasions or when happy (7.02%, 95% CI: 4.1 - 11.1) responded that they thought their fellow workers used alcohol before or during work. About half the number of participants in this study (50.5%, 95% CI: 44.7 - 56.3) felt that their jobs were dangerous when compared to the rest (41.81%, 95% CI: 36.2 - 47.6) who felt that their job was not dangerous. On the other hand, a vast majority of the participants felt that alcohol use could lead to accidents on the mine (98.06%, 95% CI: 95.84 - 99.29). This represents a good insight amongst the participants of the dangers associated with alcohol use on the mine premises.

On influencing the use of alcohol, it is encouraging to note that a majority (74.5%, 95% CI: 69.33 - 79.25) of the participants felt that something could be done to influence the

use of alcohol on the mine. The commonest suggestions on what could be done to influence the uses of alcohol amongst miners were: education (18.85%, 95% CI: 14.9 - 23.2), regular testing of miners (16.67%, 95% CI: 12.9 - 20.9) and providing entertainment activities (13.11%, 95% CI: 9.8 - 17).

About half the number of respondents gave various other reasons such as increasing religious activities, strict disciplinary measures against offenders and a complete ban on the sale of alcoholic beverages on the mine premises as a means to controlling alcohol use.

4.1.4 Reasons for Alcohol Use

Of the reasons cited by the participants when asked why they use alcohol, Most (43.70%, 95% CI: 35.1 - 52.5) said that they used alcohol for relaxation and enjoyment. Other reasons given were: fun and entertainment (25.19%, 95% CI: 18.1 - 33.4), when at parties (25.19%, 95% CI: 18.1 - 33.4), for experimentation (5.19%, 95% CI: 2.1 - 10.4) and when at braais (0.74%, 95% CI: 0.02 - 4.1). From the reasons advanced by the participants on why they use alcohol, it is clear that alcohol is used as a means of providing entertainment perhaps due to lack of or inappropriate recreational activities. The knowledge gained from this response will be vital in instituting pro active measures that will help in preventing alcohol use becoming a problem on this mine.

4.2 CANNABIS

4.2.1 Prevalence of Cannabis Use

4.2.1.1 Tested prevalence

The overall tested prevalence for cannabis use was 2.85% (95% CI: 1.31 - 5.3). This was determined by the use of the Roche "On Track" qualitative urine assay test. This result closely matched a Swedish survey, which reported a cannabis use rate of 2.7% amongst 24,000 workers drawn from 25 company employees. [52] Prior to this study, anecdotal evidence suggested that the prevalence might be higher than the 2.85% obtained in this study even though there was no recorded data on cannabis use amongst mine workers in South Africa. There are occupational and socio-cultural differences between the population studied in Sweden and the study participants in South Africa. Hence the estimate from this study might actually be an underestimation of the true prevalence. Some of the reasons for this assumption could be:

- The social stigma attached to cannabis use could have prevented some people from participating in this study. This particular mining community is closely knit and despite assurances of confidentiality, participants might have feared that word might get around if they participate and are identified as possible users of cannabis.
- Other forms of ingesting cannabis such as drinking tea or using it as a vegetable may lead to false negative results since absorption from the gastrointestinal tract is much slower.

- The "healthy worker effect" where staff who are under the influence of cannabis may be absent from work resulting in a lower prevalence amongst the tested population. This could not be ascertained as the labour unions during negotiations for this study requested that no comparisons be drawn between those who participated in this study and those that were not selected or declined to participate.

4.2.1.2 Reported prevalence

The overall reported prevalence of cannabis use was 2.0%. This was the proportion of people who answered in the affirmative when asked if they were still using cannabis.

A lower reported prevalence rate of 2.0% when compared to the tested prevalence rate of 2.85% could have resulted from:

- Lack of trust in the anonymous nature of the tests and confidentiality of the interviews.
- Fear of being "found out" and either disciplined, sacked or socially stigmatised or a combination of all of the above.

Under these circumstances, the tested prevalence remains a better reflection of the true prevalence of cannabis use in this mine.

4.2.2 Practice of Cannabis Use

4.2.2.1 Ever users of cannabis

About 6.4% (95% CI: 3.9 - 9.8) of the total number of participants who answered this question answered in the affirmative when asked if they had ever used cannabis. The disparity between reported and tested prevalence is less than that seen for alcohol. This may suggest that there is a less clear understanding among workers that cannabis may not be used on duty or of the fact that many of them are not aware that cannabis use can be detected in urine by random testing. There may be a higher level of tolerating cannabis use in the mine environment as a genuine or even accepted practice necessary for coping with the demanding physical jobs miner do. On-the-spot alcohol testing of drivers and punishment of offenders is widely practised in South Africa. Together with on-going mass media campaign, the illegality of alcohol use when driving or working is widely understood. This may however not be the case for cannabis in South Africa. Some religions even suggest that cannabis use is a necessary part of the religious practise of their adherents.

The finding in this study that participants who lived with family members were less likely to be current users of cannabis (p value = 0.0168) is very important with regards to targeted health education. It may also suggest that putting miners in a proper family environment instead of hostels may be a necessary adjunct in the control of cannabis use among miners. In the same vein, the high prevalence of cannabis use with friends (82.33%, 95% CI: 56.5 - 96.2) reported in this study highlights its use as a social form of entertainment. This is felt to be a socio-cultural norm with this group of people. Hence

peer group education may play an important role in spreading messages aimed at the control of cannabis use on the mines.

4.2.2.2 Knowledge of and attitudes towards cannabis use

A majority of the participants in this study (46.84%, 95% CI: 41.2 - 52.3) reported not to know if their fellow workers used cannabis, 37.97% (95% CI: 32.60 - 43.58) reported that they thought their fellow workers do not use cannabis and 15.19% (95% CI: 11.42 - 19.63) of the participants reported that their fellow workers used cannabis. The level of reported knowledge of cannabis use amongst mine workers in this mine is considered to be high considering that 2.85% of the workforce tested for cannabis was positive. The reason for this high level of knowledge of cannabis use amongst fellow workers is unknown. It might be as a result of a suspicion amongst miners in this particular mine that during competitions, miners take stimulants to enable them to work harder so that their groups come out tops. (Personal communication with a few miners during data collection).

Some (46.81%, 95% CI: 32.1 - 61.9) of the participants who thought that their fellow workers used cannabis thought that they did so to keep busy and reduce boredom. Other reasons advanced include helping avoid stressful situations at the workplace and for fun; 25.53% (95% CI: 13.9 - 40.4) of the participants who felt that their fellow workers use cannabis think that they use it to relax and to forget their problems. These responses indicate that stress in the workplace as well as lack of adequate recreational facilities might be an important determinant for cannabis use in this mine. Therefore, reducing

workplace stress as well as the provision of recreational facilities might be important targets if the situation is to be ameliorated.

Of the participants who reported that they were taking cannabis, 72.22% (95% CI: 46.5 - 90.2) started taking cannabis before starting work on the mines whilst 27.78% (95% CI: 9.7 - 53.4) started taking cannabis after starting work on the mines. Even though the proportion of people who started taking cannabis after commencing work on the mines is small when compared to those who started taking cannabis before joining the mines, it is still important to note that some people start taking cannabis after starting work on the mines. It means that a lot has to be done with regards to health education especially with emphasis on the effects of substance abuse amongst miners.

Most of the respondents (56.16%, 95% CI: 44.0 - 67.8) who believed that miners used cannabis reported that miners use it specifically when working hard, before and during working hours. 58.10% (95% CI: 52.4 - 63.5) of the participants in this study believe that working in the mines is dangerous to their health.

An overwhelming majority of the participants (90.49%, 95% CI: 86.6 - 93.5) who took part in this study believe that using cannabis can lead to accidents on the mines. Most (77.92%, 95% CI: 72.8 - 82.4) of the participants believe that something can be done to influence the use of cannabis amongst miners. Health education (58.9%, 95% CI: 53.1 - 64.7) and regular testing of miners (9.66%, 95% CI: 6.5 - 13.6) represented the most cited means of influencing cannabis use.

The majority (62.10%, 95% CI: 56.5 - 67.5) of the participants were aware of the availability of sports and recreational facilities on their mine premises whilst a substantial number (28.66%, 95% CI: 23.7 - 34.0) of the participants seemed not to be aware.

A majority (79.30%, % CI: 74.4 - 83.6) of the participants in this study felt that sports and recreational facilities could influence the use of alcohol and cannabis on the mines; A few (9.87%, 95% CI: 6.8 - 13.7) of the participants seemed not to agree with this whilst a similar number (10.83%, 95% CI: 7.6 - 14.8) were uncertain.

CHAPTER 5

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Alcohol misuse and cannabis use are a public health problem on South African diamond mines. The total prevalence of alcohol use on this particular mine was 1.4% and that of cannabis was 2.8%. This is low when compared to studies done internationally [31 59]. The reason for this disparity might be because of the different times the tests were carried out and also because of the healthy worker effect, which varies from place to place.

Alcohol was said to be used for relaxation and enjoyment by 43.70% of the respondents, fun and entertainment by 25.19%, when at parties by 25.19% and for experimentation by 5.19%.

Cannabis was reported to be used to help relieve stress and to cope with the physical demands of mining by 56.16%.

Being a full time employee was found to be positively associated with alcohol use ($p=0.004$). Also, higher levels of education were positively associated with alcohol use ($p=0.0013$).

Participants in this study felt that alcohol misuse and cannabis use can be controlled on the mine by: health education, (18.85% for alcohol and 58.9% for cannabis) and regular testing of miners, (16.67% for alcohol and 9.66% for cannabis).

Recommendations made in this study were suggested by the participants and were aimed at managing the ongoing problems as well as preventing the problems in the future.

5.2 RECOMMENDATIONS

Alcohol and cannabis use among the workers in mine X has a potential to increase.

The adverse effects of alcohol and cannabis use and the consequences of this on the workforce and workplace have been highlighted in the introductory part of this research. These consequences on the workforce have led employers to institute various measures to combat the problem. Methods such as random testing, pre-employment tests, post-accident tests and tests on workers suspected to be under the influence of alcohol and/or cannabis have been employed. Mine X has an existing alcohol and drug policy but this policy lacks a preventive aspect. The findings of this study suggests that a more comprehensive policy that incorporates aspects of prevention, reducing alcohol and cannabis use among mineworkers as well as managing alcohol and cannabis related problems need to be in place.

The following recommendations are made with the aim of managing the ongoing problem as well as reducing or preventing the problem in the future.

5.2.1 MULTI STAKEHOLDER POLICY FORMULATION ON ALCOHOL AND CANNABIS USE

There should be a uniform policy on the management of substance use on all the mines in South Africa. All the stakeholders, such as mine management, labour unions, mineworkers, government representatives and other stakeholders including representatives from communities where mines are located should participate in this

policy formulation to ensure better buy in. With regards to mine X, this policy should be comprehensive and should clearly state amongst other things the following:

- What is considered to be alcohol and substance use on mine X.
- The effects and consequences of alcohol and substance use on the worker in mine X and the workplace i.e. mine X
- The mode of identifying offenders, rehabilitating them and if need be the disciplinary actions to be taken.

The policy should be clearly displayed at each section of the mine and should encourage workers with alcohol and substance use problems to volunteer themselves for treatment.

5.2.2 REHABILITATION/SUPPORT PROGRAMMES FOR USERS

Effort should be made to provide a conducive working environment for the employees of this mine. It is important to target the root causes of alcohol and cannabis use and to address them. For example most participants who use alcohol started doing so before commencing work on this mine, social stressors such as financial and family problems might have contributed to this. In addressing this, employee assistance programmes with counselling services should be linked to such services that exist in the neighbouring towns since the workforce will largely be drawn from this population.

Whilst having a policy that stipulates that the financial cost for first offenders be borne by the mine management is laudable, this policy is faulty in that it only caters for full time

employees. Hence, it should be broadened to cater for all staff members and their dependants. It should also make allowance for second offenders. First offenders should be made to make a firm commitment to change. Co-workers can be used as mentors to help offenders make the desired change.

5.2.3 HEALTH EDUCATION/PROMOTION ACTIVITIES

Most miners on this mine spend a major part of their days on the mines, thus the mines are a perfect setting to institute health promotion activities, which may instil a positive attitude in the workers on the problems of substance use. These activities should be carried out in the local languages.

These health promotion activities should aim at:

- Publicising alcohol and substance use guidelines in mine X.
- Involving all the workers and should be detailed on what is expected of the miners in combating this problem.
- Health education activities that detail the effects of alcohol and cannabis use on the miners with special emphasis on the deleterious effects on the health and safety of the miners.
- Correcting false information that leads to misuse of substances by miners e.g. most miners thinking that smoking cannabis gives strength and hence leads to increased production.

5.2.4 DISCIPLINARY ACTION

Clearly spelt out disciplinary measures against people who fail to comply with policy and rehabilitation programmes should be agreed upon and disseminated to all the workers on mine X

The following should be considered in this regard:

- First offenders and volunteers should be offered all assistance by the management and staff.
- Graded disciplinary action should be taken against subsequent offenders and habitual users.
- Graded disciplinary measures could include for e.g. disciplinary hearings, suspension for a short period of time, suspension for a longer period of time and dismissal in this order.
- Severe punitive measures like dismissal should only be considered as a last resort and it should only be resorted to when all else has failed.

5.2.4.1 Sports and Recreation Activities

Sports and recreation facilities exist on many mines. The knowledge of the existence of these facilities is what is lacking, as was found out in this study. Moreover, alcohol and cannabis were reported to be used mainly as a means of creating social activity (for fun and alleviation of boredom). Thus:

- Adequate provision of sports and recreation facilities, which recognises the specific sports facilities and recreational activities favoured by the miners, should be set up.
- Proper and regular utilisation of these facilities through innovative ways like organising intra and inter mine competitions with prizes
- Family recreational facilities as well as family social events should be organised regularly by the mine management.
- The promotion of the family as the nucleus of social stability should be undertaken. Since this study showed that people living with family members were less likely to use cannabis, all effort should be made for miners to live with their family members. Where this is not possible, regular visits of family members should be encouraged.

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