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Oral health status among Nyaope users at drug rehabilitation clinics in Johannesburg

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Oral health status among Nyaope users at drug rehabilitation clinics in Johannesburg

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A research report submitted to the Faculty of Oral Health Sciences, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Masters of Science in Dentistry in the branch of Community Dentistry, Johannesburg, 2017

Supervisors

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i. Declaration

I, Anita Tetarwal, do hereby declare that this research report is my own original, unaided work. It is being submitted for the degree of MSc Dent (Community Dentistry) at the University of Witwatersrand, Johannesburg. I further declare that this has not been previously submitted for any examination or degree at this or any other university.

Signed _____

Date 22/11/2017

ii Abstract

Introduction: Nyaope, an extremely addictive drug, has devastating effects on the health of its users. This comparative cross-sectional analytical study sought to assess the oral health status and behaviour of nyaope users against a matched cohort of non-drug users.

Methods: This study was conducted at Empilweni and Nishtara drug rehabilitation clinics in Johannesburg from 1 September to 29 December 2016. A total of 51 nyaope users and 25 matched non-drug users were recruited. Oral Health status was compared between the groups the decayed, filled and missing teeth (DMFT) score, pulpal involvement, ulceration caused by dislocated tooth fragments, fistula and abscess (PUFA) score, bleeding on probing (BOP) and periodontal pocket depth (PDD) scores. A validated questionnaire that assessed sociodemographic, diet and dental behaviour was administered to all participants.

Results: The mean age of nyaope users (n=51) was 26.4 years (SD 4.84) and non-drug users (n=25) was 26.04 (SD 4.09) years (p= 0.75). Nyaope users had a mean DMFT score significantly higher than non-drug users [3.97 (SD 4.11) vs. 2.04 (SD 2.81) (p=0.03)]. Caries prevalence was significantly higher in nyaope users compared to non-drug users (82.35% vs. 48.0%; p=0.03). There was no significant difference in the prevalence of BOP [users 19.61 % vs non-users 16.0% (p=0.50)] and PDD (≥4mm) [nyaope users 13.73 % vs. non-drug users 16.0 % (p=0.53)] between two groups. The PUFA score among nyaope users and non-drug users were similar [1.19 (SD 3.03) vs. 0.68 (SD 1.28) p= 0.42]. Only 51% of nyaope users (vs. 100% non-drug users) reported daily brushing and 100% (vs. 56% of non-drug users) had a highly cariogenic diet.

Conclusion: Nyoape users had significantly higher cariogenic diets, caries prevalence, and DMFT scores compared to non-drug users. Additionally, Nypoape users were also significantly less likely to practice daily brushing than non-drug users.

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ARV	Anti-retroviral drug
ASSIT	Alcohol, Smoking and Substance Involvement Screening Test
BOP	Bleeding on probing
CPTIN	Community Periodontal Index and Treatment Need
DMFT	Decayed Missing Filled Teeth
HIV	Human Immunodeficiency Virus
IV	Intravenously
MST	Multi-systemic therapy
PDD	Periodontal Pocket Depth
PUFA	Pulpal involvement, ulceration caused by dislocated tooth fragments, fistula and abscess
SACENDU	South African Community Epidemiology Network on Drug Use
YLL	Years of life lost
WHO	World Health Organisation

CHAPTER 1: INTRODUCTION

Drug use is an alarmingly common problem in South Africa (SA) and globally, and is associated with significant mortality and morbidity (McGrath et al 2005; Shekarchizadeh et al 2013; Mokwena et al 2015b; Liebenberg et al 2016). 'Nyaope', a form of low-grade heroin mixed with marijuana has become a popular trend among South African youths (Honour, 2014). Nyaope, also known as 'whoonga' and 'sugars', is a lethal and extremely addictive South African street drug which continues to ravage the lives of youth and shatter communities (Weich et al 2008; Solomons et al 2014).

Nyaope is reported to have originated in the townships of Soshanguve and Mamelodi in Pretoria in 2000. Since then many people, almost all of whom are poor and black have been addicted to the drug which is very accessible due to its low cost of R30 a joint (Meel et al 2014; Mokwena, 2016). In 2013, the average age of nyaope users was 24 and even primary school children reportedly use the drug (Dada et al 2014; Mokwena, 2016). Nyaope users experience great psychological and physical turmoil when trying to stop using the drug. There is inadequate infrastructure for the rehabilitation of nyaope users in the public sector and they are too poor to afford private rehabilitation centres. Additionally, nyaope users require a minimum of 1 year of comprehensive care for successful rehabilitation (Mokoena, 2016).

Although the destructive effects of nyaope have been widely publicized in the media, very few South African studies have examined the systemic effects of nyaope objectively. There are no studies which have examined the oral health of nyaope users. The present study was conducted at two drug rehabilitation centres in Johannesburg in order to characterise the effects of nyaope on oral health and investigate the oral health behaviours of nyaope users. This will be the first study that objectively describes the oral health status of nyaope users. The findings of this study will be used to plan an approach to the holistic care of nyaope users at drug rehabilitation centres, with particular attention to oral health.

CHAPTER 2: LITERATURE REVIEW

2.1 Burden of Drug use

In 2014, approximately a quarter of a billion people between the ages of 15 and 64 years use an illegal drug (UNODC, 2016). Drug use has remained stable in the past three years with a global prevalence of 5.2%, however, the number of drug users have increased from 6 million to 246 million as a result of a rise in the global population (UNODC 2015). Substances being used range from the more traditional opiate types such as heroin to the newer amphetamine-based drugs (McGrath et al 2005). The global prevalence of opioid use (0.7% of the global adult population) and opiate use (0.4% globally) has remained stable according to limited data (UNODC, 2015).

Amphetamine-based drugs have become increasingly popular recently, with over 40 million annual users worldwide. Methylenedioxymethamphetine, or 'ecstasy' has become increasingly attractive, and is one of the most frequently used drugs among teenagers and young adults (McGrath et al 2005). Cocaine use has declined overall, while the use of cannabis and the non-medical use of pharmaceutical opioids have continued to rise (UNODC, 2015). Cigarette smoking is the most common form of nicotine use and there are about 1.2 billion smokers globally. By 2030, it is estimated that there will be 2 billion smokers worldwide. Smoking is becoming increasingly prevalent in developing countries, particularly among women. In developing countries 9% of women smoke compared to 22% of women in developed countries (WHO, 2003). Inhalants (e.g. household products, glue, petrol, nail paints) are substances which release fumes and can be used as drugs of use. As they are easily accessible, cheap and legal to possess, they are often used at an early age (Johnston et al 2016).

Illicit drug users in Africa comprise about 17% to 21% of total illicit drug users worldwide (DBE, 2013). South Africa is the pinnacle of illegal drug trade in sub-Saharan Africa (Liebenberg et al 2016). Drug use is extremely common in South Africa and it is estimated that 11% of the South African population will be affected by an addiction disorder during their lifetime (Mokwena et al 2015b). South Africa has

experienced significant social changes during recent decades making it an ideal destination for drug trafficking (Liebenberg et al 2016). In the Western Cape crystal methamphetamine ('tik') is the most popular drug of use, whereas in Gauteng it is methcathinone ('CAT'). South Africa is also the largest user of methaqualone (mandrax) worldwide (Liebenberg et al 2016). Alcohol is the most used legal substance in South Africa, while cannabis is the most common illicit substance used (DBE, 2013).

It has been reported that about 1% of all South Africans use amphetamines (Smit, 2014). In Gauteng, 4026 admissions to 18 treatment centres were recorded from January to June 2013. The most common used substance was cannabis (40%), followed by alcohol (27%), heroin (12%), methcathinone (8%), 'nyaope' (4%), methamphetamine (3%) and cocaine (3%) (Dada et al 2014).

Poly-substance use is a major problem in all provinces, with between 54% and 62% of patients reporting more than one substance of use. The number of patients admitted for addiction of nyaope has increased in Gauteng (Dada et al 2014). Prescription drugs have become a serious public health concern worldwide as a result of their potential for recreational use. In South Africa, anti-retroviral (ARV) medication which are conventionally used for the treatment of Human Immunodeficiency Virus (HIV) infection is increasingly being used as a component of nyaope (Davis et al 2014; Thomas et al 2014).

2.2 Socio-demographics

The use of illicit substances such as marijuana, cocaine and amphetamines is three times more prevalent in men than women, whereas the non-medical use of opioids and sedatives appears to be commoner among women (UNDOC, 2016). The prevalence of drug use is significantly higher among adolescents than adults, however, the gender gap in drug use is smaller among adolescents in comparison to their adult counterparts (UNDOC, 2016).

Sex and ethnicity may be associated with specific patterns of drug use (Chambers et al 2013). Multiple studies have indicated that drug and alcohol use is considerably higher among males than females (Compton et al. 2007). The prevalence of alcohol and drug use was found to be twice as high among males than females over a 12-month period according to an American survey, i.e. the National Survey on Drug use and Health (Merikangas et al 2012).

African American youths report less drug use than their white and Hispanic counterparts, although there are specific patterns of drug use according to school grade and drug characteristics (Chambers et al 2013). Studies have shown that there is a greater prevalence of poly-substance use among older learners. However, the use of inhalants was more common among younger students (7% among 8th graders and 3% among 12th graders) (Chambers et al 2013).

Alcohol use is prevalent among South African youth and is directly proportional to increasing age among both sexes (Seggie, 2012). There is a decrease in the age of commencement of drug use which is of particular concern (Peltzer et al 2010). Methamphetamine, ecstasy, marijuana and mandrax are popular drugs among South African youth. In Cape Town, methamphetamine abuse is most prevalent among coloureds. Heroin abuse has a greater prevalence among males and English/Afrikaans speaking populations of caucasian origin. Its appeal has increased among youth as a result of its decreasing cost and desirable physical effects such as feelings of well-being and contentment (Peltzer et al 2010; Drugs N.I.D.A. 2014).

2.3 Risk Factors

Drug use is a complex process which occurs as a result of the interaction of multiple risk and protective factors from various developmental environments (UNDOC, 2015). A history of previous use of a drug is a major predictor of its further use. In particular, marijuana use has been reported to be a significant predictor of other illicit drugs, thus termed the 'gateway drug' (Brook et al 1999; Fergusson et al 2006).

Risk factors for drug use in South Africa include age and sex, poverty, unemployment, political disturbances, peer pressure, inadequate education, traumatic life events and

psychiatric disorders (Peltzer et al 2010). Additionally, there are genetic factors and aspects of family relationships (parental drug use, family conflict, structure and cohesion) and school environment (deviant peer association, absenteeism, low academic aspiration and poor school performance) that predispose an individual to drug abuse (Spooner, 1999; DBE, 2013; Masombuka, 2013).

2.3.1 Age and sex

Adolescence is a vulnerable period of an individual's life as it predisposes them to drug use for various reasons including peer pressure, the assumption of an independent role and identity and detachment from parents. It is also associated with socialisation and experimentation, activities which have the potential to result in drug use. Males have a significantly higher probability of using illegal drugs and practicing polydrug abuse in comparison to females. They are also likely to use drug at an earlier age. This propensity of drug use among males is thought to be related to genetic and environmental factors (Spooner, 1999). Boys experiment with a greater variety of drugs compared to girls, and are likely to report more use. In a controlled environment where opportunity for drug use is equal, boys and girls tend to use drugs in comparable numbers. However, in reality, as boys have more chances to use drugs, they have a higher prevalence in this regard (Chambers et al 2013). The behaviour of women may be influenced by traditional social stereotypes which associate them with labour, family responsibility and procreation (Storbjörk, 2011).

2.3.2 Genetic and family factors

Addiction can occur due to a genetic predisposition. Individuals may be particularly susceptible to specific environmental risk factors for drug use due to their unique genetic composition (Spooner, 1999; Masombuka, 2013).

Within the relationship between adolescents and their families, there are fundamentally crucial factors that may have an effect which leads to drug addiction. Specific concerns of the adolescent-family relationships include inadequate parental family management (e.g. poor discipline), discouraging communication (criticism, blaming), poor parental mentorship (criminality, anti-social behavior and drug abuse)

and child abuse. Additionally, development of a child in a single parent environment is also a significant risk factor for drug use (Spooner, 1999). A considerable amount of research has demonstrated that teenagers have a greater likelihood of using alcohol and drugs if their parents are substance users (Adger et al 1999).

2.3.3 Poverty and unemployment

Poverty and unemployment are widespread in South Africa, predominantly among black South Africans. Inequalities in the social status of communities play an important role in prevalence of drug use among the poor. These inequalities, in turn, lead to an increase in crime rate and social degeneration (Mokwena, 2015a; Mokwena et al 2015b). The predisposition to drug use that is associated with poverty becomes greater in an environment where drugs are easily available (Mokwena et al 2014).

2.3.4 Psychiatric disorders and traumatic life events

Adolescents with a psychiatric disorder are thrice as likely to have a substance use disorder in comparison to those without a psychiatric disorder. The most common co-existent disorders are depression, conduct disorder, anxiety and specific personality disorders (Chambers et al 2013). There is a high risk of harmful outcomes including illegal drug use and criminal and suicidal behavior among youths who have undergone traumatic life events (e.g. sexual assault, neglect, death in family) (Spooner, 1999).

2.3.5 Educational factors and peer pressure

The likelihood of drug use is higher among individuals who are not educated or those who do not attend school regularly. Adolescents that do not understand the value of education have a propensity to behave in a delinquent manner and to use drugs (Spooner 1999). Poor school performance, aversion and cynicism towards school activities and suspension are more likely to occur among drug users than non-drug users. Poor school performance or school absence often leads to unemployment of adolescents which prevents adequate assimilation into society (Spooner 1999).

Peer pressure is a critical predictor of youth behavior and adolescent drug use (Brook et al 2006; Honour, 2014). Adolescence is an important period of an individual's life where he/she is attempting to develop a clear self-identity. Adolescents may fall victim to peer pressure and use drugs in an attempt to be accepted by their peers. The consequences of negative peer pressure on adolescents can be very harmful as they are often naive and vulnerable to the influences and afflictions of society (Honour, 2014).

2.4 Consequences of drug use

A high annual mortality and substantial number of years of life lost (YLL) occur as a result of illegal drug use worldwide. The considerable number of YLL is a consequence of disabilities and premature deaths (Liebenberg et al 2016). Cocaine, opioids, amphetamines and cannabis collectively were responsible for an estimated 12 million YLL as a result of disability and premature death. The method of administration of a drug is a major factor to consider when examining the risks and negative health outcomes of drugs. Parenteral drug use, specifically, is associated with a much larger risk of infection (e.g. HIV, hepatitis C) and overdose compared to drugs that are swallowed, inhaled, snorted or smoked (Ramsoomar et al 2012).

In comparison to other people of the identical age group in the general population, drug users have a more diminished life expectancy and have a greater mortality. The primary cause of death is commonly related to the illegal drug, however, significant contribution to mortality is formed by HIV and hepatitis C transmitted from contaminated needles, accidental deaths during the time of intoxication, erratic reactions to drugs and criminal activities. Substantial harm occurs to individuals and communities as a result of illicit drug use and drug addiction. Furthermore, illicit drug use has significant ramifications for the economy, health authorities and social governance (Liebenberg et al 2016). A study conducted between 2009 and 2010 revealed that alcohol abuse cost the South African economy R17 billion during that period. According to the National Drug Master Plan (2012-2016), the social and economic cost of alcohol and illegal drug use was R136 billion (6.4% of GDP) annually (DBE, 2013).

Drug use is associated with an increased probability of subsequent socially unacceptable and criminal behavior, including theft, destruction of property, assault and suicide (Brook et al 1999). Domestic violence, child molestation and neglect, reckless driving, risky sexual behavior and fetal alcohol syndrome have a strong association with alcohol use (Seggie, 2012). The effect of substance use on society is that its youth, one of its most integral and promising parts, fail to achieve at school and secure employment. This, in turn, leads to the continuous vicious cycle of crime, poverty, social isolation and violent behavior (Possi, 1996).

2.5 Nyaope

Nyaope has been reported to contain low grade heroin, morphine, methamphetamine, marijuana, cocaine, ARV medications (efavirenz and ritonavir) and various adulterants (rat poison, detergent and paracetamol) (Thomas et al 2014, Mokwena et al 2015b). There is considerable geographical variation in the precise contents of nyaope (Solomons et al 2014). Nyaope is available in a powder form which is mixed with marijuana prior to smoking it. Alternatively, the abuser inhales smoke produced after nyaope is heated on a foil with the aid of a straw (Masombuka, 2013). There also seems to be a trend of using nyaope intravenously (IV), although there is little literature at present to support that this practice is widespread (Meel et al 2014).

The individual risk of nyaope use is determined by multiple environmental, social and personal factors which exist in an often complex manner (Masombuko, 2013). Risk factors include poverty, ease of availability, unemployment, young age and male sex, lack of recreational facilities, peer pressure and low self-worth, inadequate or disturbed parent-child relationships, genetic predisposition and psychological disturbances (Mokwena et al 2015b; UNODC, 2015).

Nyaope use has a tremendous impact on health, society and the economy (Masombuka, 2013; Mokwena, 2016). Nyaope use has adverse effects on multiple systems of the body including the oral cavity.

2.5.1 Effects of nyaope use on body

Literature available on the direct effects of nyaope use in South Africa is scarce. The reported desirable effects of nyaope include a sensation of euphoria, warmth and well-being, relaxation, contentment and safety (Masombuka, 2013). Reported secondary complications of nyaope use include psychiatric disturbances (e.g. drug-induced psychosis, anxiety disorder, depression), insomnia, rigors, hot and cold flushes, immunocompromised state, frequent infections (including infective endocarditis due to IV nyaope use), skin diseases, addiction and withdrawal symptoms (e.g. severe abdominal pain, seizures) and death secondary to overdose (Meel et al 2014; Cronjé, 2015; Mokwena 2015b). Nyaope use also lead towards heart and lung complications and when used during pregnancy has harmful effects on the fetus (e.g. abnormal uterine growth, neonatal abstinence syndrome) (Thomas et al 2014; Cronjé, 2015). In addition, nyaope use may also encourage the development of resistant HIV strains (secondary to ARV abuse) and drug resistance to ARVs which has a tremendous impact on the treatment of patients affected by HIV (Meel et al 2014; Khine et al 2015).

2.5.2 Social effects of nyaope use

The social effects of nyaope use include encouragement of criminal activities, unemployment, increase in number of school drop outs and the disintegration of families and communities (Mokwena 2015a; 2016). As a result of the low cost of the drug, many youths commit crimes in order to acquire money for their subsequent fix (Fernandes et al 2016).

In South Africa 60% of criminal activities are associated with substance use according to data provided by police (Honour, 2014). Nyaope users form a large portion of individuals that commit these crimes. Drug related crimes have risen by 192% over the last decade and by 13.5% during 2012 and 2013 (Honour, 2014).

2.5.3 Oral Effects of drug abuse

It is important to examine the oral effects of each of the potential constituents of nyaope, as well as, the oral effects of other commonly used drugs because it contains

a variety of drugs (ranging from cannabis, heroin and methamphetamine) and users commonly practice poly-drug abuse (Masombuka 2013).

Drug use has direct and indirect effects on oral health. The indirect effects of drug use are related to the users' behavior and lifestyle. Drug use causes complications of oral health through its direct effect on oral tissues, as well as, disruption of the normal physiology of oral tissues (Shekarchizadeh et al 2013). Multiple studies have reported poor oral hygiene and oral diseases among illicit drug users (Brown et al 2012). Risk factors for poor oral health in drug users include inadequate tooth brushing, bruxism, dry mouth and a high sugar containing foods and beverages (Smit, 2014). Psychological and personality problems, poor general health, insufficient nutrition and poor oral hygiene are complications that lead to an increased prevalence of dental disease among drug users (Solomons et al 2014).

A) Heroin

Heroin use is associated with increased incidence of dental caries, xerostomia, periodontal disease, oral fungal and viral infections and hyperpigmentation of the tongue (Robinson et al 2005; Maloney, 2010). Dental caries in heroin users are darker and are typically located on the buccal and labial surfaces, features that may be pathognomonic for heroin use (Shekarchizadeh et al 2013). Risk factors for poor oral health among heroin users include increased consumption of sweets and poor dental hygiene (Maloney, 2010).

B) Cannabis

Cannabis use causes xerostomia and, therefore, chronic use is associated with a higher risk of caries. Cannabis, when smoked or chewed, also may cause 'cannabis stomatitis.' This is a condition characterized by hyperkeratosis and leukoedema of the buccal mucosa which may progress to leukoplakia and neoplasia of the oral epithelium with chronic use of cannabis (Cho et al 2005). Additional effects of cannabis use include gingivitis, alveolar bone loss, gingival hyperplasia, oral papillomas, uvulitis and tongue carcinoma (Maloney, 2010).

C) Methamphetamine

The chronic use of methamphetamine results in a condition called 'meth mouth' which is characterized by severe dental caries located specifically on buccal and lingual surfaces and extensive destruction of coronal tooth structure (Brown et al 2012). Methamphetamine is a sympathomimetic amine that causes vasoconstriction of the vasculature of salivary glands leading to reduced salivary flow (Klasser et al 2005). Methamphetamine is more likely to result in missing teeth when used intravenously as opposed to smoking the drug (Robbins et al 2010).

D) Cocaine

Cocaine use causes multiple problems in the oral cavity including bruxism, xerostomia, cervical abrasion, occlusal wear, increased rate of dental caries and periodontal disease, excessive haemorrhage after tooth extraction and gingival problems. Additional manifestations of cocaine use include halitosis, angular cheilitis, glossdynia, erosive lichen planus, oral candidiasis, nasal necrosis and ischaemic necrosis and perforation of palate (Sheridan et al 2001; Maloney, 2010).

E) ARV medications

ARV medications particularly protease inhibitors and non-nucleoside reverse trancriptase inhibitors, may also have detrimental effects on oral tissues. These medications can cause oral ulcers, taste abnormalities, salivary gland disorders, exfoliative cheilitis, papilloma, perioral paresthesia, erythema multiforme, lichenoid reactions and aphthous stomatitis (Jordan, 2007; Shrivastava et al 2013; Mitchell et al 2014).

F) Smoking

Smoking is associated with melanosis and a high prevalence of tooth loss. Smoker's melanosis is characterized by extensive, irregular, brownish discolouration of the oral muscosa which has a predilection for keratinised mucosa but can also affect the soft palate, buccal mucosa and floor of the mouth. Additionally, the clinical features of

inflammation and bleeding on probing (BOP) among smokers are less pronounced (Warnakulasuriya et al 2010; Goswami, 2015).

2.5.4 Oral health care of patients with nyaope use

Dentists should be competent in the early identification and diagnosis of oral diseases associated with the use of specific types of substances (Smit, 2014). In addition, this knowledge would also aid in the appropriate management of oral diseases associated with drug use, as well as, highlight approaches which are contraindicated (Solomons et al 2014). Dentists, in addition to providing appropriate dental care, must refer suspected nyaope users to rehabilitation centres and provide counselling whenever there is an opportunity. Appropriate management of oral disorders among recovering drug users will aid in regaining self-confidence and improving the quality of life of these individuals (Smit, 2014).

Nyaope use is a chronic disorder, similar to other drug use disorders. Therefore, it is important to appreciate its chronic course and the need for sustained long-term treatment (UNODC, 2015).

The first step in management of nyaope use is screening. Screening must include evaluation of the suspected drug user and, as drug abuse is not uncommon among family members of the drug user, it is important to identify them. Family members who are drug users or who are at high risk for drug use must be referred appropriately for rehabilitation (Adger et al 1999).

Management of nyaope users should be holistic, with attention to the mental, physical (e.g. withdrawal symptoms such as pain), and social aspects of the disorder. Individualised rehabilitation programmes are vital in the treatment of nyaope users and ideally requires a multidisciplinary approach (DBE 2013; UNODC, 2015; Mokwena, 2016). Key aspects of rehabilitation are continuous education (i.e. harm reduction, safe sex and HIV prevention, prevention of accidental overdose), behavioural therapy (i.e. relapse prevention strategies) and pharmacological treatment (e.g. opioid substitution) (Perkel et al 2013).

Multi-systemic therapy (MST) is an individualized, comprehensive home-orientated rehabilitation program that concentrates on school, family and aspects of the community which promote antisocial behavior. There is robust evidence that MST is an effective treatment for drug users and reduces drug use. Additionally, MST contribute to a significant reduction in violent criminal activities and admission to rehabilitation facilities. Family-orientated therapies enhance family dynamics and interaction. They also aim to correct problems in the adolescent's environment (e.g. school, family) and promote extra-curricular activities (Chambers et al 2013).

The families of nyaope users, communities and government have a critical role to play in order to prevent nyaope use and ensure that upon discharge from rehabilitation centres, patients have a stable social environment to prevent relapses (DBE, 2013; Mokwena 2016).

2.6 Summary

Drug use is rampant among the youth of South Africa. Nyaope has emerged as a popular drug of choice among young individuals (often as young as 8 years) who often live under extra-ordinarily poor socioeconomic conditions. The drug is relatively cheap, highly addictive and easily accessible. Nyaope has devastating effects on its users, communities and the South African economy. Nyaope users usually suffer from severe damage to their psychological, physical and spiritual health. They often engage in criminal activities and risky sexual behaviour due to the effects of the drug. Therefore, communities may have a high incidence of crime and sexually transmitted diseases such as HIV. Nyaope use is associated with low levels of education and high prevalence of unemployment among its users. Young, potentially productive individuals fail to find employment as they succumb to the effects of nyaope. Unemployment currently has a significant impact on the South African economy and nyaope use (as with other chronic drug use) may worsen the problem. Nyaope use has lethal effects on an individual's health.

The majority of published studies on effects of various drugs on oral health which were used in chapter 2 have been literature review type of studies (Cho et al 2005; Klasser et al 2005; Jordan, 2007; Maloney, 2010; Shekarchizadeh et al 2013). Some of

published studies have been cross-sectional in design and they included a comparative group, i.e., drug users versus non-drug users or participants from general population (Sheridan et al 2001; Brown et al 2012). However there has been no published studies that has focused on the oral health status of nyaope users. This study reports on the oral health status of nyaope users attending two drug rehabilitation centres in Johannesburg, South Africa.

CHAPTER 3: AIMS AND OBJECTIVES

3.1 Aims

The aim of the study was to determine the oral health status of nyaope users and to examine risk factors associated with oral diseases at two drug rehabilitation clinics in Johannesburg.

3.2 Objectives

The objectives of the study were

1 To determine the demographic characteristics of nyaope users.
2 To compare the oral health status (i.e. periodontal status, soft and hard tissue status) using epidemiological tools such as the decayed missing filled teeth (DMFT) and pulpal involvement, ulceration caused by dislocated tooth fragments, fistula and abscess (PUFA) score of nyaope users at two drug rehabilitation clinics in Johannesburg against matched non-drug users.
3 To compare oral health behaviors and oral hygiene practices among nyaope users and non-drug users in this cohort of patients.

CHAPTER 4: METHODOLOGY

4.1 Study Design

This was a comparative cross-sectional analytical study which included patients (i.e. nyaope users) from Empilweni drug rehabilitation centre (Soweto) and Nishtara Alcohol and Drug Centre (Lenasia) in Johannesburg. These two-drug rehabilitation centres were selected as they both required patients to be admitted for rehabilitation, had excellent facilities, provided consent for the researchers to examine the patients and were willing to provide the researchers with full access to patient medical records. However, it must be noted that individual informed consent was obtained from every participant in this study. As the patients were admitted at the hospital, it was possible to interview and examine them without any inconvenience to the patient and the examiner (i.e. there we no fixed appointments and the examiner could perform a detailed examination at a convenient time). In-patients were also selected exclusively as they would not have access to nyaope and would therefore not be intoxicated during examination. Intoxication by psychotropic substances may negatively affect the process of obtaining informed consent (Aldridge et al 2008). This may not have been possible if out-patients were selected as they may acquire nyaope out of the rehabilitation centre. Furthermore, the possibility of intoxication among patients may have also posed a threat to the safety of the researchers, which was avoided. Matched patients were non-drug users and recruited from a community dentistry outreach site, the OR Tambo clinic. This is a primary care clinic which serves the community of Diepsloot, Johannesburg, and provides the community with basic medical and dental services. Matched control patients attended the OR Tambo clinic for routine medical check-ups. Patients that attended the dental services section of the clinic were excluded.

4.2 Duration

The study was conducted from 1 September 2016 to 29 December 2016.

4.3 Patient selection

Patients who were admitted to the Empilweni and Nishtara drug rehabilitation centres were invited to participate in this survey. Nyaope users were identified with the aid of in-patient records. These records clearly documented a history of nyaope use and highlighted objective evidence of nyaope use (i.e. positive drug tests). Matched non-drug users were patients with identical social demographics (i.e. same age, gender and race) of patients in the nyaope group. The nyaope users were in various stages of remission when they were admitted to these centers for treatment of their addiction. All nyaope users provided written informed consent. They were alert and not intoxicated when informed consent was obtained.

Inclusion criteria for nyaope users

Patient with history of nyaope use.
Patients with history of nyaope and polydrug use.
Patients who provided informed consent
Patients 18 years old and above.

Exclusion criteria for nyaope users

Patients with no history of nyaope use.
Patient under 18 years.

Inclusion criteria for non-drug users:

Patients without history of drug use (as reported by patients).
Patients with matching demographics as drug users.
Patients 18 years old and above.
Patients who provided informed consent.

4.4 Sample Size

Sixty-one patients were admitted to the Empilweni drug rehabilitation centre and Nishtara drug centres from 1/09/16 to 29/12/16. As 10 nyaope users refused hospital admission (i.e. signed refusal of hospital treatment form), they were not included in the

study. Fifty-one nyaope users were interviewed and examined from 1/09/16 to 29/12/16. For maximum conformity of data and verification of this study method 25 matched non-drug users were recruited, after collecting data from nyaope users, from OR Tambo clinic. There was 1 non-drug user for every 2 nyaope users (1:2 ratio). This recruitment was similar to a study by Mateos-Moreno et al which compared the oral health of 70 drug addicts with that of a control group comprising 34 patients (Mateos-Moreno et al 2013). All 25 non-drug users that were examined were male as almost all nyaope users were male (i.e. 50 out of 51).

4.5 Data collection

The objectives and benefits of this study were explained to each participant and information relating to the study was provided in a document (Appendix 3 and 4). Written informed consent was obtained from each participant (Appendices 3a and 4a).

4.5.1 Study instrument

Study instrument had two components

A) Questionnaire: A questionnaire which consisted of 17 questions was used to record information relating to the participant's demographics, education, medical and drug history, oral health behaviour and hygiene. It was derived from the World Health Organization Alcohol, Smoking and Substance Involvement Screening Test version 3.0 (WHO ASSIST V3.0) questionnaire and American Dental Association proposed health questionnaire (Stefanac, 2007; WHO, 2010). It was modified to meet the aims and objectives of the study. As nyaope was not listed in the WHO ASSIST V3.0 questionnaire, it was added under the drug history section of the questionnaire in this study (Appendix 1).

B) Clinical component: The World Health Organization 2013 oral health assessment form was utilized to determine the oral health of all the study participants (WHO 2013) (Appendix 2). The form was used to record the clinical findings which included periodontal status and decayed, missing, filled teeth (DMFT) score. Additionally, the

form was used to record the pulpal involvement, ulceration caused by dislocated tooth fragments, fistula and abscess (PUFA) score for clinical consequences of untreated caries in both groups.

Participants were examined using mouth mirror, dental explorer and community periodontal index and treatment need (CPITN) probe. The participants were examined on site under natural light in a seated position according to the 2013 WHO guidelines. The extent of dental caries was calculated with the use of DMFT index. The bleeding on probing (BOP) and periodontal pockets depth (PDD) were graded with the use of the modified community periodontal index (CPI) which entailed examination of pocket depth and gingiva for bleeding. The PUFA score and untreated caries PUFA ratio was also calculated based on clinical findings.

The PUFA score is calculated in a similar cumulative manner as the DMFT score. A maximum of one score per tooth was given for the presence of each component of the PUFA score (i.e. visible pulp, ulceration of the oral mucosa due to root fragments, a fistula or an abscess). The PUFA score was calculated as the sum of each component score. Untreated caries PUFA ratio was calculated by following method (Monse et al 2010):

PUFA×100/D

(D= Decayed component of DMFT score)

Ten teeth (i.e. 17/16, 11, 26/27, 37/36, 31 and 46/47) were examined using CPITN probe in six sextants and BOP and PDD were assessed (Peter, 2009).

17 = Maxillary right second molar

16 = Maxillary right first molar

11 = Maxillary right central incisor

26 = Maxillary left first molar

27 = Maxillary left second molar

37 = Mandibular left second molar

36 = Mandibular left first molar

31 = Mandibular left central incisor

46 = Mandibular right first molar

47 = Mandibular right second molar

A score for gingival BOP and PDD was given based on the presence or absence of condition. Highest score in each sextant was given (WHO oral health assessment form 2013):

Gingival BOP score in ten teeth of six sextants

0 = Absence of condition

1 = Presence of condition

9 = Tooth excluded

X= Tooth not present

The PDD score in ten teeth of six sextants

0 = Absence of condition

1 = Pocket 4-5 millimeter (mm)

2 = Pocket 6 mm or more

9 = tooth excluded

x = Tooth not present

The clinical examination was conducted by a calibrated single examiner, and all the scores were confirmed by senior dentist. Intra-examination reliability was checked randomly using every 5th patient and a kappa score of 0.8 indicated good reliability.

4.6 Data analysis

The collected data was entered into a Microsoft Excel spreadsheet and was analysed with statistica version 13.2. Descriptive statistical analysis was performed using means, standard deviations (SD), frequencies and ranges. The categorical data (i.e. gender, race, education, school drop outs, methods of nyaope use, other substance abuse, dietary and brushing habits etc.) were expressed as a percentage and Chi-square test was performed for p-value of categorical data. The continuous data (i.e. age of both groups, average duration of nyaope use, DMFT and PUFA) were

expressed as mean ± SD and a t-test was performed for p-value for normally distributed data. For non-parametric data Mann-whitney U test was used. The statistical significance level was set at $p < 0.05$. Frequency histogram was used for non-normally distributed variables. Frequency tables, bar and pie charts were used to present different variables. Pearson's correlation coefficient analysis was done to check association between duration of nyaope use and mean DMFT score.

4.7 Ethics:

Ethics approval was approved on 24/06/2016 (Ethics Clearance no is M160610) from the Human Research Ethics Committee of the University of the Witwatersrand (Appendix 5). The anonymity of patients and confidentiality of patient information was maintained in this research project. Approval for this research was obtained from the Empilweni Drug rehabilitation centre and Nishtara alcohol and drug centre (Appendices 6 and 7)

CHAPTER 5: RESULTS

5.1 Demographics of nyaope users and non-drug users

Table 1 illustrates the demographics of the nyaope users and non-drug users. The mean age of nyaope users and non-drug users in this study was similar (i.e. 26 years). There was only 1 female among 51 nyaope users while all the non-drug users (i.e. 25) were male. Most of the nyaope users were black (94.12%). All non-drug users were black. More than half of the nyaope users (66.67%) completed primary school. Non-drug users had higher high school (56% vs 29.41%) and college (32% vs 3.92%) education rates in comparison to cases. About 66% of nyaope users had dropped out of high school.

Table 1: Demographics of nyaope users and non-drug users

Demographics	**Nyaope users (n = 51)**	**Matched non-drug users (n = 25)**	**p-value**
Age (mean±SD)	26.40 ± 4.84	26.04 ± 4.09	0.75
Gender (%)			
Male	50 (98.04)	25(100)	0.95
Female	1 (1.96)	0	0.67
Race (%)			
Black	48 (94.12)	25 (100)	0.86
Coloured	3 (5.88)	0	0.31
Education (%)			
Primary school	34 (66.67)	3 (12.00)	0.004
High school	15 (29.41)	14 (56.00)	0.144
College	2 (3.92)	8 (32.00)	0.004
Drop out from school (%)			
Yes	34 (66.67)	2 (8.00)	0.001
No	17 (33.33)	23 (92.00)	0.01
Employed (%)			
Yes	31 (60.78)	13 (52.00)	0.70
No	20 (39.22)	6 (24.00)	0.34

Prior to using nyaope 60.78% nyaope users were employed. Non-drug users also had a lower rate of unemployment (24%). Six non-drug users were still studying (i.e. were in high school or university) and were not regarded as unemployed.

5.2 Characteristics of nyaope users

The highest number of nyaope users (49%) were in 26-39 age group, followed by the 22-25 age group (37%) (Figure 1).

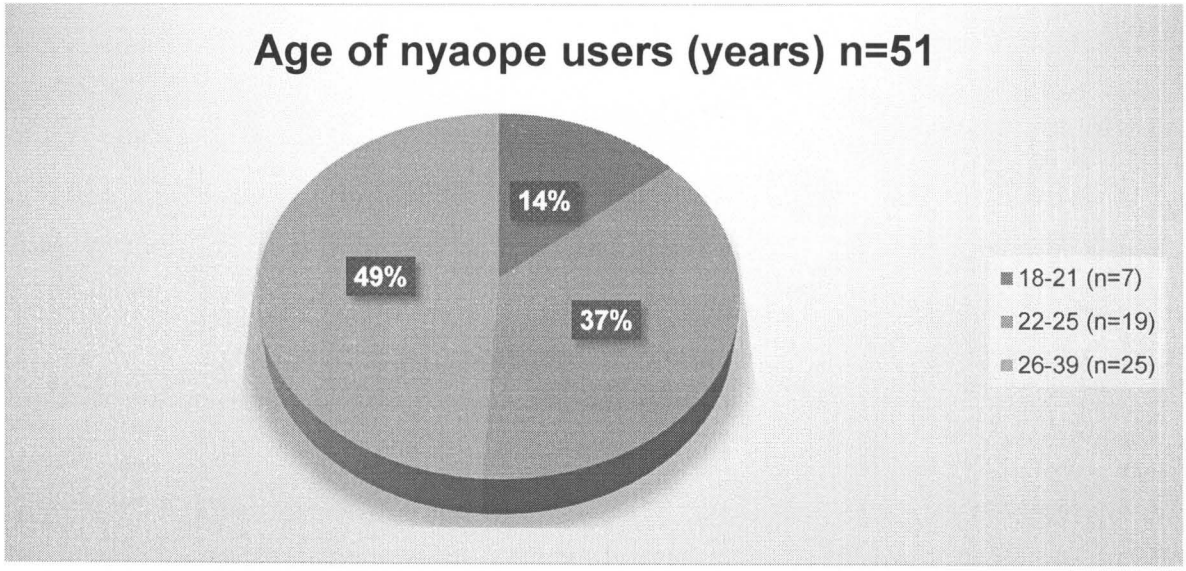

Figure 1: Percentages of nyaope users in different age groups.

The mean number of years of nyaope use was 6.8 ± 3.42. Smoking was the most common method of nyaope use (84.3%) (Figure 2).

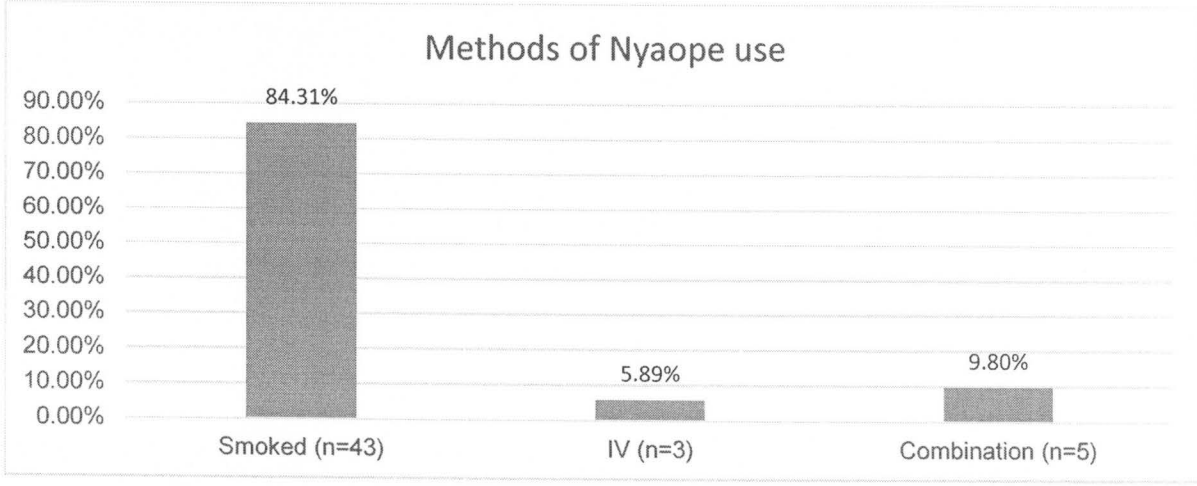

Figure 2: Methods of nyaope use

The majority of nyaope addicts used 7 or more bags per day (62.75%) whereas 25.49% and 11.76% of nyaope addicts used 5-6 bags and 3-4 bags per day, respectively. One bag of nyaope contains less than 1 gram of the drug. There was also high incidence of criminal offences among nyaope users (68.63%).

The overwhelming reason among nyaope users for their addiction was peer pressure (56.86%), followed by depressed mood (13.73%) and experimentation (13.73%) (Figure 3).

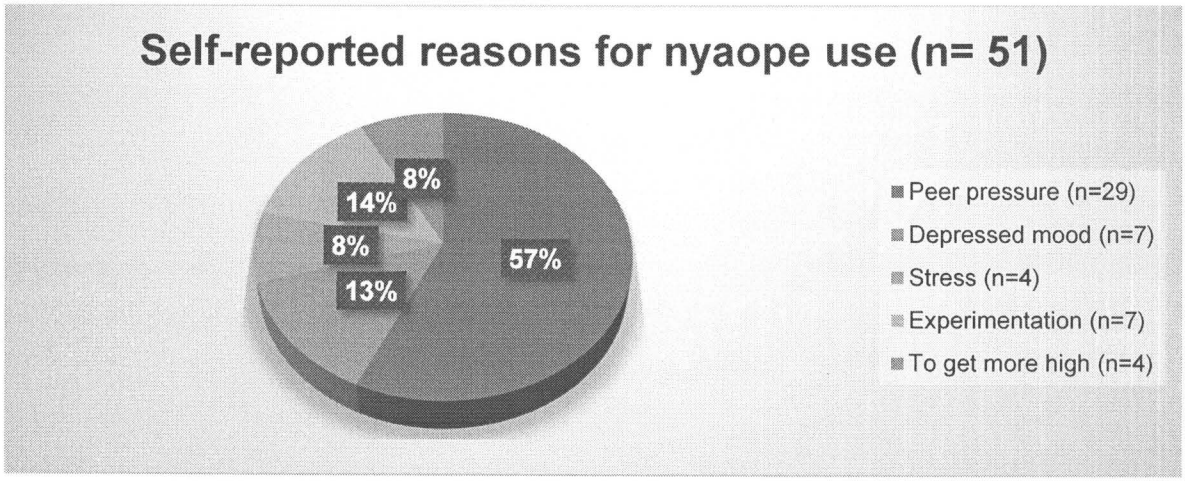

Figure 3 Self-reported reasons for nyaope use

Cigarettes were the most commonly used drug in combination with nyaope (100%), followed by marijuana (88.23%) and alcohol (60.78%) (Table 2).

Table 2: Other substance use among nyaope users

Substances	**n=51 (%)**
Cigarette	51 (100)
Marijuana	45 (88.23)
Alcohol	31 (60.78)
methaqualone (mandrax)	10 (19.61)
Cocaine	8 (15.69)
Methamphatemine (tik)	5 (9.80)
Inhalants (Glue)	6 (11.76)
Heroin	1(1.96)
Methcathinone ('CAT')	1 (1.96)

Most nyaope users perceived themselves as being in good health following rehabilitation (88.24%), however some perceived themselves as not being in optimum health (11.76%). According to self-reports 17.65% of nyaope users were HIV positive, 58.82% were negative and the remainder (23.53%) were unaware of their status. All the nyaope users reported a deterioration in their general heath following the initiation of nyaope use.

5.3 Alcohol consumption and cigarette smoking among nyaope users and non-drug users:

There was no significant difference (p=0.97) between alcohol consumption amongst the nyaope users and non-drug users. The significant difference (p= 0.001) between the nyaope users and non-drug users with respect to smoking was only evident in the 10-pack year cigarette smoking group (11.77% vs. 0%). The cigarette pack year was calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked, i.e.1 pack year= 1 pack/day×1 year (De Silvia et al 2011). All the nyaope users had a history of smoking (Table 3).

Table 3: Alcohol consumption and cigarette smoking habits between nyaope users and non-drug users

	Nyaope users (n=51)	**Matched non-drug users (n=25)**	**p-value**
Alcohol consumption (%)			
Yes	31 (60.78)	15 (60)	0.97
No	20 (39.22)	10(40)	0.96
Cigarette smoking (%)			
>5 pack year	29 (56.86)	9 (36)	0.31
<5 pack year	16 (31.37)	2 (8)	0.06
10 pack year	6 (11.77)	0	0.001
Don't smoke	0	14 (56)	<0.001

5.4 Diet and brushing habits of nyaope users and non-drug users

There was a statistically significant difference between the dietary habits of nyaope users and non-drug users with all the nyaope users reporting a poor dietary intake (p-value <0.001). Persons who consumed junk food (i.e. soft drinks and sugary foods) on a daily basis were categorized as having an unhealthy diet. The number of nyaope users brushing their teeth twice daily was also significantly lower than the non-drug users (p-value 0.0003). Twenty-five nyaope users reported that they never brushed their teeth or did so only occasionally (Table 4).

Table 4: Diet and brushing habits of nyaope users and non-drug users

	Nyaope users (n=51)	**Matched non-drug users (n=25)**	**p-value**
Diet (%)			
Healthy diet	0	11 (44)	<0.001
Unhealthy diet	51 (100)	14 (56)	0.004
Brushing habits (%)			
Once daily	22 (43.14)	10 (40)	0.86
Twice daily	4 (7.84)	15 (60)	0.0003
Occasionally	21 (41.18)	0	0.002
Never	4 (7.84)	0	0.0002

5.5 Comparison of oral health of nyaope users and non-drug users

With regards to oral health there was a significantly higher mean DMFT score amongst the nyaope users when compared to the non-drug users (p= 0.03). The nyaope users also had significantly higher dental caries compared to non-drug users (p=0.03). The mean component of missing teeth among nyaope users and non-drug users were 0.86 (SD 1.50) and 0.36 (SD 0.86), respectively. There was no significant difference in the other parameters including missing teeth, filled teeth and PUFA score (Table 5).

Table 5: Comparison of oral health of nyaope users and non-drug users

Indices	**Nyaope users (Mean±SD)**	**Matched non-drug users (Mean±SD)**	**p value**
DMFT score	3.97 ± 4.11	2.04 ± 2.81	0.03
Decayed	2.92 ± 3.23	1.56 ± 2.16	0.03
Missing	0.86 ± 1.50	0.36 ± 0.86	0.12
Filled	0.19 ± 0.80	0.12 ± 0.43	0.65
PUFA index	1.19 ± 3.05	0.68 ± 1.28	0.42
Pulpal involvement	1.15 ± 3.06	0.68 ± 1.28	0.45
Ulceration	0.04 ± 0.28	0	0.48
Fistula	0	0	
Abscess	0	0	

The mean DMFT score among nyaope users that had a high school and/or tertiary education was lower in comparison to those nyaope users that only had a primary school education. Although, there was no association with level of education and DMFT score among non-drug users. The mean DMFT score among non-drug users that had high school and/or college was similar to those that had a primary school education only. A history of employment prior to nyaope use was also associated with a lower mean DMFT score among nyaope users. Non-drug users who were employed had higher mean DMFT score than who were unemployed (Table 6).

Table 6: Association of employment and education with mean DMFT scores among nyaope users and non-drug users.

Educational level (nyaope users)	**Mean DMFT score (nyaope users)**	**Education level (non-drug users)**	**Mean DMFT score (non-drug users)**
High school and college (n=17)	3.11±3.12	High school and college (n=22)	2.09±2.94
Primary school (n=34)	4.28±4.50	Primary school (n=3)	2.0±3.46
Employment		**Employment**	
Employed prior to nyaope use (n=31)	3.87±3.78	Employed (n=13)	2.42±3.06
Unemployed (n=20)	4.15±4.67	Unemployed (n=6)	0.66±1.63

There was statistically significant difference in the prevalence of decayed teeth among nyaope users and non-drug users (p-value 0.03). The prevalence of filled teeth was low among both groups (nyaope users 7.84% and non-drug users 8%). Nyaope users had higher prevalence of BOP when compared to non-drug users (19.61% vs 16%) (Table 7).

Table 7: Prevalence of DMFT, BOP and PDD scores in nyaope users (n=51) and non-drug users (n=25)

Variables	**Nyaope users %**	**Non-drug users %**	**p value**
Decayed	82.35	48	0.03
Missing	39.22	24	0.34
Filled	7.84	8	0.98
BOP	19.61	16	0.50
PDD (≥4mm)	13.73	16	0.53

The untreated caries PUFA ratio among nyaope users and non-drug users was similar (40.94% and 43.59%). This indicates that 40.94% and 43.59% of the decayed

component had progressed to pulpal involvement among nyaope users and non-drug users respectively (Table 8).

Table 8: Untreated caries PUFA ratio

Groups	Untreated caries PUFA ratio
Nyaope users	40.94%
Non-drug Users	43.59%

Figure 4 shows the frequency histogram depicting non-normal distribution of decayed teeth among nyaope addicts with a median of 2.0 (interquartile range 1.0-4.0). This histogram shows that 9 nyaope addicts had a decayed score of 0. The highest number of nyaope addicts (n=10) had a decayed score of 1. Only 4 nyaope addicts had a decayed score of 8 and 9. One nyaope addict had highest decayed score of 19.

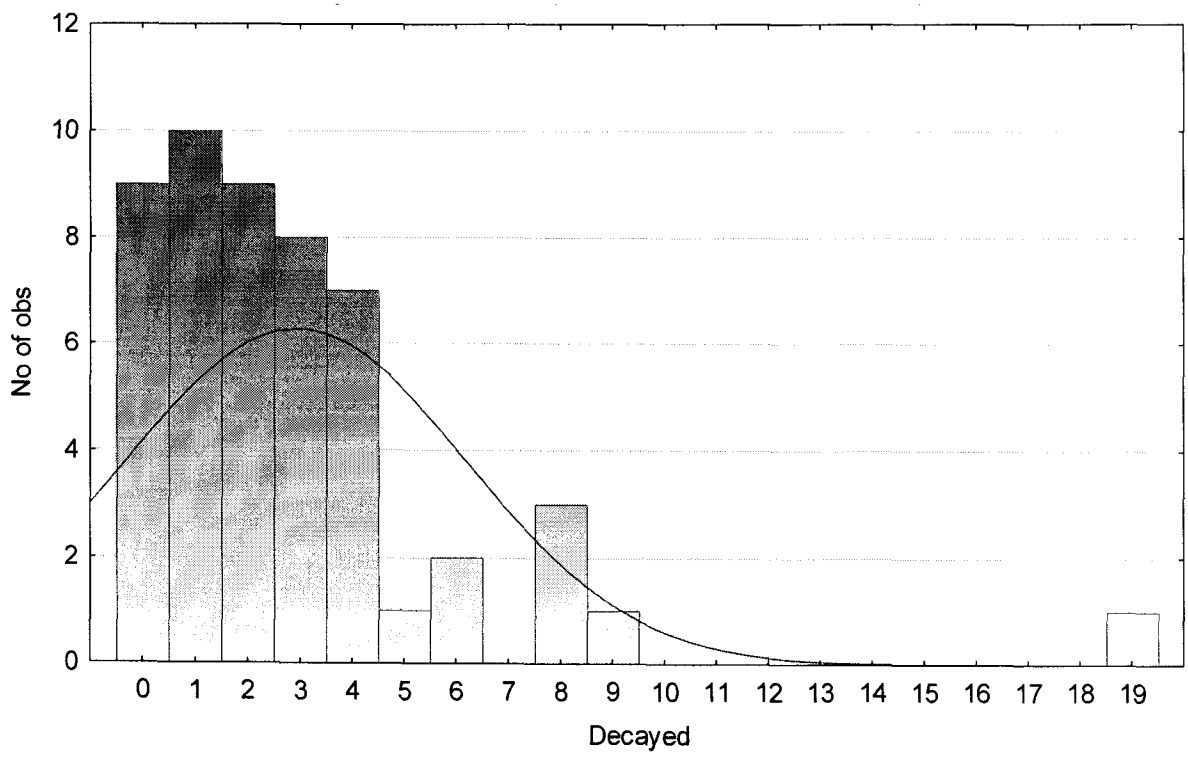

Figure 4 Frequency histogram depicting non-normal distribution of decayed teeth among nyaope users (x axis is showing number of decayed teeth and y axis is showing number of cases with decayed teeth.)

5.6 Relationship between DMFT score, duration and frequency of nyaope use

The majority of nyaope users (n=25) had used nyaope for between 6 to 10 years followed by 1-5 years (n=18). The 11-15 years group had the highest mean DMFT score (5.36±6.45) (Table 9).

Table 9: Duration of nyaope use vs DMFT

Duration of nyoape use (Years)	n=51 (%)	Mean DMFT	SD	Variance
1-5	18 (35.29)	3.72	3.25	10.5
6-10	25 (49.02)	3.48	3.88	15.1
11-15	8 (15.69)	5.36	6.45	41.6
Total	51			

As illustrated by Figure 5, 25.49% (n=13) of nyaope users in the 1 to 5 years group and 37.25% (n= 19) in the 6-10 years group had a DMFT score of 1-6. Two nyaope users (3.92%) among the 1-5 years group and 4 (7.84%) in the 6-10 year group had a DMFT score of 0. Three nyaope users (5.88%) among the 11-15 years group had a DMFT score of 0. One patient (1.96%) in the 6-10 years group and 2 patients (3.92%) in the 11-15 years group accounted for the highest DMFT scores (13-19).

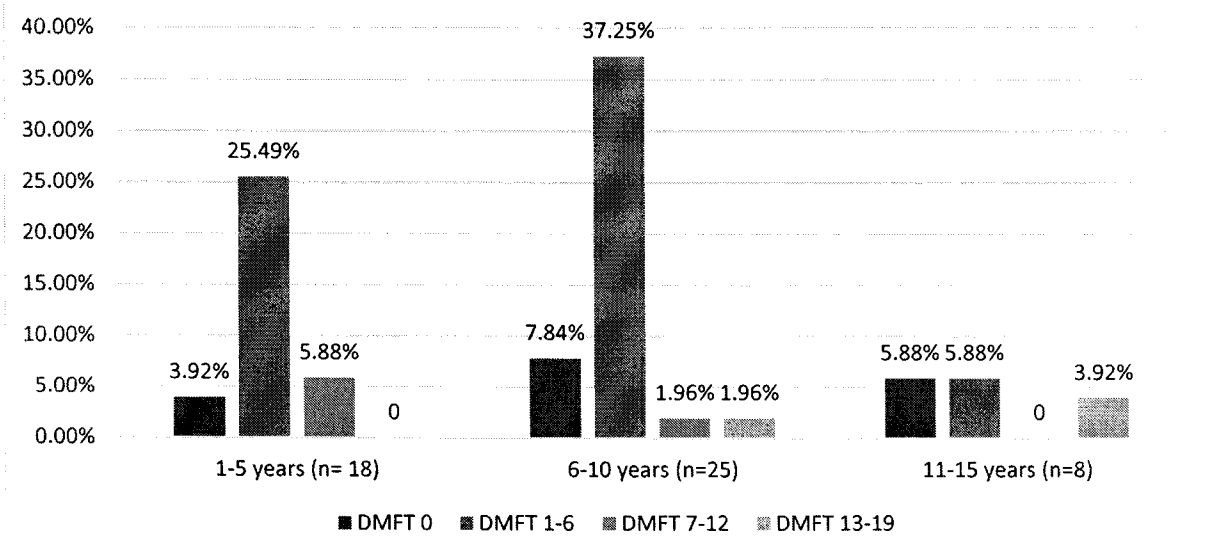

Figure 5 Relationship between number of years of nyaope use and DMFT score

Additionally, out of all 51 nyaope users the majority (n=44) had a DMFT score of between 0 and 6 (Table 10).

Table 10: DMFT score of nyoape users

DMFT score	n=51 (%)
0-6	44 (86.28)
7-12	4 (7.84)
13-19	3 (5.88)

Pearson's correlation coefficient analysis was done between number of years of nyaope used and DMFT score. It showed weak correlation between these two which means there was no association between DMFT score and duration of nyaope used (p-value 0.55). Correlation constant (r) value was 0.1 (Figure 6).

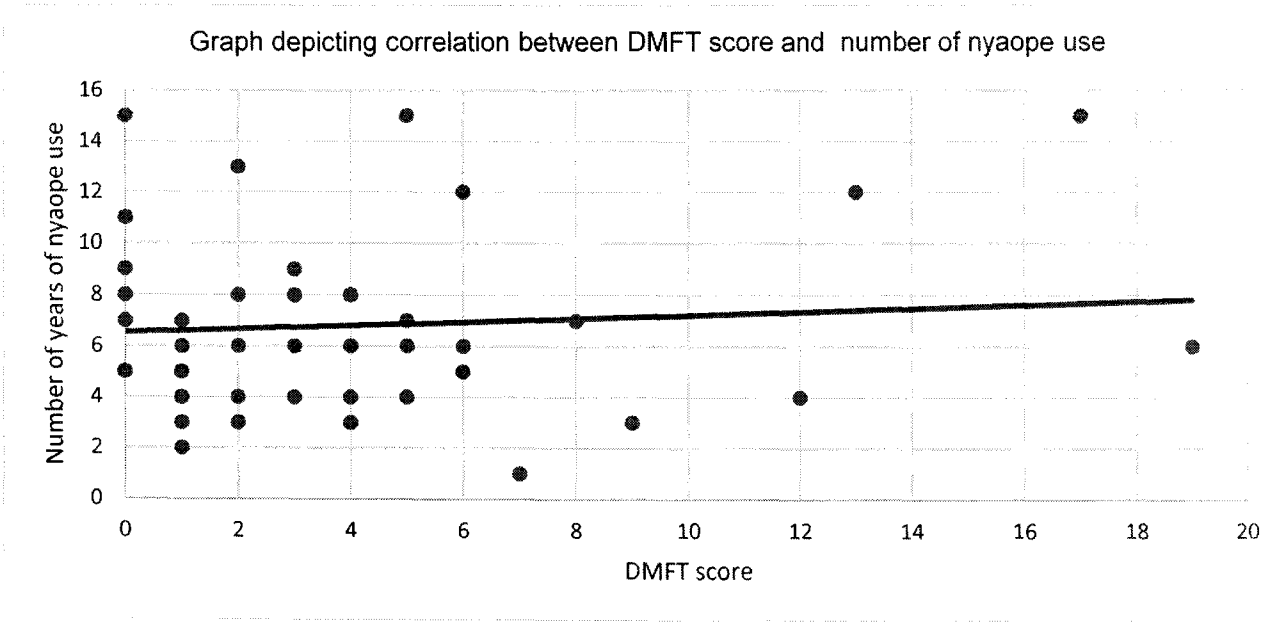

Figure 6 Graph depicting correlation between DMFT score and number of nyaope used (r = 0.1 and p-value =0.55)

CHAPTER 6: DISCUSSION

Oral health diseases are one of the commonest problems among drug users (Shekarchizadeh et al 2013). The provision of adequate oral health care among drug users is a challenge due to multiple factors. They include difficulty in identifying and following up drug users by health care professionals, poor access to dental care and lack of motivation to maintain good oral health among drug users. Furthermore, drug users often experience anxiety about receiving dental care and have a low pain threshold. Dentists are also frequently reluctant to provide dental care to these patients. (Mateos-Moreno et al 2013). This research aimed to characterize the oral health status and behaviour of nyaope users. Additionally, it was conducted in order to provide possible solutions to the development of a holistic rehabilitation programme for nyaope users, with particular attention to oral health. Adequate oral health care is a vital part of the holistic rehabilitation of drug abusers as it influences physical appearance, psychological balance and quality of life (Mateos-Moreno et al 2013).

6.1 Demographics

Nyaope users in this study were between the ages of 18 and 39 years and the mean age was 26.4 years. A similar age (18-36 years) range has been reported in a previous study by Mokwena in 2016 which analysed the experiences associated with addiction among nyaope addicts. A previous report by Honour in 2014 indicated that nyaope users were between the ages of 15 and 29 years (Honour, 2014; Mokwena, 2016). The mean age of nyaope users in this study (26.4 years) was also similar to that of nyaope users in Gauteng (24 years) in a report by South African Community Epidemiology Network on Drug Use (SACENDU). This report described the characteristics of drug-related admissions in all South African provinces from January to June 2013 (Dada et al 2014).

All nyaope users in this study were male except for 1 female, a finding which is similar to that described by the SACENDU study. According to this survey 93% of nyaope users in Gauteng rehabilitation centres were male and 7% were female (Dada et al 2014). These findings highlight the propensity of males to use illicit drugs. Blacks (94.12%) were the predominant users of nyaope in this study followed by coloureds

(5.88%). The SACENDU survey also reported findings that were almost identical to this study with blacks and coloureds accounting for 94% and 5%, respectively (Dada et al 2014). The predominance of nyaope abuse among blacks in this study is likely to be a reflection of the racial demographics of Soweto. However, it is also known that nyaope use affects mainly young black people (Mokwena, 2016).

There was a significant difference in college education of nyaope users (3.92%) and non-drug users (32%). A significant number (66.67%) of nyaope users dropped out of high school in this study. In a study by Honour, a significant number of nyaope users stated that they had dropped out of high school as a result of nyaope use (Honour, 2014). The exact high school drop-out rate was not mentioned which was a limitation of this study. All the Nyaope users in this study were unemployed, with 60.78% reporting that they were employed prior to their addiction. This high rate of unemployment is similar to that reported by Mokwena (2016) who found that eighty six percent (n=93) of nyaope users (n=108) were unemployed (Mokwena, 2016). Thus, unemployment is a significant problem among nyaope users and is a major risk for nyaope addiction. Nyaope use increases the likelihood of the user losing his job and reducing his chances of future re-employment (Fernandes et al 2016).

6.2 Method of nyaope use

The predominant method of using nyaope in this study was through smoking (84.31%), however, a small number used the drug through the IV route (5.89%) or used it through a combination of smoking and IV route (9.80%). These findings were consistent with the SACENDU survey conducted in 2013, which indicated that when nyaope is the primary drug of abuse, it is usually smoked (78%). The IV route (2%) also accounted for a minority of drug use according to this survey (Dada et al 2014).

6.3 Psychosocial aspects of nyaope use

This study highlighted peer pressure as being the most significant risk factor for initiation and continuation of nyaope use. Peer pressure has also been highlighted in previous literature as a significant predictor of adolescent drug use. A study conducted by Brook et al described the predictors of drug abuse among 1468 South African

youths aged between 12 to 17 years. It highlighted peer pressure as a crucial predictor for drug use (Brook et al 2006). A qualitative report by Honour aimed to identify reasons for nyaope use among youth in Gauteng. Among the nyaope users that were interviewed, most stated that peer pressure was the major reason for their addiction (Honour, 2014).

Additional self-reported reasons for nyaope use in this study were stress and depressed mood, experimentation and the desire to obtain greater pleasure than received from the use of other, less potent substances. Although they had not been formally diagnosed with depression, 13.73% of nyaope users in this study reported they used nyaope because of depressed mood. Depression, stress and experimentation with drugs are well described risk factors for drug addiction (Jeram, 2009; Espada, 2011; Honour, 2014). A British study investigated the reasons for psychoactive drug use among 364 adolescent poly-drug users. Eighty seven percent of the poly-drug users in this study stated that they used drugs to obtain relief from a depressed mood (Boys et al 2001). According to the study by Honour alluded to previously, some nyaope users experimented with nyaope for excitement and adventurous purposes (Honour, 2014). A few nyaope users in this study stated that they started using nyaope as their previous primary drug of use (usually marijuana) did not make them feel 'high enough'. Heavy use of marijuana during adolescence is a significant predictor of subsequent use of illicit, often harder drugs. (Fergusson et al 2006). It is likely that these nyaope users had developed tolerance to marijuana and sought a different drug which would produce a greater high.

A significant number of nyaope users in this study had committed crimes, predominantly robbery, in order to obtain money to obtain nyaope. Masombuka has described the experiences of parents (n=8) of nyaope users in Soshanguve township. According to the parents, the behaviour of nyaope users is characterised by opportunistic and compulsive theft (i.e. of money, various items including phones and clothes) from their own families and neighbors. This money or profit from stolen items would then be used to fuel their nyaope addiction (Masombuka, 2013).

6.4 Other substance use

According to this study, poly-drug use is common among nyaope users. The most prevalent secondary drugs of use among nyaope users in this study were cigarettes (100%), marijuana (88.23%) and alcohol (60.78). Mandrax, cocaine, inhalants and methamphetamine were used by some nyaope users. Heroin and methcathinone were used by one person each. The prevalence of poly-drug use is significant, although literature on this subject is scarce. A study by Kedia et al examined the patterns of mono- and polydrug use from records of 68,891 admissions to community sponsored treatment programs in Tennessee from 1998 to 2004. It showed that a significant number (n=34,016; 48.7%) of the admissions reported polydrug use. The most commonly used drugs were alcohol, cocaine and cannabis, both exclusively and in combination (Kedia et al 2007). A study by Mateos-Moreno et al revealed that among 64 poly-drug users 98.4% and 53.1% consumed tobacco and alcohol, respectively (Mateos-Moreno et al 2013). The strong association between alcohol and illicit drug use is well described (Kedia et al 2007; Mateos-Moreno et al 2013).

6.5 Diet and brushing habits

In this study, nyaope users had a diet that was significantly more unhealthy than that of non-drug users (100% vs 56%; p=0.004). The diet of nyaope users consisted mostly of processed foods (e.g. biscuits, chips) and sugary drinks. Literature on the dietary habits of nyaope users is scarce, however, there is evidence that indicates that drug addicts have a poor diet which is often rich in sugar (Shekarchizadeh, 2013). The findings of the current study were similar to that of Schulz-Katterbach et al and Robinson et al. Schulz-Katterbach et al examined the risk of caries among 43 marijuana users (cases) and 42 cigarette smokers (controls). The study found that marijuana users had a considerably higher consumption of sugary drinks than cigarette smokers (p=0.0078). In another study, Robinson et al examined the oral health behaviour of British drug abusers aged between 21 and 52 years (n=40). Most study participants used heroin, however, some used cocaine and amphetamines. Many of the subjects used alcohol and all smoked cigarettes. The study highlighted that although drug use was associated with appetite suppression among drug users, it also caused them to crave sugar-rich foods (e.g. doughnuts, sugary drinks)

(Robinson et al 2005). Thus, it appears that abusers of marijuana and heroin, which are the main constituents of nyaope, have a propensity to consume sugary foods and drinks (Robinson et al 2005; Schulz-Katterbach et al 2008).

There are no studies regarding the brushing habits and oral health of nyaope users. In this study, nyaope users were less likely to brush their teeth when compared to no-drug users ($p=0.002$). A matched case-control study examined the oral diet, oral health behaviour and caries status among cases (methamphetamine abusers, n=18) and controls (non-methamphetamine users, n=18). The average age of the study participants was 31±6 years. The likelihood of methamphetamine users to never brush their teeth was significantly higher in comparison to that of controls ($p<0.001$) (Morio et al, 2008). This finding was similar to the current study.

Mateos-Moreno et al conducted a study which examined the dental profiles of 64 recovering poly-drug users and compared it to 34 control group participants. Among the poly-drug users, almost 97% consumed heroin and 90% consumed cocaine. The study revealed that 64% of the participants never brushed their teeth and only 17% brushed their teeth once daily (Mateos-Moreno et al 2013). In contrast, the present study revealed that the brushing habits of nyaope users were significantly better as about 8% of nyaope users in this study never brushed their teeth and 43.14% brushed their teeth daily.

6.6 Oral health of nyaope users

The mean DMFT score was significantly higher ($p=0.03$) among nyaope users in comparison to non-drug users. Nyaope users also had significantly higher dental caries compared to non-drug users ($p=0.03$). Possible reasons for this higher DMFT score among nyaope users were the poor diet and oral hygiene, chronic use of nyaope and poly-drug use and unfavourable socioeconomic circumstances (poor education and unemployment). Nyaope users had a significantly less healthier diet than non-drug users ($p<0.001$). All of the non-drug users brushed their teeth at least once daily whereas only 43% of the nyaope users brushed their teeth once daily which may account for the higher mean DMFT score among the nyaope users. Mateos-Moreno

found that the mean DMFT score was significantly higher among poly-drug users than control subjects ($p<0.001$) (Mateos-Moreno et al 2013).

Previous literature has indicated that drug addicts have high DMFT scores. In the study by Mateos-Moreno et al it was reported that the mean DMFT score among poly-drug users was 22.7. The participants in the study had used heroin (96.8%) and cocaine (90.6%) for 8 to 30 years and 6 to 30 years, respectively. Marijuana (65.6%) was used for 8 to 29 years. They were aged between 30 and 56 years (Mateos-Moreno et al 2013). Silverstein determined the DMFT score of 77 study participants who had a history of recreational drug use. Eight four percent of the participants used marijuana and had a DMFT score of almost 12 (Silverstein 1973). Research has highlighted prolonged drug use, poor oral hygiene and dietary habits, poly-drug use, immunodeficiency and systemic disease (e.g. HIV infection) as major risk factors for high DMFT scores among drug addicts Additionally, psychosocial factors including ignorance of health issues, low self-esteem, inadequate education and psychiatric disturbances have a significantly harmful effect on their oral health (Mateos-Moreno et al 2013). These risk factors for high DMFT score are common among nyaope users.

There was no association between level of education and employment with mean DMFT among non-drug users. Whereas, it was associated in nyaope users. The mean DMFT score among non-drug users was similar with higher education and primary education (2.09 vs 2.0). Employed non-drug users has higher mean DMFT than unemployed non-drug history. Nyaope users with low levels of education had a higher mean DMFT score in comparison to those who had higher levels of education. (4.28 vs 3.11). A history of unemployment among nyaope users was also associated with a higher mean DMFT score than those nyaope users that were employed prior to nyaope use (4.15 vs 3.87). There is paucity in literature where association of DMFT score with education level and employment was done among nyaope users and non-drug users. A study from Bosnia examined the relationship between drug use, socioeconomic factors, and oral hygiene behaviour among heroin users. It showed that heroin users with unfavourable socioeconomic circumstances including lower level of education and unemployment had a higher mean DMFT score when compared to heroin users that were employed and had a higher level of education. (Supic et al 2013). These findings were similar to the current study.

Oral hygiene is often not a priority among drug addicts who are more concerned about acquiring drugs in order to avoid severe withdrawal symptoms (Masombuka, 2013, Mateos-Moreno et al 2013, Honour, 2014; Meel et al 2014).

Although the mean DMFT score of nyaope users in the present study was higher than matched non-drug users, it was significantly lower than DMFT scores of drug users reported by multiple previous studies (Mateos-Moreno et al 2013, Silverstein 1973). Possible reasons for a significantly lower DMFT score in this study were better oral hygiene among nyaope users (51% brushed teeth daily), shorter duration of nyaope use (6.8±3.42 years) and younger age (26.4±4.84). A Chinese study which studied the oral health of ex-heroin users (n=445) also demonstrated mean decayed (2.92), filled (0.27) and missing teeth (0.70) indices similar to the present study (mean decayed, filled and missing teeth indices of 2.92, 0.19 and 0.86, respectively). Seventy five percent of the study subjects brushed their teeth daily (Ma et al 2012). Notably, drug users in both these studies had better oral hygiene practices than that of the 64 drug users in the study by Mateos-Moreno et al (only 36% brushed teeth daily) (Ma et al 2012, Mateos-Moreno et al 2013).

Mateos-Moreno et al examined the oral health of poly-drug users who had been using drugs for a period of up to 30 years, substantially more than the nyaope users in the present study (maximum of 15 years) (Mateos-Moreno et al 2013). It is possible that the longer duration of drug use in the study by Mateos-Moreno contributed to a higher DMFT score. Previous studies examining DMFT scores among drug users have often selected subjects that are comparatively much older than those in this study (Dasanayake et al 2010; Mateos-Moreno et al 2013). Participants were between the ages of 30-56 in the study by Mateos-Moreno et al (Mateos-Moreno et al 2013). Dasanayake et al compared the DMFT scores between alcohol users (43.5±8.8 years) and combined alcohol and drug users (35.4±7.3 years). The DMFT score of all the subjects in this study was 16-18 (Dasanayake et al 2010). The high DMFT scores found among drug users in these studies may be confounded by age as the prevalence of caries and higher mean DMFT scores is associated with increasing age (Ma et al 2012).

The mean PUFA score among nyaope users and non-drug users was 1.19 and 0.68 respectively. This difference may be due to better oral hygiene and compliance to dental appointments among non-drug users. As there is a paucity of literature on the PUFA indices of poly-drug users, the findings of this study could not be compared. The clinical consequences of untreated caries may be objectively measured by the 'Untreated Caries, PUFA Ratio' (Monse et al 2010). The Untreated Caries, PUFA Ratio in this study among nyaope users and non-drug users was 40.9% and 43.6%, respectively. This indicated that 40.9% of nyaope users and 43.6% of non-drug users had progression from dental caries to pulpal involvement. These findings indicate that a significant proportion of these individuals do not seek care in the early stages of the diseases and possible wait for the appearances of clinical signs and symptoms of tooth decay before seeking help. These findings highlight the need for prompt treatment of dental caries (i.e. endodontic treatment and extraction).

Bleeding on probing was higher among nyaope users (19.61%) than non-drug users (16%), although the difference was not significant ($p=0.50$). Reddy et al conducted a comparative study which examined the periodontal status of drug users (n=250) and age and sex matched non-drug users (n=250). Drug users were found to have a lower BOP than the control group ($p<0.001$). The lower prevalence of BOP among the drug users may be explained by the high rate of smoking (67.6%) among the drug users (Reddy et al 2012).

The low prevalence of BOP in the present study may also be explained by the high prevalence of smoking among both groups (i.e. all nyaope users and about half of non-drug users). Smoking reduces BOP through vasoconstriction of the gingival blood vessels and limiting blood flow to the gingivae. Smoking results in blunting of the normal inflammatory cascade that is activated when gingivae are exposed to bacterial plaque. Therefore, the actual extent of gingival inflammation may not be clinically visible (Reddy et al 2012). Ma et al examined the periodontal status of 445 Chinese ex-heroin abusers aged between 20 and 59 years. It was expected that the prevalence of BOP would be low as 329 of the ex-heroin users were cigarettes smokers. However, almost all (99.55%) had BOP. According to Ma et al, there was a possible overestimation (up to 50%) of BOP in this study (Ma et al 2012). Inflamed, diseased gingivae can lead to an overestimation of BOP upon examination when higher than

usual forces are applied. An incorrect assessment of the extent of inflammation may be made due to the resultant increased tissue trauma and bleeding (Aldredge, 2012).

In this study, periodontal pocket depth score (i.e. pockets ≥4mm) were present among 13.73% of nyaope users. In the study by Ma et al, 197 out of the 445 ex-heroin abusers were younger than 35 years. Among the 197 ex-heroin users, 17.3% had periodontal pockets. All the nyaope users in this study except for one were ≤35 years. Therefore, the prevalence of periodontal pockets among nyaope users in this study was similar to that of ex-heroin users in the study by Ma et al (Ma et al 2012).

Possible reasons for lower prevalence in periodontal diseases (i.e. BOP and PDD score) in the present study were fewer number of study participants (n=76), younger study participants (mean age 26 years) and duration of nyaope use (1-15 years). The sample size of this study was comparatively smaller than the studies described previously (Ma et al 2012; Reddy et al 2012). Literature has indicated that periodontal diseases have a strong association with increasing age and duration of drug use (Ma et al 2012).

Limitations of the study

This study has a number of limitations. Importantly, there has been no previous research on the oral health behaviour of nyaope users and the effects on oral health of nyaope use. Therefore, the results of this study could not be extrapolated to previous studies and comparison of findings was not possible. This is the first South African study to examine the oral effects of nyaope. The choice of only 2 drug centres in Johannesburg chosen conveniently cannot be representative of nyoape users in Johannesburg or Gauteng. However, it does provide important insights into the oral health status of nyoape attending drug rehabilitation centres in Johannesburg. Although nyaope users had a higher mean DMFT score in comparison to non-drug users, it may not solely be attributed to nyaope use alone. Other factors (i.e. inadequate education, poor diet and oral hygiene, poly-drug use) that may have contributed to a higher DMFT score among nyaope users may have confounded the results of the study. As some of the findings of this study were based on answers from questionnaires, there was potential of bias (i.e. response bias). Patients may have

provided incorrect information regarding oral hygiene habits (including frequency of tooth-brushing), duration of nyaope use and HIV status and other parameters. Additionally, non-drug users were not objectively confirmed drug free (i.e. through blood tests) as this was a questionnaire based study.

The sample size of the study was relatively small due to resource constraints. These included limited assistants for data collection and a low admission rate of nyaope users at the rehabilitation centres. It is likely that a large number of nyaope users do not seek help and admit themselves to rehabilitation facilities. Therefore, a significant number of nyaope users with poor oral health are missed. Lastly, there were no documented results of HIV tests of the nyaope users in this study. HIV infection could be a confounding factor in this study

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

Nyoape users had significantly higher cariogenic diets, caries prevalence, and DMFT scores compared to non-drug users. Additionally, Nypoape users were also significantly less likely to practice daily brushing than non-drug users. Risk factors associated with sub-optimal oral health were inadequate education, poor diet and oral hygiene practices, unemployment and prolonged nyaope use.

A number of steps can be taken to improve the oral and general health of nyaope users in the community. Large scale studies are required to confirm the findings of this study and also to provide further knowledge in the behaviour (including oral health behaviour) and the oral health of nyaope users. They will also, in turn, assist in formulating evidence-based management strategies for the treatment of these troubled individuals.

Adequate oral health among nyaope users can only be achieved through a holistic approach. The management of nyaope addiction should address the physical (including oral health), psychological, socio-environmental and political aspects of the disease. Every nyaope addict that is admitted to a rehabilitation centre must have a complete and thorough initial physical examination and must be referred to a physician, psychologist and dentist. They must be counselled at each opportunity and by each health professional about the harmful effects of nyaope and the risk of systemic disease (including HIV infection). It is essential to refer nyaope users for an HIV test because of the high risk of HIV infection. HIV infection, as mentioned previously may result in significant oral diseases (directly or secondary to opportunistic infections) and also contribute to a high DMFT score. If a nyaope user is HIV positive, they must be referred promptly for ARV initiation. It is vital that upon discharge from the rehabilitation facility, nyaope users are followed up closely by all the relevant health professionals. The dentist, in particular, must emphasize in an ongoing manner, the need for preventative measures for preservation of good oral health. This includes regular tooth-brushing and maintaining a healthy diet.

However, these measures may not suffice. The reality is that successful rehabilitation of hard-drug addicts is a very complex problem and requires the participation of

families, communities and politicians. Family members have an important role in the rehabilitation of nyaope users. Parents should be alert to the possibility of drug use by their child and must be able to detect signs of drug use. It is their responsibility to care for their children. It is important to note that a number of recommendations that is applicable to poly-drug users appears to also apply to nyoape users. Drug use in general appears to have serious adverse oral health effects which warrants that this group be regarded as high risk for oral diseases.

The role of the SA government and policy-making by politicians is critical. It is a failure of our society and generation that children as young as 13 years can buy nyaope from school, a place where children are supposed to be safe and cherished. Government needs to take an aggressive approach through the development of tough political policies in combating this modern-day scourge that has ravaged the youth of our communities.

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Appendix 1

Questionnaire (Stefanac 2007, WHO 2010)

Study Number _____ Age _____

Gender M F

Race _____

Suburb _____

Occupation _____

Please tick the appropriate block

What level of education have you completed?

No formal schooling ..... ☐

Primary school completed ..... ☐

High school completed ..... ☐

College/university completed ..... ☐

DRUG INFORMATION

Question 1 In your life, which of the following substances have you ever used?	**YES**	**NO**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)		
b. Alcoholic beverages (beer, wine, spirits, etc.)		
c. Nyaope		
d. Cannabis (marijuana, pot, grass, hash, etc.)		
e. Cocaine (coke, crack, etc.)		
f. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)		
g. Inhalants (nitrous, glue, petrol, paint thinner, etc.)		
h. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)		
i. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)		

j. Opioids (heroin, morphine, methadone, codeine, etc.)	
k.Other – specify	

Question 2 In the past 3 months, how often have you used the substances you mentioned *(FIRST DRUG, SECOND DRUG, ETC)*?	**Never**	**Once Or twice**	**Monthly**	**Weekly**	**Daily or Almost daily**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)					
b. Alcoholic beverages (beer, wine, spirits, etc.)					
c. Nyaope					
d. Cannabis (marijuana, pot, grass, hash, etc.)					
e. Cocaine (coke, crack, etc.)					
f. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)					
g. Inhalants (nitrous, glue, petrol, paint thinner, etc.)					
h. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)					
i. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)					
j. Opioids (heroin, morphine, methadone, codeine, etc.)					
k.Other – specify					

Question 3 During the past three months, how often has your use of (FIRST DRUG, SECOND DRUG, ETC) led to health, social, legal or financial problems?	**Never**	**Once Or twice**	**Monthly**	**Weekly**	**Daily or Almost daily**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)					
b. Alcoholic beverages (beer, wine, spirits, etc.)					
c. Nyaope					

d. Cannabis (marijuana, pot, grass, hash, etc.)	
e. Cocaine (coke, crack, etc.)	
f. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	
g. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	
h. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	
i. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	
j. Opioids (heroin, morphine, methadone, codeine, etc.)	
k.Other – specify	

Question 4 Have you ever tried and failed to control, cut down or stop using (FIRST DRUG, SECOND DRUG, ETC.)?	**No, never**	**Yes, in the past 3 months**	**Yes, but not in past 3 months**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)			
b. Alcoholic beverages (beer, wine, spirits, etc.)			
c. Nyaope			
d. Cannabis (marijuana, pot, grass, hash, etc.)			
e. Cocaine (coke, crack, etc.)			
f. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)			
g. Inhalants (nitrous, glue, petrol, paint thinner, etc.)			
h. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)			
i. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)			

j. Opioids (heroin, morphine, methadone, codeine, etc.)	
k.Other – specify	

Question 5	**No, Never**	**Yes, in the past 3 months**	**Yes, but not in the past 3 months**
Have you ever used any drug by injection? (NON-MEDICAL USE ONLY)			

Pattern of injecting

☐ Once weekly or less or Fewer than 3 days in a row

☐ More than once per week or 3 or more days in a row

Question 6 Why did you start using nyaope? (Please specify)

DENTAL INFORMATION

Do your gums bleed when you brush? _____

How would you describe your current dental problem? _____

Are your teeth sensitive to cold, hot, sweets or pressure? _____

When was the last dental appointment? _____

How often do you brush your teeth? _____

DIETARY HABITS

Healthy ☐

Unhealthy ☐

MEDICAL INFORMATION

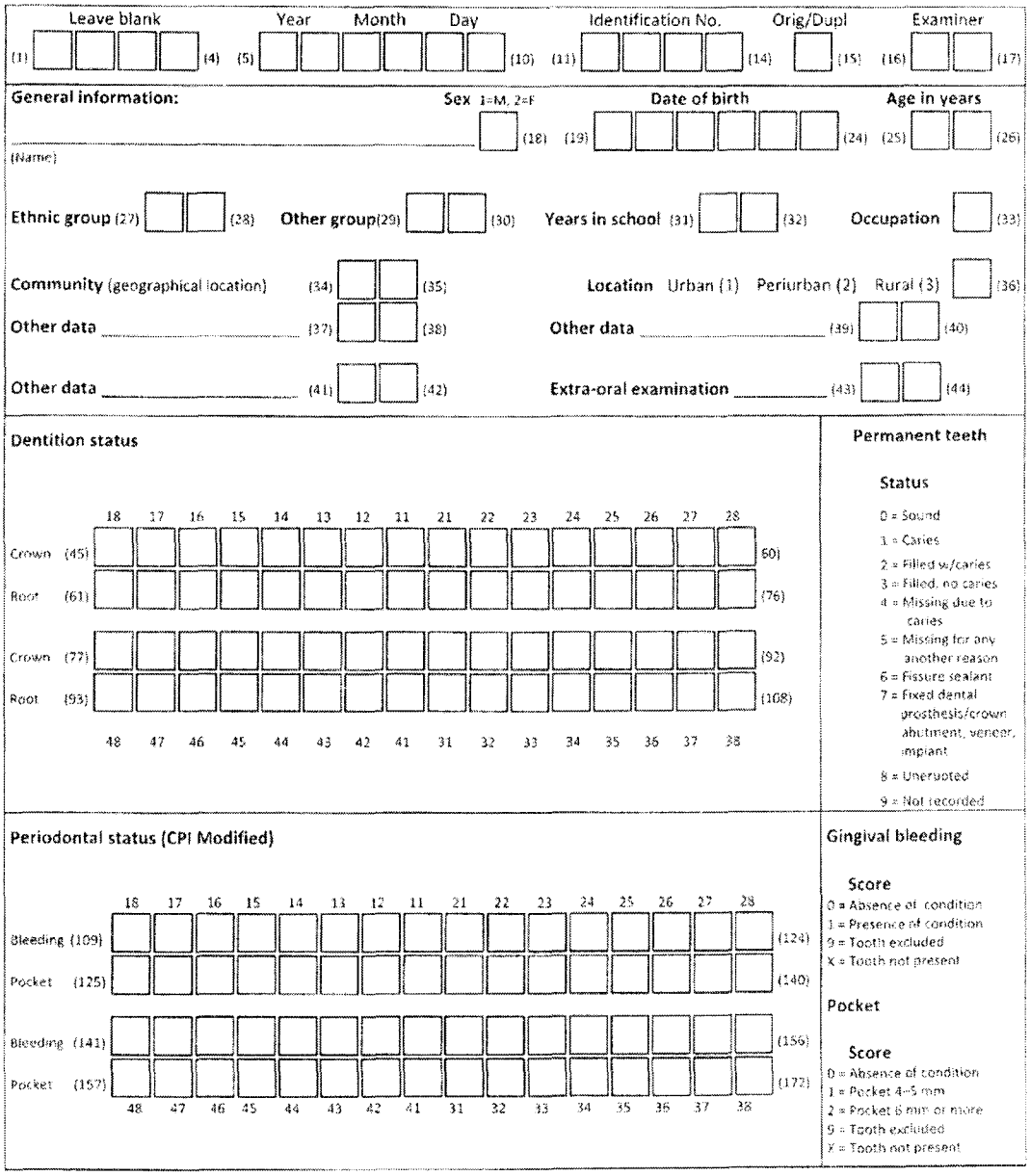
	Yes	No	Don't know
Are you in good health?	☐	☐	☐
Has there been any change in your general health within the past year?	☐	☐	☐
AIDS or HIV infection	☐	☐	☐

Signature of Patient_____ Date_____

Appendix 2

World Health Organization

World Health Organization
Oral Health Assessment Form
for Adults, 2013



Appendix 3

PARTICIPANT INFORMATION SHEET [Nyoape users]

Good Day

My name is Anita Tetarwal and I am MSc student in the department of Prosthodontics, School of Oral Health Science (SOHS), University of the Witwatersrand (Wits). For the purposes of obtaining my degree, I am conducting a research study and my research title is **"Oral health status among Nyaope users at drug rehabilitation clinics in Johannesburg".**

Nyaope use is increasing dramatically in communities and is having a devastating impact on its users. Nyaope users are often young and from disadvantaged backgrounds. Nyaope use causes various systemic and oral health problems. This research project will focus on oral health status of users of nyaope and risk factors that predispose to its use. This project will include an oral examination and a questionnaire. The aim of this study is to reveal the patterns of oral diseases associated with nyaope use and, therefore, assist in their appropriate management and prevention.

We are inviting you to take part in this study. The research will include a 10-15 minute dental examination of you under a natural light at the drug rehabilitation center. You will also be asked to fill a questionnaire at the examination site which contains 18 questions. The questionnaire will focus on your drug, dental and medical history. It will take about 10 minutes to complete the questionnaire. After the dental examination, basic dental treatment like filling, scaling and extraction will be provided at community oral health outreach program (COHOP).

Confidentiality will be maintained throughout all the phases of the research, including data collection, data capture and in the final research report. Each patient will be given a study number, and therefore no patient will be individually identified in any written and spoken report. All information will be used exclusively for research purposes and will not be shown to anyone but the researcher (i.e. Anita Tetarwal) and my supervisor and co-supervisor (i.e. Prof V Yengopal and Dr I Munshi).

No harm will be caused to the physical and mental health of patients involved in this study. There will be no financial compensation for participating in the study. I would therefore like to invite you to participate in this study.

If you agree to participate in this study, you may sign this document. Please note that you may withdraw your name from this study any time, for whatever reason, without any question being asked.

If you have any queries regarding this project please contact me via e-mail: tetarwalanita19@gmail.com or via telephone 0726840488. Alternatively you may contact my supervisors and Human Research Ethics Committee (Medical) (HREC).

Kind Regards

Anita Tetarwal	Prof V Yengopal (HOD)	Dr I Munshi
Researcher	Research Supervisor	Co-supervisor
Tel: 0726840488	Tel: 011 7172593	Tel: 011 4884849

Contact details of HREC (Medical)

Prof P Cleaton-Jones- Tel: 011 717 2301 email: peter.cleaton-jones1@wits.ac.za

Ms Zanele Ndlovu- Tel: 011 717 2700 email: zanele.ndlovu@wits.ac.za

Mr Rhulani Mkansi Tel: 011 717 2656 email: Rhulani.mkansi@wits.ac.za

Mr Lebo Moeng Tel: 011 717 1234 email: Lebo.moeng@wits.ac.za

Appendix 3a

INFORMED CONSENT FOR PARTICIPANT

Study title: "Oral health status among Nyaope users at drug rehabilitation clinics in Johannesburg".

I _____ have been fully informed as to the procedures and the purpose of this study.

I signing this consent form I agree that I_____ am participating in the study. I also understand that I am free to refuse to participate or withdraw my consent and to discontinue my participation in this study at any time. This will involve no penalty or loss of benefit.

I understand that if I have any questions pertaining to the study at any time that they will be answered.

Signature of patient: _____

Signature of witness: _____

Date: _____

I Anita Tetarwal, herewith confirm that the above study participant has been fully informed about the nature and conduct of the above study.

Researcher's signature: _____

Date: _____

Appendix 4

INFORMED CONSENT FORM FOR MATCHED NON-DRUG USERS

Good Day

My name is Anita Tetarwal and I am MSc student in the department of Prosthodontics, School of Oral Health Science (SOHS), university of the Witwatersrand (Wits). For the purposes of obtaining my degree, I am conducting a research study and my research title is **"Oral health status among Nyaope users at drug rehabilitation clinics in Johannesburg".**

This is a comparative cross-sectional analytical study. By matched non-drug users, we mean patients like yourself, who do not take any drugs and have similar age and sex like nyaope users. We want to examine your mouth and record the oral health status of your mouth. We will also do this for the patients who take nyaope drug and then we will compare our findings.

We want to understand whether the oral health status of people like yourself who do not take drugs is similar/different to that of patients who are drug users. In this way we can highlight the effects /non-effects of drug use in the mouth.

For this purpose, I would like to examine your oral health status. This examination will take 10-15 minutes. You will also be asked to fill a questionnaire at the examination site which contains 18 questions. The questionnaire will focus on the patient's drug, dental and medical history. It will take about 10 minutes to complete the questionnaire. After the dental examination, appropriate treatment will be provided at community outreach site.

Confidentiality will be maintained throughout all the phases of the research, including data collection, data capture and in the final research report. Each patient will be given a study number, and therefore no patient will be individually identified in any written and spoken report. All information will be used exclusively for research purposes and will not be shown to anyone but the researcher (i.e. Anita Tetarwal) and my supervisor and co-supervisor (i.e. Prof V Yengopal and Dr I Munshi).

No harm will be caused to the physical and mental health of patients involved in this study. There will be no financial compensation for participating in the study. I would therefore like to invite you to participate in this study.

If you agree to participate in this study, you may sign this document. Please note that you may withdraw your name from this study any time, for whatever reason, without any question being asked.

If you have any queries regarding this project, please contact me via e-mail: tetarwalanita19@gmail.com or via telephone 0726840488. Alternatively, you may contact my supervisors and Human Research Ethics Committee (Medical) (HREC).

Kind Regards

Anita Tetarwal	Prof V Yengopal (HOD)	Dr I Munshi
Researcher	Research Supervisor	Co-supervisor
Tel: 0726840488	Tel: 011 7172593	Tel: 011 4884849

Contact details of HREC (Medical)

Prof P Cleaton-Jones- Tel: 011 717 2301 email: peter.cleaton-jones1@wits.ac.za

Ms Zanele Ndlovu- Tel: 011 717 2700 email: zanele.ndlovu@wits.ac.za

Mr Rhulani Mkansi Tel: 011 717 2656 email: Rhulani.mkansi@wits.ac.za

Mr Lebo Moeng Tel: 011 717 1234 email: Lebo.moeng@wits.ac.za

Appendix 4a

INFORMED CONSENT FOR MATCHED NON-DRUG USERS

Study title: "Oral health status among Nyaope users at drug rehabilitation clinics in Johannesburg".

I _____ have been fully informed as to the procedures and the purpose of this study.

I signing this consent form I agree that I_____ am participating in the study. I also understand that I am free to refuse to participate or withdraw my consent and to discontinue my participation in this study at any time. This will involve no penalty or loss of benefit.

I understand that if I have any questions pertaining to the study at any time that they will be answered.

Signature of participant: _____

Signature of witness: _____

Date: _____

I Anita Tetarwal, herewith confirm that the above study participant has been fully informed about the nature and conduct of the above study.

Researcher's signature: _____

Date: _____

Appendix 5

R14/49 Ms Anita Tetarwal

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M160610

NAME: (Principal Investigator)	Ms Anita Tetarwal
DEPARTMENT:	Oral Rehabilitation Empilweni and SANCA Drug Rehabilitation Centres
PROJECT TITLE:	Oral Health Status among Nyaope Users at Drug Rehabilitation Clinics in Johannesburg
DATE CONSIDERED:	24/06/2016
DECISION:	Approved unconditionally
CONDITIONS:	(Revised title 20/07/2016)
SUPERVISOR:	Prof Veersamy Yengopal
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	05/08/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 10004, 10th floor, Senate House/2nd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in June and will therefore be due in the month of June each year.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 6

SANCA NISHTARA
ALCOHOL & DRUG CENTRE
Awareness • Empowerment • Rehabilitation

8283 Capella Str. Ext. 09
Lenasia 1820
Tel: (011) 854-5988/852 2176
Fax:(011) 854-5989
Email:info@sancanishtara.co.za
www.sancanishtara.co.za
Reg No. 2003/015400/08

To: Dr. Anita Tetarwal
School of Oral Health Science, University of the Witwatersrand
Subject: Research on Oral Health status of Nyaope users
Date: 07 November 2016

Dear Dr. Tetarwal

Your research project in respect of the above refers.

Permission has been granted by management of Sanca Nishtara to conduct your study at our Rehabilitation Centre in Lenasia.

As agreed in terms of your findings, that you will render dental treatment should patients require further dental care.

Furthermore, it is mutually agreed that the findings of your survey will be made available to us.

Thank you for reaching out to our Centre for the purpose of your research.

Yours faithfully

Shahida Kazie
Director
SANCA Nishtara Alcohol & Drug Centre
(011) 854 5988/852 2176/2657
management@sancanishtara.co.za
www.sancanishtara.co.za

LET'S DEVELOP
OUR LIVES
OUR COMMUNITIES
OUR IDENTITIES
WITHOUT DRUGS

Appendix 7

Empilweni Clinic- Come Back Mission
SARS PBO 930030556 NPO 061/482/

Chris Hani Baragwanath Academic Hospital
Postal Address: PO Box 451, Fairlands, Johannesburg 2030
Tel: +27(11) 933 1296
Email: moniquef@empilweni.org.za

19 July 2016

Anita Tetarwal

Student number 1242324

MSc Prosthodontics

Study: Emerging challenges and risk factors for Oral Health Status among Nyaope Abusers

Dear Prof V Yengopal & Dr I Munshi

This letter serves to confirm that Anita Tetawal will conduct a study based on the Empilweni Chis Hani Substance Abuse Treatment Center regarding the emerging challenges and risk factors for Oral Health Status among Nyaope Abusers.

The Empilweni Chis Hani Substance Abuse Treatment Center, is an in-patient treatment center which caters for 20 service users for a detoxification and therapeutic intervention for a period of 8 weeks.

Should you require any further details please do not hesitate to contact our office on 011 933 1296.

Kind Regards

Monique Fisher