Vol. 5, pp. 41 - 55, June, 2021
ISSN: 2664-0066

African Journal of Alcohol & Drug Abuse

Emerging Trends on Non-Medical Use of Prescription Drugs in Kenya

Morris Kamenderi[1*], John Muteti[1], Victor Okioma[1], Job Kandie[2], William Munyoki[3] Kirwa Lelei[1] and Stephen Kimani[1]

[1]National Authority for the Campaign Against Alcohol and Drug Abuse (NACADA), Kenya

[2]Pharmacy and Poisons Board, Kenya

[3]Government Chemist, Kenya

Corresponding Author:

Morris Kamenderi,

Directorate of Research and Policy Development,

National Authority for the Campaign Against Alcohol and Drug Abuse (NACADA), Kenya

Abstract

The last decade has experienced increased availability of substances in the drug markets and the growth of a dynamic market for non-medical use of prescription drugs. Data suggests that non-medical use of prescription drugs exceeds many illicit drugs. Despite the growing global problem of non-medical use of prescription drugs, it has not been accorded the much needed attention especially in Africa and Kenya in particular. The study therefore aimed to establish evidence of non-medical use of prescription drugs in Kenya. The study used an exploratory cross-sectional design. The study was conducted in the eight regions of Kenya where 18 purposively sampled counties were covered. The study relied on non-probability sampling methods. Results of laboratory analysis confirmed that antidepressants, antipsychotic, anticholinergic, opioid analgesics, anaesthetics and antihistamines were the most prevalent prescription drugs for non-medical use. The study established evidence of non-medical use of prescription drugs. Towards addressing this emerging problem, the study recommends the need for more stringent measures to control prescription drugs with high potential for abuse; engagement of the law enforcement agencies and the healthcare providers to suppress diversion of prescription drugs for non-medical use; and implementation of demand reduction strategies aimed at prevention and education of those at risk on the potential harms and other adverse consequences of non-medical use of prescriptions drugs.

Key words: *Non-medical use and prescription drugs*

Introduction

Non-Medical Use of Prescription Drugs (NMUPDs) usually involves consumption of a prescription drug without a doctor's prescription or non-compliance with the prescription guidelines (Bennett, Holloway and May, 2018; Cicero and Ellis, 2017; Hulme, Bright and Nielsen, 2018). This includes consumption of a prescription drug at a higher dose; prolonged duration or frequency of use; altering routes of administration; and concurrent or consecutive use with other medications or illicit substances (Lankenau et al., 2012; Schepis, 2018).

The last decade has experienced increased availability of substances in the drug markets and the growth of a dynamic market for NMUPDs (UNODC, 2020). Data from UNODC shows that NMUPDs exceeds many illicit drugs and is ranked second after cannabis in some countries (UNODC, 2020). For example, in the United States, current non-medical use of prescription analgesics and tranquillizers follows illicit use of cannabis, with 3.3 and 2.0 million people aged 12 or older (SAMHSA, 2017). In England and Wales, 6.4% of adults aged 16 to 59 (approximately 2.2 million people) reported non-medical use of prescription analgesics in the past year (Home Office, 2019). Although there are inadequate global estimates on the non-medical use of pharmaceutical opioids, tramadol has been reported in many countries from West and North Africa and the Middle East; while hydrocodone, oxycodone, codeine, tramadol and fentanyl has been reported in North America (UNODC, 2020). For instance, data from Nigeria shows that 4.6 million people were estimated to have used pharmaceutical opioids for non-medical use especially tramadol (National Bureau of Statistics and UNODC, 2018). The problem of NMUPDs in Kenya is more prevalent among adolescents with data indicating lifetime usage of 10.4% among primary school pupils (NACADA, 2018) and 16.1% among secondary school students (NACADA, 2016).

Although there is limited data on the consequences of NMUPDs, The Drug Abuse Warning Network estimated that there were 228,366 emergency department visits in 2011 resulting from a drug-related suicide attempt, with almost all cases (95%) involving prescription drugs (SAMHSA, 2011). In 2010, there were 38,329 drug overdose deaths in the USA, most involving use of pharmaceuticals (Jones, Mack and Paulozzi, 2010). Mortality arising from the drug related overdose was mainly attributed to pharmaceuticals especially opioids (16,651, 75.2%), benzodiazepines (6,497, 29.4%), antidepressants (3,889, 17.6%), and antiepileptic and anti-parkinsonism drugs (1,717, 7.8%) (Jones, Mack and Paulozzi, 2010).

Despite the growing global problem of NMUPDs, it has not been accorded the much needed attention especially in Africa and Kenya in particular. Although there is evidence of NMUPDs from national surveys in Kenya, there is limited evidence on the profile of specific drugs. Further, current strategies on alcohol and drug abuse prevention and control lay emphasis on the traditional drugs and substances of abuse namely alcohol, tobacco, khat, cannabis, heroin and cocaine with limited focus on NMUPDs. This study therefore aims to establish evidence of NMUPDs in Kenya. The findings provide valuable data to control access and misuse of prescription drugs for non-medical use. This information will also bolster the current strategies on drugs and substance abuse prevention and control in Kenya.

Methodology

Study design

The study used an exploratory cross-sectional design where both qualitative and quantitative data was generated. While the main methodological approach in contemporary research of drugs remains quantitative, there has been a growing responsiveness to triangulate studies with the use of qualitative methods as a means of in-depth investigation and understanding of the problem (Agar, 1980).

Study area

The study was conducted from 1st December 2019 - 30th January 2020 covering the eight regions of Kenya namely; Nairobi, Eastern (Upper and Lower Eastern), Central, Rift Valley (North Rift and South Rift), Nyanza, Western, North Eastern and Coast. In total, 18 counties were covered in the survey. These counties were Nairobi, Kajiado, Nakuru, Kisii, Kisumu, Busia, Trans Nzoia, Uasin Gishu, Kiambu, Nyeri, Meru, Isiolo, Garissa, Marsabit, Makueni, Mombasa, Kilifi and Kwale.

Sampling procedure

The study relied on non-probability sampling methods given the hidden and criminal nature of drug abuse and diversion of prescription drugs through illicit channels. All the eight regions were sampled purposively to understand the national landscape of the problem and to ensure broad representation of respondents based on economic, social and cultural diversity. From each of the eight sampled regions, 18 counties were purposively selected based on known drug use patterns and behaviour (NACADA, 2017), rural-urban dichotomy and proximity to Kenya's national borders. From the 18 counties, 22 sub-counties were purposively selected using similar criteria. From each sub-county, one location was also purposively selected for data collection. These were the units where focus group discussions (FGDs) were conducted as well as collection of suspected samples of prescription drugs for non-medical use prevalent in the area. FGDs were conducted at a venue provided by the area Chief. Identification of the first participant for the FGD was done by the area Chief or youth leaders implementing alcohol and drug abuse prevention and treatment interventions. In the inclusion criteria, a respondent needed to be either a current drug user or a recovering drug user. After identification of the first respondent meeting the inclusion criteria, snow balling sampling method was used to identify the next respondent through peer referral. Each respondent was allowed to recruit one respondent from their networks until a threshold of 6 – 8 FGD participants was achieved. Both male and female genders were included in the sample for FGDs. A total of 22 FGDs were conducted in the eight regions (Table A1). The study targeted a purposive sample of 176 participants.

Research instruments

Qualitative data was captured using focus group discussion guides. This elicited rich qualitative data that aided deeper understanding of the problem of NMUPDs in Kenya. One FGD was conducted in each of the sampled locations. After convening the team, the moderator started the session with the introductions and setting of the ground rules. This was followed by a brief description of the assignment and the benefits of the study findings. The moderator also assured the participants that their anonymity, confidentiality and privacy would be safeguarded. Individual responses were captured in writing in order to encourage

participation in the discussions following reservations on the use of tape recording. The interviews were conducted either in Kiswahili or English languages based on the literacy levels of participants. The moderators were recruited prior to the study and trained on the objectives, identification of suspected prescription drugs and procedures for conducting the discussions.

Sample collection

During the FGD sessions, participants were requested to mention all the emerging drugs and substances that they were available in the locality, narrowing down to the specific drugs that they were currently using. From the discussions, the moderators were able to identify a list of suspected prescription drugs for non-medical use that were commonly known by their street names. After the discussion, the moderator identified two volunteers from the FGD who were currently using suspected prescription drugs to assist with the sample collection. Suspected samples were collected using convenience sampling method. After consent was obtained, the volunteers were facilitated to collect one sample per category of each suspected prescription drugs identified during the discussions.

The collected samples were received by a representative from the Government Chemist for coding and labeling. Each sample was given a sample number; date of sampling; the county, sub-county and location; method of sampling; and the name of the handling officer. This information was further recorded in a sample collection register. Each suspected sample was also recorded according to its street names. After labeling, the samples were packaged and transported to the Government Chemist laboratory for testing and identification. Being an exploratory study investigating an emerging trend, there was no pre-determined sample size. Rather, efforts were made to collect any suspected samples of NMUPDs identified from all the sampled sites.

Sample identification

The samples were processed and screened using the UV-Visible Spectrophotometer (Shimadzu UV-VIS – 1650PC) and identity confirmed using Gas Chromatography linked with Mass Spectrometer detector (GC-MS, Agilent Model GC 7890B with a mass spectrometer 5977A MSD). Identification of samples was limited to the use of Agilent Life Sciences G1035D Wiley10th with NIST 2011 MS Library. GC-MS is one of the most commonly used techniques for the identification and quantitation of forensic drug samples including pharmaceuticals. As a "hyphenated" technique, it combines the separation power of a GC with the analyte specificity of a spectroscopic technique, providing highly specific spectral data on individual compounds in a complex mixture often without prior separation (Gill, Stead and Moffat, 1981; Rop et al., 1988). GC-MS and UV-VIS spectrometry techniques are also destructive in nature, because they require sample preparation making them unsuitable for use afterwards.

Data analysis

Descriptive statistics especially frequencies and percentages were used to describe, organize and summarize results from laboratory analysis. Content analysis was used to analyse the qualitative data. Field notes from the FGDs were entered into the computer immediately after the discussions. The field notes were reviewed numerous times and the broad thematic areas were extracted and coded. The codes were grouped into categories based on similarity. These categories were linked to their sub-categories and subsequently, they were arranged around a common cluster. Finally, the main theme was extracted. The coding process was

undertaken by two researchers to ensure comparability of codes. Any differences in the codes were resolved through discussion and consensus. Direct quotes were also generated to capture views and experiences of participants.

Results

Background characteristics

Data from the 22 FGDs showed that a total of 154 respondents participated in the focus group discussions where 124 (85.5%) were male while 30 (19.5%) were female.

Results of laboratory analysis

Confirmatory laboratory results showed evidence of NMUPDs. The most prevalent prescription drugs for non-medical use were benzhexol; diazepam; flunitrazepam; amitriptyline; chlorpromazine; codeine; benadryl; haloperidol; tramadol; propofol; olanzapine; carbamazepine; and chlorpromazine (Table 2). Data also showed that the problem of NMUPDs was evident across a number of sampled counties namely: Nairobi, Garissa, Meru, Marsabit, Makueni, Mombasa, Kilifi, Kwale, Busia, Kisumu, Uasin Gishu and Nyeri (Table B1).

Profile of prevalent prescription drugs for non-medical use in Kenya

Further analysis showed that diazepam was the most prevalent prescription drug for non-medical use representing 35.2% of the 68 confirmed samples followed by benzhexol (22.0%), flunitrazepam (14.7%), amitriptyline (7.3%), chlorpromazine (4.4%), codeine (4.4%), carbamazepine (1.5%), tramadol (1.5%), chlorpheniramine (1.5%), benadryl (1.5%), haloperidol (1.5%), propofol (1.5%) and olanzapine (1.5%) (Table 1).

Table 1

Profile of prevalent prescription drugs for non-medical use

Prescription Drug	Number	Percent
Diazepam	24	35.2
Benzhexol	15	22.0
Flunitrazepam	10	14.7
Amitriptyline	5	7.3
Chlorpromazine	3	4.4
Codeine	3	4.4
Carbamazepine	1	1.5
Tramadol	1	1.5
Benadryl	1	1.5
Biperiden	1	1.5
Haloperidol	1	1.5
Propofol	1	1.5
Olanzapine	1	1.5
Total	**68**	**100**

Note: Data from study findings, 2020

Classification of prevalent prescription drugs for non-medical use

The identified prescription drugs for non-medical use were categorized into 6 classes namely antidepressants (diazepam, flunitrazepam and amitriptyline); antipsychotic (olanzapine, chlorpromazine and carbamazepine); anticholinergic (benzhexol, biperiden and haloperidol); opioid analgesics (codeine and tramadol); anaesthetics (propofol); and antihistamines (benadryl and chlorpheniramine) (Table 2). Data showed that antidepressants were the most prevalent prescriptions drugs for non-medical use (57.3%) followed by anticholinergic drugs (25.0%), antipsychotic drugs (7.4%), opioid analgesics (5.9%), antihistamines (2.9%) and anaesthetics (1.5%).

Table 2

Classification of prevalent prescription drugs for non-medical use

Classification of drugs	List of prevalent drugs	No.	Percent
Total		68	100
Antidepressants	diazepam, flunitrazepam and amitriptyline	39	57.3
Anticholinergic	benzhexol, biperiden and haloperidol	17	25.0
Antipsychotic	olanzapine, chlorpromazine and carbamazepine	5	7.4
Opioid analgesics	tramadol and codeine	4	5.9
Antihistamines	benadryl and chlorpheniramine	2	2.9
Anaesthetics	propofol	1	1.5

Note: Data from study findings, 2020

Reasons for NMUPDs

The study explored the major reasons behind NMUPDs among the study participants to inform intervention areas that could be implemented to reverse this emerging trend. Findings revealed that prescription drugs were being abused due to their psychoactive effects and the perception that these drugs were "legal highs". Participants reported that since these drugs were available in hospitals and drug pharmacies, they were perceived to be legal.

"I don't fear to be arrested for taking these drugs. If you are caught using heroin or marijuana by police, you are going to be arrested. I don't fear to hide when taking these drugs because you can get them from a chemist or a hospital" (a 21 year old male).

"When I take largactil, I will be high for two days. All I need to do is just to take a hot drink and I am high again" (a 27-year-old male).

Participants also reported that prescription drugs were very affordable, readily available and easily accessible. It was perceived as a cheaper way for users to get "high" especially when they could not access enough finances to purchase the more expensive narcotic drugs especially heroin. It also implied that non-medical use of prescription drugs could have been used to moderate the withdrawal symptoms among heroin users.

"With only 20 ksh, I am able to buy a few tablets that will make me feel good" (a 24-year-old male).

"When I don't have money to buy heroin, I will buy "ma-white" (street name for benxhexol) and use them to cover for missing heroin" (a 32-year-old male).

It was also noted in the discussions that prescription drugs were commonly used to "knock-off" the effect of stimulant drugs in order to overcome the side effects of insomnia. This emerging reason was a major enabler of the non-medical use of prescription drugs with a depressing effect on the central nervous system (CNS).

"After chewing khat for many hours, I can't sleep. I have to take "C5" (street name for diazepam) for me to sleep, otherwise I will stay awake the whole night" (a 30 -year old male).

In addition, it was revealed that prescription drugs were being used to enhance the psychoactive effect of narcotic drugs. It was perceived that the use of two or more drugs with a similar psychoactive effect on the CNS enhanced the intensity of intoxication among the users.

"When I smoke my dose of heroin, I will also top up with some cosmos (street name for benzhexol) to feel more high" (a 31-year-old male).

Further, the study established that prescription drugs were used as a motivation by gangs to commit crime. This included "spiking" and dragging of unsuspecting revelers by commercial sex workers with the primary intention of robbing from them.

"I always take bugizi (street name for flunitrazepam) before I go to commit a crime. It gives me courage not to fear anything. Even when I hurt somebody, tomorrow I will not remember what I did" (a 26-year-old male).

"These days we no longer put mchele (street name for flunitrazepam) in alcohol because men have known. I will buy a chewing gum, make a cut at the centre and insert a small piece of "mchele" in the gum. Once he is drunk, I will offer him a chewing gum but I will first pick one without the drug. Then I will give him the one with a drug. Once he chews the gum, I can do what I want" (a 27-year-old female).

"Men have become clever, but we have become cleverer. I will wait for him to get drunk. Then I will excuse myself and dash to the toilet and smear "mchele" around my lips. When I go back, I will kiss him and give him my saliva to swallow. But myself I will not swallow. Then I will be sure he is finished" (a 36-year-old female).

Sources of prescription drugs for non-medical use

The study explored the common sources of prescription drugs for non-medical use in order to assess the risks of diversion. It was reported that the prescription drugs were mainly supplied by some unethical persons running drug pharmacies as well as unethical healthcare providers in hospitals and mental health facilities. In addition, it was demonstrated that in some areas, there were organized networks dealing with the supply of prescription drugs for non-medical use. These findings provided evidence of diversion of prescription drugs into the illicit market for non-medical use.

"If I want to buy my drug, I will just go to a chemist and they are going to sell to me" (a 24-year-old male).

"I buy from a specific chemist because they know me. But if you go there they will not sell to you because they do not know you" (a 28-year-old male).

"There is a person in town who gets the drugs in bulk from the hospital. He is the one who sells to us. But if you go to the hospital, they will not give you" (a 24-year-old male).

Discussion

There was emerging evidence of NMUPDs in Kenya. The most prevalent prescription drugs for non-medical use were antidepressants; anticholinergic; antipsychotic; opioid analgesics; antihistamines and anaesthetics. According to the UNODC, the past decade has witnessed the growth of a dynamic market for non-medical use of prescription drugs (UNODC, 2020). Medications with demonstrated non-medical use includes prescription opioids (Allen and Harocopos, 2016; Dertadian et al., 2017) and antidepressants (Mateu-Gelabert et al., 2017). Regulation of controlled substances including prescription drugs is governed by three multilateral treaties: The Single Convention on Narcotic Drugs 1961, as amended by its 1972 Protocol (United Nations, 1961), the Convention on Psychotropic Substances 1971 (United Nations, 1971), and the Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances 1988 (United Nations, 1988). In Kenya, these drugs are scheduled under the Pharmacy and Poisons Act, Cap 244 Revised in 2012 (GoK, 1989) and the Narcotic Drugs and Psychotropic Substances (Control) Act (1994).

According to the findings, diazepam, flunitrazepam and amitriptyline were the prevalent antidepressants for non-medical use. The past 20 years has witnessed increasing spectrum of medications including antidepressants (Evans and Sullivan, 2014). Antidepressants can be abused in multiple of ways, often in the context of polydrug use (Schmitz, 2016). They may be combined with other sedatives to enhance their effects, or they may be used to offset the effect of stimulant use. Non-medical use of antidepressants has arisen from their diversion (Hayhoe and Lee-Davey, 2018).

Anticholinergic drugs especially benzhexol, biperiden and haloperidol were another class of prescription drugs for non-medical use identified by the study. A similar trend has been reported in Jordan where anticholinergic drugs were the most commonly abused substances after opiates, cocaine, marijuana, and amphetamines (Hadidi, 2004). Literature shows that benzhexol is one of the anticholinergic medications with the greatest abuse potential attributed to its potency (Mohan, Mohandas and Dube, 1981). Stephens (1967) also noted that anticholinergic drugs are preferred due to their hallucinogenic effects (Stephens, 1967).

Non-medical use of antipsychotics was another emerging trend with confirmation of olanzapine, chlorpromazine and carbamazepine. The motivation for non-medical use of antipsychotics relates to: self-medication of anxiety, sleep disturbance, insomnia and depression; attenuation of negative effects of consuming or withdrawing from other substances; and enhancement of pleasurable effects through the co-ingestion of other substances (Malekshahi et al., 2015; McLarnon et al., 2012).

Under opioid analgesics, tramadol and medications containing codeine were the main drugs for non-medical use identified in this class. Non-medical use of pharmaceutical opioids is reported in many countries, especially in countries of West and North Africa and the Middle East (tramadol), and in North America (hydrocodone, oxycodone, codeine, tramadol and

fentanyl) (UNODC, 2020). Tramadol which has been identified in some parts of Africa are reportedly intended for the illicit market and the dosage is higher than those prescribed for medical purposes (UNODC, 2020). According to Manchikanti (2006), the non-medical use of prescription opioid analgesics is an ongoing challenge. Its overall burden to society has been difficult to quantify, though it manifests itself in several ways, including the physical and psychological consequences of addiction (Rhodin, 2006).

Another emerging finding was the non-medical use of anaesthetics especially propofol. Studies have showed that the abuse potential of propofol is related to its elation, euphoria and pleasurable feelings (Early and Finver, 2013; Bryson and Frost, 2011; Bonnet and Scherbaum, 2012). Propofol has also been reported to be the most commonly abused anaesthesia medication among anesthesia care providers in Australia and New Zealand (Fry, Fry and Castanelli, 2015). In the United States, Wischmeyer et al (2007) reported a fivefold increase in the non-medical use of propofol after comparing two time periods during 1990-2005.

The study also confirmed the non-medical use of antihistamines (benadryl and chlorpheniramine). Studies have shown that antihistamines; sleep aids; caffeine; ephedrine; pseudoephedrine; antitussives and expectorants; dextromethorphan; laxatives; anabolic steroids; and sildenafil are medications with highest abuse potential (Williams and Kokotailo, 2006; Tseng et al., 2003; Tinsley and Watkins, 1998). In other studies, codeine containing products, cough and cold medications are the most commonly implicated medications for abuse (Cooper, 2013; Murphy, 2001; Derry, Moore and McQuay, 2010; Eickhoff et al., 2012).

Besides laboratory identification of prescription drugs for non-medical use, the study investigated the major reasons associated with this emerging trend. The underlying reasons were related to their psychoactive effect and perception that they were legal; affordability, availability and accessibility; moderating the psychoactive effects of stimulants; enhancing the psychoactive effect of other drugs; and the motivation to commit crime. According to Hernandez and Nelson (2010), NMUPDs are on the increase because they are perceived to be more socially acceptable, less stigmatized and safer than illicit substances. Peprah et al (2020) in their study revealed that affordability and the psychoactive effects of prescription drugs were key motivators for NMUPDs. In addition, Boyd et al (2006) inferred that overcoming the negative effects of drugs especially insomnia was a major motivator of NMUPDs. Hellawell (1995) therefore deduced that NMUPDs will continue to increase due to the high profits, increasing demand and more permissive attitudes towards drugs among young people.

The study revealed evidence of diversion of prescription drugs for non-medical use. Findings established that unethical persons running drug pharmacies as well as unethical healthcare providers in hospitals and mental health facilities were the major sources of prescription drugs for non-medical use. Peprah et al (2020) made similar observations where prescription drugs for non-medical use were obtained from drug pharmacies without a requirement for a doctor's prescription. Diversion of prescription drugs involves the unlawful channeling of regulated pharmaceuticals from legal sources to the illicit marketplace, and can occur along all points in the drug delivery process, from the original manufacturing site to the wholesale distributor, the physician's office, the retail pharmacy, or the patient" (Inciardi et al., 2007).

It has also been established that pharmacists usually never keep any record or monitor patient medication profiles thereby creating a vacuum in the information necessary to make appropriate counseling decisions (Hammerlein, Griese and Schulz, 2007). Further, lack of pharmacist vigilance may lead to long-term abuse of the common medications (Sansgiry and Patel, 2013). Although control strategies typically focus on reducing the diversion of prescription drugs from legitimate sources, proliferation of unregulated sources has rendered control strategies less effective (Coleman et al, 2005).

Conclusion

The study has established evidence of NMUPDs in Kenya. Towards addressing this emerging problem, the study recommends interventions that eliminate diversion of prescription drugs for non-medical use. First, there is need for more stringent measures to control prescription drugs with high potential for abuse. Secondly, there is need to engage the law enforcement agencies and the healthcare providers to suppress diversion of prescription drugs for non-medical use. Finally, there is need to implement demand reduction strategies aimed at prevention and education of those at risk on the potential harms and other adverse consequences of NMUPDs.

References

Agar, M. H. (1980). The professional stranger: an informal introduction to ethnography. SanDiego: Academic Press.

Allen, B. and Harocopos, A. (2016). Non-Prescribed Buprenorphine in New York City: Motivations for Use, Practices of Diversion, and Experiences of Stigma. J Subst Abuse Treat, 70, 81-86.

Bennett, T., Holloway, K. and May, T. (2018). A Comparison of Recent Trends in Prescription Drug Misuse. In T. Schepis (Ed.), The Prescription Drug Abuse Epidemic (pp. 243-264). Santa Barbara, California: ABC-CLIO, LLC.

Bonnet, U. and Scherbaum, N. (2012). Craving dominates propofol addiction of an affected physician. J Psychoactive Drugs, 44, 186-90.

Boyd, C. J., McCabe, S. E., Cranford, J. A. and Young, A. (2006). Adolescents' motivation to abuse prescription medications. Pediatrics, 118(6), 2412 – 2480.

Bryson, E. O. and Frost, E. A. (2011). Propofol abuse. Int Anesthesiol Clin, 49, 173-80.

Cicero, T. J. and Ellis, M. S. (2017). The prescription opioid epidemic: a review of qualitative studies on the progression from initial use to abuse. Dialogues in clinical neuroscience, 19(3), 259-269.

Coleman, J. J., Bensinger, P. B., Gold, M. S., Smith, D. E., Bianchi, R. P. and DuPont, R. L. (2005). Can drug design inhibit abuse? J Psychoactive Drugs, 37(4), 343-62.

Cooper, R. J. (2013). 'I can't be an addict. I am.' Over-the-counter medicine abuse: a qualitative study. BMJ Open, 3(6), e002913.

Derry, S., Moore, R. A. and McQuay, H. J. (2010). Single dose oral codeine, as a single agent, for acute postoperative pain in adults. Cochrane Database Syst Rev, (4), CD008099.

Dertadian, G., Iversen, J., Dixon, T. C., Sotiropoulos, K. and Maher, L. (2017). Pharmaceutical opioid use among oral and intravenous users in Australia: A qualitative comparative study. Int J Drug Policy, 41, 51-58.

Earley, P. H. and Finver, T. (2013). Addiction to propofol: a study of 22 treatment cases. J Addict Med, 7, 169-76.

Eickhoff, C., Hämmerlein, A., Griese, N. and Schulz, M. (2012). Nature and frequency of drug-related problems in self-medication (over-the-counter drugs) in daily community pharmacy practice in Germany. Pharmacoepidemiol Drug Saf , 21(3), 254-260.

Evans, E. A. and Sullivan, M. A. (2014). Abuse and misuse of antidepressants. Subst Abuse Rehabil, 5, 102-20.

Fry, R. A., Fry, L. E. and Castanelli, D. J. (2015). A retrospective survey of substance abuse in anaesthetists in Australia and New Zealand from 2004 to 2013. Anaesth Intensive Care, 43, 111-7.

Gill, R., Stead, A.H. and Moffat A.C. (1981). Analytical aspects of barbiturate abuse: identification of drugs by the effective combination of gas-liquid, high-performance liquid and thin-layer chromatographic techniques. Journal of Chromatography, 204, 275-284.

GoK (1994). Narcotic Drugs and Psychotropic Substances (Control) Act. National Council for Law Reporting.

GoK (1989). Pharmacy and Poisons Act, Cap 244. Revised in 2012. National Council for Law Reporting.

Hadidi, K. A. (2004). "Development of a screening method for the most commonly abused anticholinergic drugs in Jordan; Trihexyphenidyl, procyclidine and biperiden." Legal Medicine, 6 (4), 233–241.

Hämmerlein, A., Griese, N. and Schulz, M. (2007). Survey of drug-related problems identified by community pharmacies. Ann Pharmacother, 41(11), 1825–1832.

Hayhoe, B. and Lee-Davey, J. (2018). Tackling benzodiazepine misuse. BMJ, 362, k3208.

Hellawell, K. (1995). The role of law enforcement in minimizing the harm resulting from illicit drugs. Drug Alcohol Rev, 14(3), 317-22.

Hernandez, S. H. and Nelson. L. S. (2010). Prescription drug abuse: insight into the epidemic. Clin Pharmacol Ther, 88, 307–317.

Home Office. (2019). Drugs Misuse: Findings from the 2018/19 Crime Survey for England and Wales. London: Home Office.

Hulme, S., Bright, D. and Nielsen, S. (2018). The source and diversion of pharmaceutical drugs for non-medical use: A systematic review and meta-analysis. Drug Alcohol Depend, 186, 242- 256.

Inciardi, J. A., Surratt, H. L., Kurtz, S. P. and Cicero, T. J. (2007). Mechanisms of prescription

drug diversion among drug-involved cluband street-based populations. Pain Med, 8(2),. 171-83.

Jones, C. M., Mack, K. A. and Paulozzi, L. J. (2010). Pharmaceutical overdose deaths, United States, 2010. JAMA, 309, 657–659.

Lankenau, S. E., Schrager, S. M., Silva, K., Kecojevic, A., Bloom, J. J., Wong, C. and Iverson, E. (2012). Misuse of prescription and illicit drugs among high-risk young adults in Los Angeles and New York. J Public Health Res, 1(1), 22-30.

Malekshahi, T., Tioleco, N., Ahmed, N., Campbell, A. N. C. and Haller, D. (2015). Misuse of atypical antipsychotics in conjunction with alcohol and other drugs of abuse. J Subst Abuse Treat, 48, 8–12.

Manchikanti, L. (2006). Prescription drug abuse: What is being done to address this new drug epidemic? Testimony before the Subcommittee on Criminal Justice, Drug Policy and Human Resources. Pain Physician, 9, 287–321.

Mateu-Gelabert, P., Jessell, L., Goodbody, E., Kim, D., Gile, K., Teubl, J., Syckes, C., Ruggles, K., Lazar, J., Fredman, S. and Guarino, H. (2017). High enhancer, downer, withdrawal helper: Multifunctional nonmedical benzodiazepine use among young adult opioid users in New York City. Int J Drug Policy, 46, 17-27.

McLarnon, M. E., Fulton, H. G., MacIsaac, C. and Barrett S. P. (2012). Characteristics of quetiapine misuse among clients of a community-based methadone maintenance program. J Clin Psychopharmacol, 32, 721–3.

Mohan, D., Mohandas, E. and Dube, S. (1981). Trihexyphenidyl abuse. Brit J Addiction, 76 (2), 195-197.

Murphy, J. C. (2001). Americans make choices about self-care. Am J Health-SystPharm, 58(16), 1494.

NACADA (2016). National Survey on the Status of Alcohol and Drugs Abuse among Secondary School Students in Kenya. Nairobi: NACADA.

NACADA (2017). Rapid Situation Assessment of Drug and Substance Abuse in Kenya. Nairobi: NACADA.

NACADA (2018). Status of Drugs and Substance Abuse among Primary School Pupils in Kenya. Nairobi: NACADA.

National Bureau of Statistics and UNODC (2019). Drug Use Survey in Nigeria 2018. Vienna, 2 Austria.

Peprah, P., Agyemang-Duah, W., Appiah-Brempong, E., Akwasi, A. G. and Morgan, A. K. (2020). "With tramadol, I will ride a jaguar": a qualitative study of motivations for non-medical purpose tramadol use among coomercial vehicle operators in Kumasi, Ghana. Substance Abuse Treatment, Prevention and Policy, 49, 1-16.

Rhodin, A. (2006). The rise of opiophobia: Is history a barrier to prescribing? J Pain Palliat Care Pharmacother, 20, 31–2.

Rop, P.P., Spinazzola, J., Zahra, A., Bresson, M., Quicke, J. and Viala, A. (1988). Column liquid chromatographic analysis of barbiturates in biological fluids. Journal of Chromatography, 427, 172-180.

SAMHSA (2017). Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration.

Sansgiry, S. S. and Patel, H. K. (2013). Nonprescription Drugs. In: Swarbrick J, editor. Encyclopedia of Pharmaceutical Science and Technology. Fourth Edition. Boca Raton, FL: CRC Press.

Schepis, T. S., Teter, C. J., & McCabe, S. E. (2018). Prescription drug use, misuse and related substance use disorder symptoms vary by educational status and attainment in U.S. adolescents and young adults. Drug and Alcohol Dependence, 189, 172–177.

Stephens, D. A. (1967) Psychotoxic effects of benzhexol hydrochloride (artane). Br J Psychiatry, 113, 213-218.

Tinsley, J. A. and Watkins, D. D. (1998). Over-the-counter stimulants: abuse and addiction. Mayo Clinic Proc, 73(10), 977–982.

Tseng, Y. L., Hsu, H-R., Kuo, F-H., Shieh, M. H. and Chang, C. F. (2003). Ephedrines in over-the-counter cold medicines and urine specimens collected during sport competitions. J Anal Toxicol, 27(6), 359–365.

United Nations (1988). Convention Against the Illicit Traffic in Narcotic Drugs and Psychotropic Substances. United Nations.

United Nations (1971). Convention on Psychotropic Substances. United Nations.

United Nations (1961). Single Convention on Narcotic Drugs 1961, as amended by the Protocol Amending the Single Convention on Narcotic Drugs 1972. United Nations.

UNODC (2020). World Drug Report. Vienna, Austria.

Williams, J. F. and Kokotailo, P. K. (2006). Abuse of proprietary (over-the-counter) drugs. Adolesc Med Clin, 17(3), 733–750.

Wischmeyer, P. E., Johnson, B. R. and Wilson, J. E. (2007). A survey of propofol abuse in academic anesthesia programmes. Anesth Analg, 105, 1066–1071.

Appendix A

Focus Group Discussion Sites

This appendix presents a detailed report on the sampling of the FGD sites across the country from the region, county, sub-county and location level.

Table A1

Focus Group Discussion Sites

Region	County	Sub-County	Location (FGD site)
Nyanza	Kisumu	Kisumu Town East	Town
	Kisii	Kisii Central	Nyatieko
Nairobi	Nairobi	Lang'ata	Nairobi West
		Eastleigh	Eastleigh
		Roysambu	Roysambu
		Kasarani	Githurai
Central	Nyeri	Nyeri Central	Mukaro
	Kiambu	Kiambu	Town
North Rift Valley	Uasin Gichu	Eldoret West	Kibulgeny
South Rift Valley	Nakuru	Nakuru	Municipality
	Kajiado	Kajiado Central	Kitengela
Eastern	Makueni	Makueni	Wote
	Isiolo	Isiolo	Central
	Marsabit	Saku	Township
	Meru	Meru North	Maua Town
Western	Trans-Nzoia	Trans-Nzoia West	Municipality
	Busia	Busia	Township
Coast	Mombasa	Kisauni	Kisauni
	Kwale	Diani	Diani
	Kilifi	Bahari	Mtwapa
		Malindi	Malindi
North Eastern	Garissa	Garissa Central	Township

Note: Data from study findings, 202

Appendix B

Laboratory analysis report

This appendix presents a detailed laboratory analysis report of the suspected samples collected during the study.

Table B1

Laboratory analysis report for suspected samples

Sample No.	Confirmed drug	Source County
F/MISC/641/19	Benzhexol	Nairobi
F/MISC/643/19	Diazepam	Nairobi
F/MISC/644/19	Benzhexol	Nairobi
F/MISC/645/19	Flunitrazepam	Nairobi
F/MISC/646/19	Diazepam	Nairobi
F/MISC/647/19	Benzhexol	Nairobi
F/MISC/653/19	Diazepam	Garissa
F/MISC/655/19	Amitriptyline	Garissa
F/MISC/657/19	Diazepam	Meru
F/MISC/664/19	Diazepam	Marsabit
F/MISC/672/19	Diazepam	Makueni
F/MISC/681/19	Diazepam	Mombasa
F/MISC/682/19	Flunitrazepam	Mombasa
F/MISC/686/19	Amitriptyline	Kilifi
F/MISC/687/19	Diazepam	Kilifi
F/MISC/688/19	Flunitrazepam	Kilifi
F/MISC/691/19	Diazepam	Kwale
F/MISC/692/19	Amitriptyline	Kwale
F/MISC/701/19	Flunitrazepam	Kilifi
F/MISC/702/19	Diazepam	Kilifi
F/MISC/706/19	Diazepam	Kilifi
F/MISC/710/19	Diazepam	Kilifi
F/MISC/711/19	Chlorpromazine	Kilifi
F/MISC/715/19	Amitriptyline	Kilifi
F/MISC/716/19	Diazepam	Kilifi
F/MISC/721/19	Amitriptyline	Mombasa
F/MISC/722/19	Flunitrazepam	Mombasa
F/MISC/723/19	Diazepam	Mombasa
F/MISC/726/19	Flunitrazepam	Nairobi
F/MISC/727/19	Diazepam	Nairobi
F/MISC/732/19	Diazepam	Kiambu
F/MISC/734/19	Diazepam	Nairobi
F/MISC/735/19	Benzhexol	Nairobi
F/MISC/737/19	Diazepam	Nairobi
F/MISC/745/19	Diazepam	Nairobi
F/MISC/747/19	Flunitrazepam	Nairobi
F/MISC/749/19	Benzhexol	Nairobi

Sample No.	Confirmed drug	Source County
F/MISC/750/19	Diazepam	Nairobi
F/MISC/751/19	Codeine	Nairobi
F/MISC/752/19	Benadryl	Nairobi
F/MISC/754/19	Flunitrazepam	Nairobi
F/MISC/756/19	Benzhexol	Nairobi
F/MISC/757/19	Benzhexol	Nairobi
F/MISC/758/19	Diazepam	Nairobi
F/MISC/760/19	Flunitrazepam	Nairobi
F/MISC/767/19	Benzhexol	Busia
F/MISC/773/19	Chlorpromazine	Busia
F/MISC/776/19	Chlorphenamine	Kisumu
F/MISC/781/19	Biperiden	Kisumu
F/MISC/783/19	Benzhexol	Kisumu
F/MISC/785/19	Benzhexol	Kisumu
F/MISC/786/19	Codeine	Kisumu
F/MISC/787/19	Carbamazepine	Kisumu
F/MISC/788/19	Codeine	Kisumu
F/MISC/792/19	Benzhexol	Kisumu
F/MISC/793/19	Haloperidol	Kisumu
F/MISC/796/19	Diazepam	Busia
F/MISC/801/19	Tramadol	Uasin Gishu
F/MISC/803/19	Benzhexol	Uasin Gishu
F/MISC/804/19	Diazepam	Uasin Gishu
F/MISC/809/19	Diazepam	Uasin Gishu
F/MISC/810/19	Benzhexol	Nairobi
F/MISC/821/19	Benzhexol	Nyeri
F/MISC/822/19	Propofol	Nyeri
F/MISC/836/19	Olanzapine	Uasin Gishu
F/MISC/837/19	Benzhexol	Uasin Gishu
F/MISC/838/19	Chlorpromazine	Uasin Gishu
F/MISC/707/19	Flunitrazepam	Kilifi

Note: Data from study findings, 2020