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OPIATE ANALGESICS OVER-USE IN BULAWAYO: A ROOT
CAUSES FOLLOW UP PHARMACOVIGILANCE STUDY 2020-2021

BY

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Abstract

Observed trends in the over usage of opioid analgesics by both patients and prescribers locally have significantly increased and this may result in tolerance, dependence and addiction among other undesirable effects. Demand for and consumption of opiate analgesics has risen by over three-fold in the past five years in Bulawayo city, according to local surveys. The present pattern of use of the medicine, depicting overuse of the analgesics, may pose irreversible harm to the medicine users and the community at large. Interviewer-administered questionnaires were filled in by patients presenting with pain on consultation and clinicians in the city; and a tool to assess opioid prescription patterns was filled in at pharmacies where opiate analgesics are dispensed. The likelihood of overuse of opiate analgesics by patients in pain was computed and analyzed using logistic regression models in SPSS version 23 and factors influencing opiate analgesic overuse in the city. 365 patients were enrolled in the study, 243 (66.7%) of them were female and point prevalence of pain was established to be 39%. 61 clinicians participated in the study were, largely comprising nursing staff. Knowledge levels and perceptions of clinicians served as proxy for independent variables influencing opiate analgesic overuse. Variables that were mostly associated with patients' likelihood to overuse opiate analgesics included: pain interference on sleep at [OR: 0.07(95% CI: 0.06-0.08) $p < 0.005$] and pain interference with general activity at [OR: 0.06(95% CI: 0.05-0.08) $p < 0.005$]. The average knowledge score of the clinicians with respect to perceptions and knowledge about opioid analgesics, was 52.3%. Factors that were most statistically significant in influencing opiate analgesic overuse were lack of availability and adherence to guidelines at [OR: 0.36(95% CI: 0.27-0.45) $p < 0.05$] and inadequate training of clinicians at [OR: 0.12(95% CI: 0.04-0.19) $p < 0.05$]. Clinicians' prescribing patterns indicated typical length of opiate analgesics for treatment of chronic pain to be more than the seven-day recommended dosing. The researcher recommends a longer prospective study, conducted at more sites nationwide such that the results thereof can be generalized. Furthermore, in-depth training of all clinicians on associated benefits and risks of opioids and alternatives will contribute greatly in mitigating opiate analgesic overuse.

Key words: Opiates, Interference, Training, Overuse

Declaration Page

I, RUMBIDZAI MICHELLE MUTSIWA, student number 192013, do hereby declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

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Dedication Page

I dedicate this work to my parents, Mr. N. Mutsiwa and Mrs. F. Mutsiwa who have been my source of inspiration.

List of Acronyms and Abbreviations

WHO	World Health Organization
INCB	International Narcotics Control Board
BCC	Bulawayo City Council
CHANS	College Of Health, Agriculture and Natural Sciences
EDLIZ	Essential Drug List of Zimbabwe
MCAZ	Medicines Control Authority of Zimbabwe
MOHCC	Ministry of Health and Child Care
ZIMA	Zimbabwe Medical Association
ZINA	Zimbabwe Nurses Association
USA	United States of America

Definition of Key Terms

Extramedical Use

- Usage of illicit opioids and the usage of pharmaceutical opioids not as directed by the prescriber or without a prescription

Opioid Use Disorder

- A troublesome pattern of opioid use resulting in serious impairment or distress

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Pain is a horrid sensory and emotional feeling that is related to actual or potential injury. Pain experience may be acute, chronic, or intermittent, or a mixture of all three types (Goldberg & McGee, 2011). This personal and/ or subjective symptom is largely influenced by age, race, gender, and psychosocial factors and is most common in patients with other underlying diseases such as kidney disease and tumors that may have not been discovered yet. Patients' experience of pain may be worsened by inability to express it, anxiety and fear (Zewdu Gelaye Wondimagegn, 2021). Additionally, Cole (2002) similarly suggests that pain remains a real perception that involves bodily sensation similar to that reported during tissue-damaging stimulus, and an experience of atrocity with regards to the experienced threat.

Globally, approximately 1 in 5 adults are diagnosed with pain and another 1 in 10 adults suffer from chronic pain annually, though its distribution is not equal universally (Goldberg & McGee, 2011). Sufficient and appropriate pain management is indispensable to the care of crucially ill if not all patients presenting with the unfavorable symptoms, though Zewdu Gelaye Wondimagegn (2021) reports that misconceptions and traditions have impeded the efforts in effective pain control interventions. Adequate assessment of pain and its appropriate classification is the primary tactic for treating pain and a blend of physiologic and behavioral pointers may be helpful (Cole, 2002). Ability to merge multiple pain classifications is also a plus in tailor-making regimens for the different patient individual circumstances.

In addition to non-steroidal anti-inflammatory drugs (NSAIDS) and weak opioids, for example Codeine, used to medicate mild and/or moderate pain, strong opioids such as Tramadol and morphine like analgesics have been prescribed since the early 1980s to treat pain of severe nature, mainly in patients suffering from chronic pain (Palaian, Ibrahim, & Mishra, 2011). An epidemic of opioid utilization for the cure of pain has been observed over the past decades, in both developed and developing countries, where an increase in the misuse/abuse of these pain remedies, and consequent demons of addiction, are also reported, succeeded by an epidemic of deaths ascribed to opioid overdose (Zewdu Gelaye Wondimagegn, 2021).

The relationship between pharmaceuticals, in this case opioids, and the social behavior with exceptional reference to social values impacting medicine consumption and usage i.e. the sociopharmacology of opioids, needs to be investigated in order to generate knowledge on off-label medication indications and adverse drug reactions of the marketed opioids like Tramadol and Fentanyl in the post marketing period (Morgan, 2016). This knowledge surmounts to the pharmacovigilance of the medicines outside the strict control employed during the drug development process. Hence sociopharmacology is a data assembly platform for the marketed medicine, contributing immensely to public health for both the individual and the society. Furthermore, sociopharmacology alludes to variables that have a marked impact on the action of medication and the incidence of particular effects of the medicine as acknowledged and/or experienced and interpreted by the user (Maiti & Alloza, 2014).

1.2 Background to the Study

The deleterious effects of pain cannot be overstated, the overall status of the patient may deteriorate resulting in changes in consciousness, sleep, movement, as well as metabolic, endocrine, gastrointestinal, including psychological functions. Though much research has focused on pain management, it however still is prominent, especially in this advent of non-communicable disease (Zewdu Gelaye Wondimagegn, 2021). Factors such as limited resources, insufficient training, cultural bias and language barriers have left pain management largely unaddressed leading to poor basic pain care, patient self-medication by over the counter medication, sharing medication in the community and use of illicit drugs in trying to alleviate the pain. Intention of effective pain management is to improve lives of the patients by ensuring best possible clinical outcomes (Manjiani, Paul, Kunnumpurath, Kaye, & Vadivelu, 2014).

Observed trends in over usage of these opioids by prescribers and consumers in our local setting for pain management medically are also shifting towards those of developed countries and safety concerns, such as tolerance, dependence, addiction and resultant respiratory depression, now arise and threaten our already burdened and frail healthcare systems. Degenhardt *et al.* (2019), reports that opioid dependence is ranked third among substance use disorders with regards to contribution towards morbidity and premature mortality. Concomitant medicine use due to comorbidities further aggravates risks of opioid overdose, especially with medicines such as gabapentin, benzodiazepines and/or amphetamines. Manjiani *et al.* (2014) also highlighted that patients currently misusing opioids or have done so in the past or diagnosed with psychiatric illness would most probably develop problems with use of opioids.

Furthermore, rational use of opiate painkillers may lower morbidity and mortality, and maximize use of scarce healthcare resources, including reduction of financial burden on patients (Wendie, Ahmed, & Mohammed, 2021). Inappropriate prescribing of medicines, dispensing and usage is a worldwide burden though the extent of the challenge has been stated to be predominant in developing countries. Failing to prescribe according to clinical guidelines and unsuitable self-medication may be attributable to opioid misuse.

A systems thinking approach and robust action is required on medicine related issues by exploiting the concept of the socio-pharmacology of opioid use. Studying the correlational relationship of opioid pain medication and the social value of tolerating pain within a society may be indicative of consumption patterns of the analgesics as it seeks to investigate social determinants of medicine intake (Morgan, 2016). Ideal policy as well as regulatory context for opioids should aim to minimize problems to health and the society that may probably arise from extra medical use of opioids and dependence, in addition to making sure that prescribed opioids are accessible as essential medications (Degenhardt *et al.*, 2019).

1.2 Statement of the Problem

Pain is undoubtedly a common issue that affects the quality of life of an individual. As opioids are prescribed to relieve pain, their misuse in alleviating both acute plus chronic pain may potentially lead to dependence. With prolonged use, agony relieving effects may lessen, thus pain becoming worse. Goldberg and McGee (2011) highlights that if opioids are repeatedly taken, their effects are lowered by virtue of development of tolerance. Additionally, the body can develop dependence which may result in withdrawal symptoms. The withdrawal makes it challenging to discontinue taking them and addiction follows when dependence affects daily life.

There have been observations, from prescription sales mostly from retail pharmacies, that demand for and consumption of these medications, particularly Tramadol and fixed dose combinations incorporating paracetamol, has worryingly been on the rise, both on and off prescription, hence attributing the current investigation. In a survey carried out by the researcher in 15 retail pharmacies, findings showed that the average number of prescriptions containing opioids increased from 582 to 1916 in the last five years as shown in the graph below, by slightly over three-fold. The present opioid medication use patterns, depicting over-use of the analgesics, are likely to outweigh the advantages thereby causing the above mentioned undesirable effects to the consumers themselves and the community at large in cases of overdose or substance use disorder.

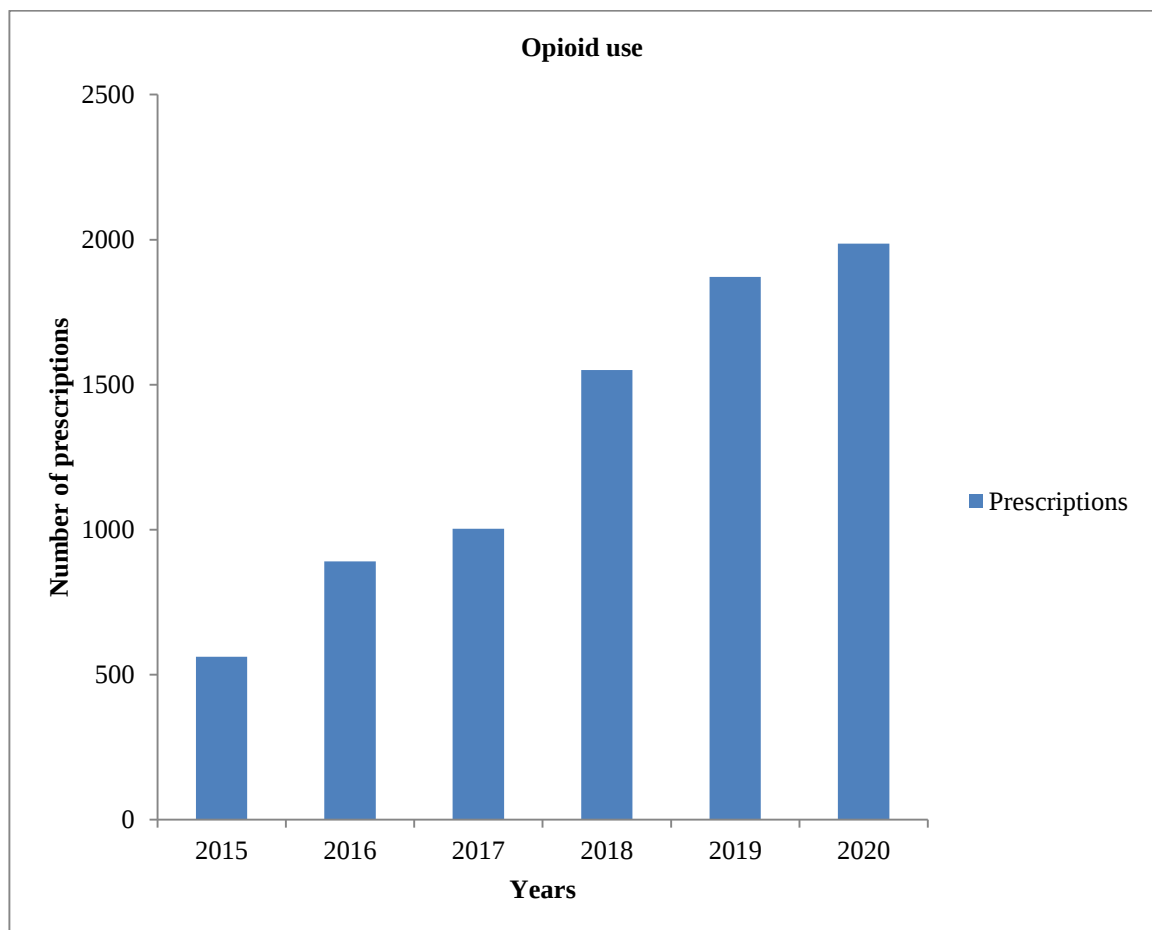


Figure 1: Graph showing an increase in the consumption of opiate analgesics in Bulawayo from a survey from 15 retail pharmacies. The y-axis shows the years and the x-axis shows the average number of prescriptions.

1.3 Research Objectives

1.3.1 Main Objective

The purpose of the study was to determine factors influencing the over-use of opioid analgesics in Bulawayo from 2020-2021

1.3.2 Specific Objectives

The study specifically sought to:

1. establish the pain burden in Bulawayo in the period 2020-2021 and how it may contribute to opiate analgesic overuse
2. determine clinicians' prescribing patterns for opiate analgesics in Bulawayo in the period 2020-2021 by reviewing prescriptions containing opioids
3. identify factors influencing over-usage of opiate analgesics at public and private clinics and hospitals in Bulawayo in the period 2020-2021

1.4 Research Questions

1. What were the pain burdens in Bulawayo in the period 2020-2021 and how could it have contributed to opiate analgesic overuse?
2. What were the clinicians' prescribing patterns for opiate analgesics in Bulawayo in the period 2020-2021?
3. Which factors were the likely causes of the over usage of opiate analgesics at public and private clinics in Bulawayo in the period 2020-2021?

1.4 Assumptions/ Hypothesis

H₀: There was no association between clinicians' prescribing patterns and other factors for opiate analgesics and their overuse in Bulawayo in the period 2020-2021

H₁: There was an association between clinicians' prescribing patterns and other factors for opiate analgesics and their overuse in Bulawayo in the period 2020-2021

1.5 Significance of the Study

Despite pain management being a priority in healthcare settings for a number of years now, aims to address it have probably been coupled with irrational medicine use, some of which have potential for addiction. Use of opiate analgesics for chronic non cancer pain has seemingly been controversial with the safety as well as efficacy of using the opioids for long periods being uncertain. This study sought to highlight reasons for maluses of opioid analgesics and advocate for their avoidance by promoting rational use of these medicines by prescribers, dispensers and consumers through alignment to laws and regulations governing opioid use. Findings from this study minimized gaps in both knowledge and practice of correct pain management by both health care workers and patients.

Unlike other researches that overlook socioeconomic and other matters that create vulnerabilities to unsafe and/or chronic medicine use among individuals, communities, and population groups as noted by Morgan (2016), this study seeks to trace how social, knowledge, health-related and economic aspects generate conditions that proliferate harmful medication use and develop solutions to reduce the ill. Focusing on changing those aspects rather than changing affected medicine users may ameliorate the undesirable effects of overusing opioids. This follow up pharmacovigilance study is more focused on

extending knowledge of medicine safety by offering a post marketing risk-benefit assessment of opioid analgesics locally, so as to determine their merit.

1.6 Delimitation of the Study

The study was only conducted at hospitals, private surgeries, council clinics and retail pharmacies in Bulawayo. Thus, the findings from the study cannot be generalized at national level. The time frame for the study was 2020-2021. Study population were patients presenting with pain on consultation, health care workers and opiate prescriptions that were reviewed.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

The misuse of opioids requires the researcher to map out the entire study and the methods to retrieve the information to single out and explicitly interpret how the misuse of opioids comes about. Understanding the methods to segment different classes of pain, how they are measured, and the general history which proportionate the extent of the pain, is of paramount importance. The appropriate use of opioids being subjective to the circumstance that most patients who become dependent on the opioids are simply complying with the need for pain management due to the condition of their ailment. However, the increased levels of the use of opiate analgesics and their patterns of use are alarming and require a multi-sectorial approach to curb the opioid epidemic.

2.2 Theoretical Framework

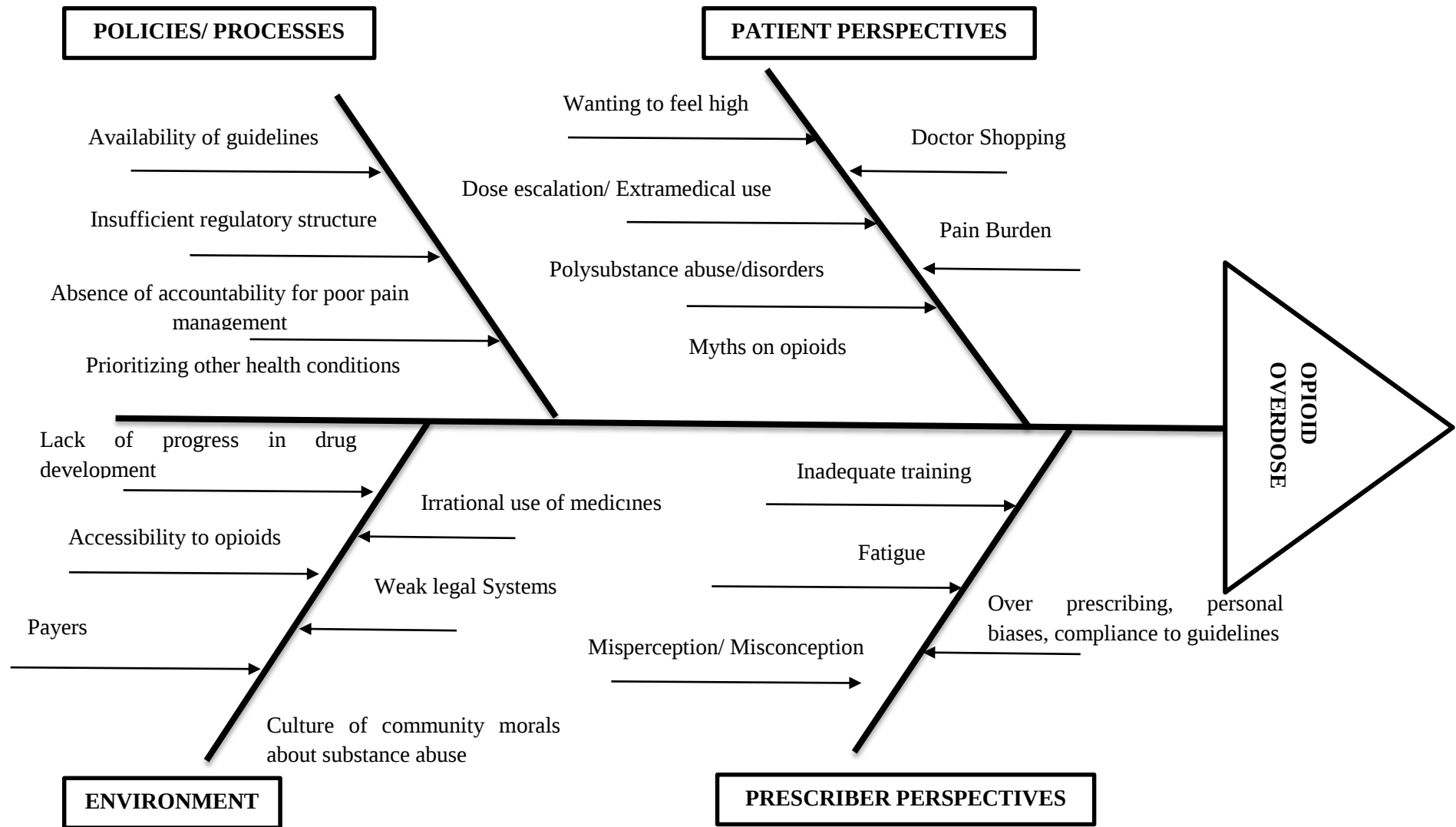


Figure 2: Conceptual Framework

2.3 Relevance of the theoretical Framework to the study

The theoretical framework structures and supports the underlying principle of the research, problem statement, purpose, and research questions. Over use of opiate analgesics has numerous interrelated underlying causes, which when identified can be addressed to halt the public health problem. More so, this framework serves as an anchor theme for literature review, as well as most decisively, methodology and analysis of findings. The relationships between the determinants of opiate analgesic overuse can be fully understood by:

- I. Aiding the researcher to select suitable research questions
- II. Guiding the choice of research design
- III. Supporting the researcher's predictions of the outcomes, in addition to interpreting and analysing the results obtained based on existing literature
- IV. Persuade the reader on the relevance of the research in question

2.4 Classification of pain and description of pain burden.

Pain in general is categorized according to its underlying cause, location, frequency, duration, and intensity. According to Cole (2002) pain classification is thus considered complicated and can present as a source of misperception for many clinicians. Pain can also be of malignant or non-malignant nature, in most cases malignant pain is usually chronic and, in some cases, requires palliative care. Acute pain is limited to not more than 30 days' duration, where chronic pain continues for more than 6 months. Wondimagegn *et al.*, (2021) in their study note that pain of chronic nature is common in HIV/ AIDS, cancer, muscle-skeletal and neurodegenerative diseases and requires extensive costs, both medically and socially. Sub-acute pain is thus the interim from the beginning of the second month to the end of the sixth month of continued pain.

Acute pain may serve a protective purpose in that it cautions of danger, restricts use of injured or unwell body organs, and signals when the conditions resolve. Chronic pain, alternately, has slight protective significance, if at all, persists even when normalization after injury or illness occurs, and in due course interferes with productive activity (Cole, 2002).

The clinical burden of pain is seen as the purpose of the healthcare workers' responsibilities in addition to the demands incurred by physicians when they engage a patient suffering from chronic pain in care. "Burden of disease" is a broad term that comprises diverse conceptual and technical approaches in assessing the impact of poor health on persons and populations that are used for a variety of purposes. Conceptualizing burden, whether definite or multiple conditions are the emphasis that determines which approaches are used to approximate burden. Reports from a study by Blyth (2019) show that the burden from musculoskeletal pain is expected to rise prominently in low- and middle-income countries as a result of population growth, aging, and other risk factors like obesity, injury, and sedentary lifestyles. Present-day estimates of the international burden of musculoskeletal pain are founded on a systematic, thoroughly evaluated evidence base.

A way of establishing the total burden of pain would be by combining pain intensities of diverse groupings into a single metric. Methods embedded in this concept have been of use to determine the burden of diseases, linking the time expended in the illness state with its severity (Alonso & Schuck-Paim, 2021). There is substantial evidence indicating that the effects of variables such as pain severity are not easy to account for. Potential mechanisms involve social norms where patients suffering from chronic pain describing

high levels of pain severity may be said to be violating values of stoicism in adversity response (Chibnall, Tait, & Gammack, 2018). Psychosocial contributors are known to exist as well for chronic pain. In the absence of medical evidence, when pain severity levels are high health care workers may discount symptoms presented by patients, and this may result in under treatment or mismanagement of the pain.

Considering the several challenges in directly assessing pain experience, several scales are available to evaluate its severity according to how patients perceive it, regularly by means of self-reporting questionnaires. Numerical ratings obtained are usually inconsistent across individuals and discrete categories, such as mild; moderate and severe, offer more relatable grading systems thus keeping variation within narrower limits. A study by Verne-Salle *et al.*, (2020) highlighted that patient used a larger proportion of emotional qualifiers in describing their pain as compared to sensory qualifiers, showing the impact of the emotional element in pain. Pain's impact on daily life, largely affects working ability, sleep and mood.

2.5 Opiate analgesic use in pain management: Why opiates are abused?

Opioids are effective analgesics indicated for alleviating both acute as well as chronic pain of moderate to severe nature; and chronic malignant and non-malignant pain. The World Health Organization (WHO) has listed opioids as essential medicines for severe pain and in palliative care and a wide variety of them exist on the market, with variable clinical potencies. According to the current EDLIZ 8th Edition, Codeine plus Tramadol are indicated for moderate pain and Morphine for severe pain, given orally except in patients

with swallowing difficulties and titrating the dosages for Morphine until pain control is achieved in the patient.

Beyond potent analgesia, opiate analgesics lessen anxiety and produce moderate sedation and a profound sense of well-being, regularly to the point of euphoria. These are an absolute benefit for patients who would otherwise have to tolerate the pain and misery of acute or else terminal medical conditions (Fields, 2011).

Opioids initially used to treat austere and acute agony are notorious for potentially causing dependence and misuse. Use of opioids use has blown out of proportion gradually to non-cancer chronic pain, levitating safety concerns. In a study by Pergolizzi *et al.*, (2017) it was similarly noted that there has been renewed recognition of possibility of opioid overuse, misuse and abuse. Furthermore, according to Degenhardt *et al.*, (2019) there have been substantial increases in opioid prescribing ways for a diversity of chronic non-cancer pain disorders in the USA and Canada. However, evidence for opioid long-term use in managing non-cancer chronic pain is said to be scarce and subject to significant controversy. Side effects of opioids vary in magnitude from one medicine to the other, they include respiratory depression; nausea and vomiting; pruritis; constipation; sedation and urinary retention and are aggravated in renal impairment (Dahan, Overdyk, Smith, Aarts, & Niesters, 2013; Hider-Mlynarz, Cavalié, & Maison, 2018).

Use of opioids for extra medical purposes, referring to usage of illicit opioids and the usage of pharmaceutical opioids not according to the prescriber's instruction or without a prescription, is unlawful in most countries, and can be punishable by fining and even incarceration. Worldwide, countless persons use opioids extra medically originally because they are delighted by their effects, without inescapably selecting opioid

dependence including its long-term social and health consequences. The multifaceted intersection of extramedical use of opioids is coupled with amplified amounts of commendation for medical needs in most high-income countries, especially the USA, and has brought aggregate attention to their extra medical use and related harm as reported by Degenhardt *et al.*, (2019).

Opioid dependence as a result of opioid overuse and extra medical use involves symptoms such as impaired governance over medication use, prominence of use of particular medicine and physiological symptoms like withdrawal and tolerance. The term opioid use disorder is often preferred to express the latter in North America (Degenhardt *et al.*, 2019). Risk factors for opioid dependency or opioid use disorders encompass genetics, occasions in early life, and the environment. It is however not every individual though who develops opioid dependence among extra medical opioid users.

2.6 Opioid consumption levels

International Narcotics Control Board (INCB) statistics on national level usage of pharmaceutical opioids demonstrate that use is low in Africa, Asia, the Caribbean, and east including southeast Europe. In nations with the utmost opioid consumption, much use is for chronic non-malignant pain. Use of opioids in the USA is the greatest compared to other countries, consuming 68% of the globe's prescribed opioids in the period 2011 to 2013 (Degenhardt *et al.*, 2019). In Africa, minimal levels of opioid utilization were observed across the continent as well as limited statistical data for medical opioid use, which may be indicative of cultural and social barriers that exit regarding the use of opioids in pain relief.

Lethal opioid overdose is a severe adverse outcome of both approved and extra medical use of opioids that is escalating in the United Kingdom, Australia, Canada, and across Europe. Pattern trends of extramedical use of opioids and dependence, and its associated harms vary among countries. Degenhardt *et al.* (2019) informs that substantial extramedical use of opioids such as Tramadol, coupled with overdosing, dependence and death have been reported in the Middle East and other African countries such as Nigeria, Zimbabwe and Chad, with much of this use thought to be of medicines produced and acquired illicitly. Furthermore, other problems that have been noted involve extra medical use of codeine-containing medicines that are found over-the-counter such as Co-codamol, containing paracetamol; and Myprodol, additionally containing Ibuprofen.

It is imperative to track opioid consumption by monitoring sales of the analgesics as it presents a number of advantages. Describing the consumption trends of the opioids enables analysis of the effects of withdrawing ‘notorious’ medicines and releasing new medicines onto the market. Additionally, it helps in ensuring that guidelines that promote the safe use and management of the medicines are executed well in clinical practice. It can also assist in identifying the largely used medicines needing further surveillance, and may perhaps support studies on misuse as stated by Dahan, Overdyk, Smith, Aarts, & Niesters (2013).

2.7 Drug use patterns

Drug utilization patterns are a key determinant in medicine safety. Directly advertising prescription medicines to the consumer has become ordinary in many countries through globalization and this may have an impact on the individual patient’s therapeutic

decisions, without the support of healthcare workers. The resultant effects have been growing self-medication, legal and illegal medicine sale over the Internet, and over-prescribing and dispensing by health workers on patients' request (Jeetu & Anusha, 2010).

Wendie, Ahmed & Mohammed (2021) highlight the need to have an essential tool to investigate medicine use patterns in health facilities by virtue of the complexity of the pharmaceutical care process. The WHO developed core medicine use indicators to measure performance in prescribing practices, patient care and facility-based factors, thereby offering a description of medicine use states at respective healthcare centers or areas and superior quantitative rational medicine use evaluation.

According to Singh, Banerjee, Garg, & Sharma (2019) prescribing indicators i.e. the average amount of medicines on prescriptions, percentage of medicines suggested by generic name and healthcare center formulary medicine list, proportion of encounters with an antibiotic and injection prescribed; measure health workers' performance in relation to appropriate use of medicine. Patient care indicators i.e. regular consultation and dispensing time, proportion of medicines dispensed, satisfactorily labeled, and knowledge on dosage of patients; assess patient experiences at health care centers and how knowledgeable they are about medicines dispensed to them. Thus recommendations for rational and cost-effective medicine use may be advocated based on these evaluations. Auditing prescriptions allows for prescription quality improvement and enhanced holistic patient care.

Degenhardt *et al.*, (2019) however suggests that evidence for prescription medicine monitoring programs is mixed and inadequate due to low strength evidence and high bias

risk. Unless it is compulsory for prescribers to align to national and/or local medicine formularies, prescription monitoring programs are not likely to be of benefit. Results from these interventions might include reduced incidence of opioid dependence, though providing insufficient response to the prevalence of opioid use dependence and associated ills.

2.8 Prescribers' perspectives

Understanding how the role of healthcare workers, particularly prescribers, contributes to the over consumption of opioids can guide intervention strategies in averting this ill. Lack of progress in drug development by pharmaceutical companies may even be worsening the status quo of opioid use by failing to design opioid ligands that preserve or maintain high analgesic potency yet with minimal abuse potential. Moreover, there currently aren't non-opioid painkillers with either similar potency for μ agonists or the extensive analgesic efficacy range; hence failure to uncouple the great deal of analgesia from the possible addiction perpetuates the dilemma of using opioids for the treatment of chronic non-malignant pain. Fields (2011) supported this line of thought when he concluded that the debate remains over how and when to use opiate analgesics effectively.

Prescribing patterns are the strongest factors linked to long term opioid use. Practitioners who support broader acceptance of chronic non-malignant opioid use, such as neuropathic pain, argue that it is unethical to withhold sufficient treatment from any patient in severe pain from whatever cause (Fields, 2011). Key recommendations according to Manjiani *et al.* (2014) for starting chronic opioid therapy consist of an accurate physical assessment and examination, which includes a psychiatric history by clinical staff; a brief trial of chronic opioid therapy as a management alternative for patients suffering from moderate

to severe non-malignant pain that impacts adversely on body function or quality of life; rigorous monitoring of patients with a history of psychiatric issues, medicine abuse and behavioral problems; the patients' frequent evaluation, including discontinuing therapy when necessary; and assisting patients in realizing therapeutic goals and steadily decreasing dosages to manage intolerable opioid adverse effects. More so, in a predictive model presented by Mitra (2013) it was shown that prescribing can be adjusted to lower patient risk, unlike patient demographic characteristics.

In high-income nations, overprescribing of pharmaceutical opiate analgesics for chronic non-malignant pain has fashioned iatrogenic dependence and consequent increases in extra medical opioid use, especially in Canada and the USA (Degenhardt *et al.*, 2019). Misconceptions and misperceptions on pain by the prescribers may aggregate to overuse of opioids by patients. In a study by Cole (2012), several practitioners were reported to incorrectly associate pain as a natural result of growing old, though the elderly are at higher risk for various aching conditions. Such perceptions may fuel unnecessary overtreatment of pain by opioids. In addition, patients suffering from chronic pain, sadly, require more effort and resources than treatment in isolation by probably one practitioner. A holistic attitude is ideal where a complex set of physical, psychosocial, socioeconomic and spiritual problems caused by chronic pain, when this is lacking, the practitioner is likely to resort to symptomatic management, typically by overuse of a solo therapeutic agent or approach which may be convenient at that time.

As chronic pain, including malignant pain, worsens ultimately due to disease progression and the different interventions employed to treat the disease, need to raise doses of opioids is regularly more related to the prevailing considerations than to the quick development

of medication abuse or tolerance, as various practitioners mistakenly believe (Cole, 2012). More so, prescribers may have personal biases with regards to the gender, race and ethnicity of their patients which may affect their attitudes towards the agony being experienced by the patients. Other factors that may affect over prescribing of opioids analgesics include inadequate education and training on pain, poor pain assessment skills, insufficient knowledge of the types of analgesics available and their appropriate dosages for various pain presentations (Manjiani *et al.*, 2014 and Wondimagegn *et al.*, 2021). A study by Singh, Banerjee, Garg, & Sharma (2018) highlighted the need to train prescribing practitioners to write rational prescriptions, in addition to adhering to the WHO standards for prescriptions so as to attain quality improvement in service delivery.

In most cases, insufficient pain management training and understanding on opioid abuse risk by physicians contribute to their incapability to prescribe opioids safely, implement and understand risk assessments, identify addiction, and enable discussions with patients. Furthermore, prescribers who overrate the benefits and underrate the hazard of opioids are likely to add to over-prescription by means of providing months' worth of treatment even when only a few days may suffice for pain management.

2.9 Rational use of medicines

As stated by the World Health Organization (WHO), rational use of medicines requires that patients are given medication suitable for their clinical needs, in dosages that meet specific individual requirements for a period of time that is adequate and at the least possible cost to them and their community. Results from a study by Singh, Banerjee, Garg, & Sharma (2018) on analysis of prescriptions showed incomplete details regarding

history, assessment, diagnosis and investigations on patients due to heavy workload, non-specific patient complaints and verbal communication by the prescribers instead of noting all the details. This could be inferred to incomplete entries of medication formulations and administrations; and the duration of treatment, potentially resulting in dosing errors. Incorrect dose, dose omission, and incorrect duration are the most frequent types of prescribing errors that may be associated with medical opioid over consumption worldwide.

It was noted by WHO (2002) that over 50% of all medication globally are prescribed, dispensed, or sold incorrectly, though 50% of patients globally are unable to consume them correctly. Widespread types of irrational opioid use include improper selection of medication for pain treatment; failure to prescribe the opioids according to clinical guidelines; and inappropriate self-treatment, habitually of prescription-only medicines. Prescribers' illegible handwriting may also cause medications errors mentioned earlier (Singh, Banerjee, Garg, & Sharma, 2019). Inaccurate use and over-use of medicines is wasting resources, especially loss of revenue through often out-of-pocket payments by patients. Additionally, it results in considerable patient harm, poor patient outcomes and adverse drug reactions at times (Wendie et al., 2021)

Inappropriate medicine use is deemed to be a crisis in the Global South. This may have possible implications on healthcare budgets as about 25%–70% of international healthcare expenditure is used up on medicines (Singh, Banerjee, Garg, & Sharma, 2018). Rational medicine use should be normalized as it maximizes the rewards that can be derived from optimal medication use. More so, optimal use of limited health care requirements can be

attained as a result, even though evidence-based approaches (Wendie, Ahmed & Mohammed, 2021).

2.10 Patient perspectives

Several dynamics exist as to how patients may contribute to the overuse or extra medical use of opioids. It may be that they are not able to adequately articulate the level or extent to which they are in pain, and in cases where it is exaggerated the prescriber may perceive it as needing treatment with opioids, i.e. moderate to severe in nature (Manjiani *et al.*, 2014). Some patients may have fear for serious terminal illness and want to get rid of the pain, in a denial state, thus requesting for extremely strong pain killers such as opioids, even for long undue periods. Ultimately, there is no means of knowing how much pain the next person is experiencing, it is only prudent to assume that pain is present when a patient says it is, at whatsoever intensity they say it is. By all means, acute pain ought to be recognized before it develops into chronic pain.

Cole (2002) in his study notes that chronic pain is confusing to most sufferers, as it depresses, incapacitates, and lowers quality of life. Ultimate increased disability and suffering may cause patients to increase dosages on their own in trying to restore a pain-free existence. Although the pain threshold is objectively constant from one person to the other, the tolerance level is highly variable. Endurance levels to pain differ individually and may be affected by factors such as anxiety, depression, and motivation which significantly influence the pain behavior exhibited. Some patients may contemplate that pain ought to be tolerated, have an impression that requests for pain medications from

prescribers are troublesome, or be affected by communication fatigue (Degenhardt *et al.*, 2019).

A review of present-day palliative care pain management in US by Manjiani *et al.*, (2014), showed that discrepancies existed across diverse racial and ethnic clusters regarding pain perception, its assessment, and treatment. These discrepancies were existent in different types of pain, i.e. acute; sub-acute, malignant and chronic non-malignant pain, and in several clinical settings, comprising consultation rooms and postoperative recovery.

Additionally, personal and cultural biases, and communication problems between the patient and healthcare workers are other related barriers to effective pain management. Sedation effects of other co-medications or neurologic compromise may influence negatively the verbal or physical pain expressions. The patient's belief system additionally plays a role in desiring pain relief, when one trusts something to help them they can benefit from less harmful analgesics and even placebos. In a study by Wondimagegn *et al.*, (2021), distrust of healthcare workers by patients presented as a barrier to adequate pain treatment. This may influence extra medical opioid use as patients want to take matters to their hands. Hider-Mlynarz, Cavalié, & Maison (2018) also noted that the disparities in analgesic preferences observed among pain patients globally could be explained by different local traditions and cultural backgrounds.

Dependent variables such as geographic environments, treatment availability, forms of available prescription opioid formulations, medication disposal services, perception of risk by prescribers, over-prescription of opioid analgesics or under-treatment of pain, workplace conditions, peer substance abuse, community norms about substance use and

abuse, and access to legit and illegal opioids are key risk factors that may perpetuate opioid misuse (Jalali, Botticelli, Hwang, Koh, & McHugh, 2020). Misuse of opioids is also prejudiced by the accessibility to the opioids from family members, friends and/or work mates. Individual risk factors comprise being male and poor educational attainment. Also, persons who use opioids extramedically usually use several substances and often have polysubstance use disorders and mental health conditions (Degenhardt *et al.*, 2019).

2.11 Healthcare System related factors to opioid overuse

Among the most ordinary health system-related challenges associated with opioid analgesic overuse are lack of guidelines and regulations for assessing and managing pain, minimal or no enforcement of the guidelines where there are present, prioritizing other health burdens such as COVID-19, absence of accountability for poor pain management, and minimal monitoring and evaluation targeted at quality improvement (Zewdu Gelaye Wondimagegn, 2021). In cases of averting opioid use disorders or dependence caused by opioids, challenges faced include low coverage of interventions and suboptimal quality of treatment. Where these interventions have been implemented, they favored a decline in supply of the opioids over decrease in their demand. Degenhardt *et al.*, (2019) suggests scaling up policy changes that make the prevention of harms related to opioid-use a priority. The policy frameworks ought to adopt approaches at the population level, based on public health.

In the private sector, surplus funds may fuel increased purchase of opioid analgesics which may promote their overuse. The same goes for biased reimbursement policies, for example where pain medicines from other classes besides opioids such as NSAIDs may incur shortfalls on medical aid yet opioids may be paid in full, this can result in overprescribing

of these opioids in response to patient requests for minimal treatment cost options, as is the case of Naproxen versus Tramadol tablets.

2.12 Other causes of opiate analgesics overuse

Different pharmaceutical marketing strategies exist from country to country, where opioids may not be “truthfully” marketed or is associated with cohesion for use by way of incentivizing prescribers, and may have a bearing on analgesic preferences by healthcare workers (Hider-Mlynarz et al., 2018). Supply of opioids can be achieved through minimized prescribing or improved use of misuse-deterrent formulations; however these efforts can be nullified by unintentional, short-term negative consequences (Jalali *et al.*, 2020). Little average medicine dispensing time, i.e. time spent by a patient from the time they enter the pharmacy and are issued out their medicine, may not be sufficient for the patient to fully understand how they ought to take their opioid analgesics, which may increase chances of extra medical use of the opioids.

To some extent, significant movements employed to improve morphine availability in various African countries in recent years may have caused undue use by users. For example, morphine therapy in Uganda, for patients suffering from cancer and HIV/AIDS has been allowed free of charge and healthcare professionals permitted to prescribe opioids within their clinical practices (Manjiani *et al.*, 2014). Namisango *et al.*, (2018) highlight that Sub-Saharan African (SSA) countries still find it difficult to strike a balance between effective medicine control and aiding their availability for managing pain clinically as a result.

2.13 Pharmacovigilance

Pharmacovigilance is distinctly described by the World Health Organization (WHO) as ‘the science and undertakings involving the detection, assessment, understanding and avoidance of adverse effects or other drug-related problem that may present; and it serves to ensure that both healthcare workers and the patient, are well informed to make decisions when choosing medicines for treatment. Its other critical role is making sure that there is continual safety of marketed medicines, including generic medicines, in order to minimize harm to patients by evaluating and monitoring medicine safety (Jeetu & Anusha, 2010).

By determining the environmental burden of medicines used in large populations, detecting medicine interactions and probably comparing safety profiles of similar medicines, pharmacotherapy can effectively be monitored, especially via surveillance systems.

Furthermore, the safety profile of medicines is said to be directly linked with socio-political, economic and cultural factors in any region, which in turn impacts access to medicines, their consumption patterns and their public perceptions. Thus findings related to pharmacovigilance studies can inform on rational use of medicines from the national governments, the pharmaceutical industry, professional bodies and other significant stakeholders in policy formulation and amendments.

The scope of pharmacovigilance is seemingly broadening as the array of medicinal products develops. The broader safety concerns now address more than the monitoring, detection and assessment of adverse medicine reactions occurring under defined conditions and within specific dosages. It is thoroughly linked to the patterns of drug use

within societies. Complications resulting from irrational use of medicines, overdoses and polypharmacy, growing use of traditional and herbal medicines with other medicines, counterfeit medicines, extra medical sale of medicines over the Internet thus increasing self-medication practices, medication errors and lack of efficacy are all within the domain of pharmacovigilance (Jeetu & Anusha, 2010).

The impact of pharmacovigilance should be increased accountability, which must lead to more research in improving public perception of medicines. Health practitioners and patients themselves must be empowered with useful information that improves personal therapy and supports the diagnosis and treatment of medicine-induced disease, including minimizing iatrogenic diseases.

2.14 Summary

The association of the prescriber, the patient, and the socio-economic ills creating an increased burden on prescription opioid abuse need to be reviewed. Prior to introduction of the pain management medication to the patient, subsequent education of the side effects of the opioids needs to be addressed in order to manage possible future dependence of the patient to the opioids. Beside prescription opioids, information of drugs and their effects are at the disposal of the public, and in as much as health facilities practice pharmacovigilance there are loopholes in the system which results in some individuals procuring opioids illegally leading to the downwards spiral into addiction. In this chapter, literature was presented in order to highlight the significance of the theoretical framework to the study in question.

CHAPTER 3 METHODOLOGY

3.0 Introduction

The chapter outlines how the study was conducted, and includes the procedure that was performed to enroll the study participants, the resources that were required to conduct the study, type of tools that were used to collect data, and how the data analysis was conducted.

3.1 Research Philosophy

The researcher assumed and believed that there were differences between patients who over-used opiate analgesics and those that did not. These differences could be quantified, and analyzed. The positivism research philosophy was therefore chosen and used. This research philosophy allowed for the measurement, and quantification of the differences between the patients who over-used opiate analgesics, and those that did not.

3.2 The Research Design

An analytic cross-sectional study was conducted. Prescriptions for any patient who had been prescribed opiate analgesics more than twice in Bulawayo for the period 01 July 2020, to 30 June 2021 were classified as eligible for over-use of opiate analgesics. Prescriptions for any patient who had been prescribed opiate analgesics for not more than twice in Bulawayo for the period 01 July 2020, to 30 June 2021 were classified as not having over-used opiate analgesics. Given the time and financial resource limitations to conduct the study, an analytical cross-sectional study design was the most appropriate design. The analytical part of the cross-sectional study aimed to answer the research question on what factors were associated with the over-use of opiate analgesics. The descriptive part of the study aimed to answer the research question on the pain burden of

patients on opioids in Bulawayo, and the research question on the prescription patterns of opiate analgesics by the clinicians in Bulawayo.

3.2 Study Setting

The study was conducted in Bulawayo city which is the second capital city of Zimbabwe. The city is located in the Southwestern part of the country and is approximately 440 kilometers from Harare the capital city of Zimbabwe. Bulawayo has 7 hospitals, 18 council clinics, 60 private surgeries, and 70 private pharmacies.



Figure 3: Study site

3.3 Study Population and Sampling

The study population were patients who presented with pain on consultation, clinicians in Bulawayo, and opioid prescriptions submitted to pharmacies in Bulawayo.

3.3.1 Target population

The target population were residents of Bulawayo city. Bulawayo has a population of 700 466 according to the ZIMSTAT 2021 population estimates.

3.3.2 Inclusion criteria

- All patients in Bulawayo city, aged 18 years and above, who presented with pain on consultation, from 01 July 2020, to 30 June 2021.
- All prescriptions of opiate analgesics received from 01 July 2020 to 30 June 2021.
- All clinicians in Bulawayo City.

3.3.3 Exclusion criteria

- Prescriptions of patients with acute diseases prescribed with opiate analgesics
- Prescriptions of chronic malignant pain patients prescribed with opiate analgesics.
- Clinicians not willing to participate.
- All patients in Bulawayo city, aged below 18 years, who presented with pain on consultation, from 01 July 2020, to 30 June 2021.
- Patients who presented with pain on consultation but with any form of incapacitation (physical, mental or psychological) impairing their full capacitation in the study.

3.3.4 Sample Size and Sampling Procedure

3.3.4.1 Sample Size

Using Dobson`s formula:

$$n = \frac{Z^2_{\alpha/2} N p (1-p)}{d^2(N-1) + Z^2_{\alpha/2} p(1-p)^2}$$

Where N=67,

p=0.108, where p is the prevalence of inappropriate prescriptions in a study conducted by (Fadare, Agboola, Opeke, & Alabi, 2013) in Nigeria.

Delta= margin of error =0.10,

A total of 10.8% of the patients had analgesics inappropriately prescribed. The calculated sample size was 25 health facilities.

Pharmacies

Using Dobson`s formula:

$$n = \frac{Z^2_{\alpha/2} N p (1-p)}{d^2(N-1) + Z^2_{\alpha/2} p(1-p)^2}$$

Where N=77,

Z = 1.96 is the z score corresponding to 95% CI

p=0.108, where p is the prevalence of inappropriate prescriptions in a study conducted by Fadare et.al, (2013) in Nigeria and delta= margin of error = 0.10,

A total of 10.8% of the patients had analgesics inappropriately prescribed. The calculated minimum sample size was 26 pharmacies.

Prescriptions of patients prescribed opiates

Using Dobson`s formula:

$$n = \frac{Z_{\alpha/2}^2 p (1-p)}{d^2}$$

Where N=20 319,

$Z_{\alpha}=1.96$, z score corresponding to 95% CI,

$p=0.69$ ((Harker et al., 2020) in a study on opioid abuse in South Africa),

$d= 0.10$, margin of error

confidence interval 95%,

non-response rate of 10%.

Where $p= 0.181$, was the proportion of patients who were admitted with opioid abuse.

A minimum sample size of 83 prescriptions was used.

Health workers

Using Dobson`s formula: $n=Z_{\alpha}^2 \times p (1-p)/d^2$,

where $Z_{\alpha}=1.96$, z score corresponding to 95% CI,

$p=0.69$ (proportion of health workers who correctly responded to questions on opioids in a study on opioids for chronic pain by Pearson et.al, 2015),

$d = 0.10$, margin of error

confidence interval = 95%,

non-response rate of 5%. Where $p=69\%$,

A sample size of 86 health workers was used.

Patients presenting with pain on consultation

Using Dobson`s formula: $n=Z_{\alpha}^2 \times p (1-p)/d^2$,

where $Z_{\alpha}=1.96$, z score corresponding to 95% CI,

$p=0.3$ (estimated prevalence of pain in the study population in a study in Brazil by Pereira, 2014),

$d = 0.10$, margin of error

confidence interval = 95%,

$N= 429\,946$ (population of adults above 15 years of age in Bulawayo City

Attrition rate of 10%. Where $p=30\%$

A sample size of 548 patients was used.

3.3.4.2 Sampling Procedure

Health facilities (Hospitals, surgeries and council clinics)

Seven hospitals were purposively sampled. A total of 18 surgeries and council clinics were systematically sampled from the list of surgeries and council clinics in Bulawayo. The list of surgeries and council clinics in Bulawayo was obtained from the Bulawayo City Council (BCC) registry and participating health facilities were selected according to a random starting point however with a fixed, periodic interval. The periodic or sampling interval was found by dividing the population size by the desired sample size.

Pharmacies

All the pharmacies at the seven hospitals were purposively sampled. A total of 19 private pharmacies were systematically sampled from the list of pharmacies in Bulawayo. Here too, the list of retail pharmacies in Bulawayo was obtained from the Medicines Control Authority of Zimbabwe (MCAZ) registry and participating retail pharmacies were selected according to a random starting point however with a fixed, periodic interval. The periodic or sampling interval was found by dividing the population size by the desired sample size.

Prescriptions of patients prescribed opiates

A total of four prescriptions containing opiate analgesics for each of the seven hospitals were conveniently sampled. Sampling was done at the pharmacies where the patients received the medicines. A total of three opioid prescriptions were conveniently sampled from each of the 19 retail pharmacies. The transaction history of opioid medicines was retrieved from the respective dispensing systems and divided into three groups according to the months in which they were dispensed, each group comprised of four consecutive months. Prescriptions belonging to one patient appearing in more than one of the three groups were then fished out per individual pharmacy to make up the study sample. The same was done for opioid prescriptions at hospitals; the only difference was that in the case of hospitals prescriptions were divided per each quarter of the year since four prescriptions were required from each hospital.

Health workers

Health workers were randomly sampled from the medical ward, surgical ward, maternity ward, and the out-patients department for each of the seven hospitals. All workers at each health facility had an equal chance of being selected to participate in the study. A list of all the health workers from each institution was obtained from the human resources department and each one of their names was attached with sequential numbers and a sample of 5 workers was drawn from each hospital using a random number generator. The same was done at surgeries and/or council clinics, 2 health workers, including a medical doctor, and a nurse were chosen from each of the 18 health facilities.

Patients presenting with pain on consultation

Patients presenting with pain on consultation were purposively sampled at the health facilities. A random starting point was selected then preceding participants were selected after a fixed, periodic interval which was established by dividing the population size by the desired sample size. An average of 22 patients per health facility were interviewed.

3.4 Data Collection Instruments

3.4.1 Questionnaire

Interviewer-administered questionnaires were used to collect data from the patients who presented with pain on consultation from 01 July 2020 to 30 June 2021 in Bulawayo city, and the clinicians in Bulawayo city. The questionnaire for the patients was used to capture data on the socio-demographic characteristics of the patients, as well as description of the severity of the pain they experienced. The questionnaire for the clinicians captured their demographic characteristics as well as their knowledge on the rationale prescription of opiate analgesics. A tool was used to assess the opiates prescription patterns in Bulawayo city.

3.5 Pilot Study

Data collection tools were pretested at one health facility in the province that was not part of the study sites, at Ekusileni Hospital. This was done to assess the validity of the tools, the time required to administer the questionnaires, the willingness of respondents to answer questions and relevance of the answers, and subsequently making amendments where necessary before the study participants could be interviewed.

3.6 Data Collection Procedure

3.6.1 Questionnaire

Face-to-face interviews were conducted using the questionnaires. The data collection was done in private and at the most convenient place for the study participants. All COVID-19 prevention protocols were adhered to during the data collection exercise.

3.7 Analysis and Organization of Data

3.7.1 Quantitative data

Data was analyzed using Microsoft Excel and SPSS version 23. The statistical software was used to generate medians, frequencies, proportions, and to perform bivariate, and multivariate logistic regression to determine the independent factors associated with opiate over-use in Bulawayo. Prevalence Odds Ratios were the measures of association calculated, at a statistical significance level of $p < 0.05$, and a 95% confidence interval. Multivariate descriptive analysis using principal component analysis was done to determine the pain burden in patients.

3.8 Ethical Consideration

Permission to conduct the study was sought and obtained from the heads of all health facilities from which data for the study was obtained, including Bulawayo City Director for Health Services, Mpilo Central Hospital and United Bulawayo Hospital Chief Executive Officers. The research proposal was similarly presented to the Africa University Research Ethics Committee (AUREC) for approval and permission was granted (Approval Number: 2342/22).

Written informed consent was obtained from each study participant before recruitment into the study. The researcher read out the details of the consent form to the potential participant in a bid to make the participant aware of the aim of the study. The researcher only obtained consent after the participant understood the study procedures. The participant's preferred language was used for clear understanding thus the consent form was available in both English and local languages.

3.9 Summary

An analytical cross-sectional study was conducted in Bulawayo city among patients who presented with pain on consultation, clinicians, and opioid prescriptions submitted to pharmacies. Data was collected between January and February 2022 using interviewer administered questionnaires and a tool to assess prescribing patterns by clinicians. Ethical approval was obtained from the heads of all health facilities from where the data was obtained and Africa University Research Ethics Committee (AUREC).

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the results and interpretation of opiate analgesics over-use in Bulawayo. Additionally, it presents views of 365 patients presenting with pain on consultation and 61 clinicians, which were randomly selected from health facilities in Bulawayo in the cross-sectional study. Frequency tables were used to present demographic characteristics and other responses from the study participants. Microsoft Excel and SPSS version 23 was used to analyse data collected from the respondents.

4.2 Data Presentation and Analysis

4.2.1 Response rate for patients

The response rate shows that 365 (62.93%) of the targeted sample size participated in this research and thus making an appropriate response rate.

Table 1: Response rate for patients

Response Categories N=580	Frequency	Percentage
Responded Successfully	365	62.9
Unusable Responses (not fully completed or contains multiple errors or multiple answers)	23	4.0
Did Not Respond	192	33.1

4.2.2 Socio-demographic characteristics of patients who presented with pain on consultation

A total of 365 respondents participated in the study, 243(66.7%) respondents were female and 122 (33.3%) respondents were male. African participants were 347 (95.2%) accounting for the majority of the respondents. The majority population of the respondents

resided in medium density suburbs, being accounted for by 174 (47.6%) participants. Patient respondents who were formally employed were 293 (81%), also accounting for the majority of the participants. The results furthermore showed that only 18 (4.8%) participants smoked cigarettes and 139 (38.1%) drank alcohol as shown in Table 1 below. The mean age of participants was 37.9 (SD± 11.1).

Table 1: Socio-demographic characteristics of patients presenting with pain on consultation

Characteristic	Category	n	%
Age	Average	37.86 (SD±11.1)	
Sex	Female	243	66,7
	Male	122	33,3
Race	African	347	95,2
	Caucasian	18	4,8
Area of residence	High density	104	28,6
	Medium density	174	47,6
	Low density	87	23,8
Marital status	Single	122	33,3
	Married	225	61,9
	Separated	18	4,8
Highest level of education	Secondary	122	33,3
	Tertiary	243	66,7
Employment status	Not employed	18	4,8
	Self-employed	18	4,8
	Formally employed	293	80,8
	Student	18	4,8
	Other, specify	18	4,8
Religion of Respondents	Apostolic	35	9,5
	Pentecostal	208	57,2
	Orthodox	122	33,3
Smoke cigarettes	Yes	18	4,8
	No	347	95,2
Drink alcohol	Yes	139	38,1
	No	226	61,9
Average monthly income	0-100 USD	18	4,8
	100-200 USD	104	28,6
	200-500 USD	139	38,1
	500-1000 USD	35	9,5
	Over 1000 USD	69	19

4.2.3 Brief Pain Inventory Short Form

The results in Figure 3 show that 277 (76%) respondents had experienced similar pain before, like back pain, knee pains, and stomach aches.

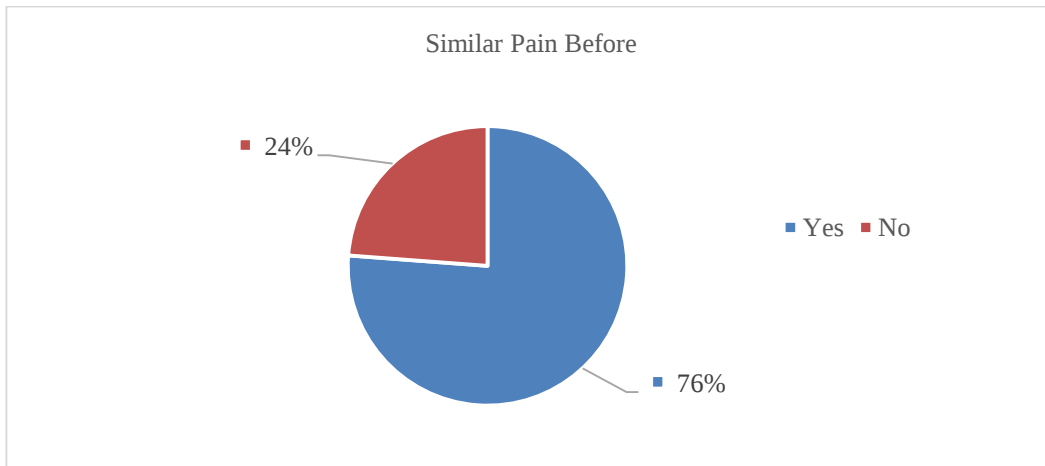


Figure 4: Experience of similar pain before

The results shown in Figure 4 below indicate that 139 (38.1%) respondents felt pain in Torso Back; 104 (28.6%) in Torso Front, followed by 69 (19%) who reported pain in front leg. However, 87 (23.8%) respondents didn't mark any body part in pain.

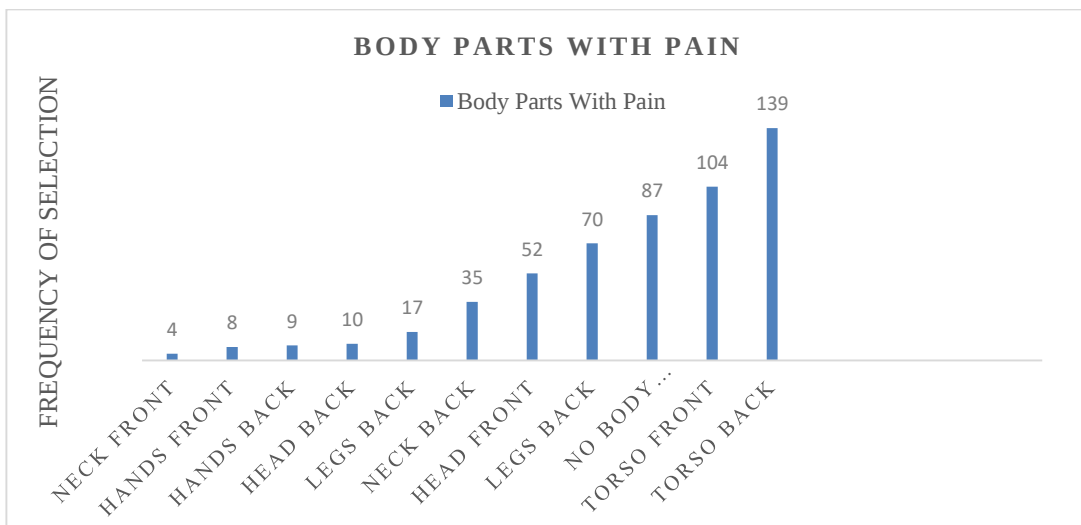


Figure 5: Body area that hurts the most

Figure 5 below shows combined pain levels as reported by respondents on a scale of 0 to 10. Results show that pain at its worst in the last 24hours was rated 4.10; pain at its least in the last 24 hours was rated 3.29; pain on the average was rated 3.62 and lastly the pain they were experiencing during the interview was rated 3.86.

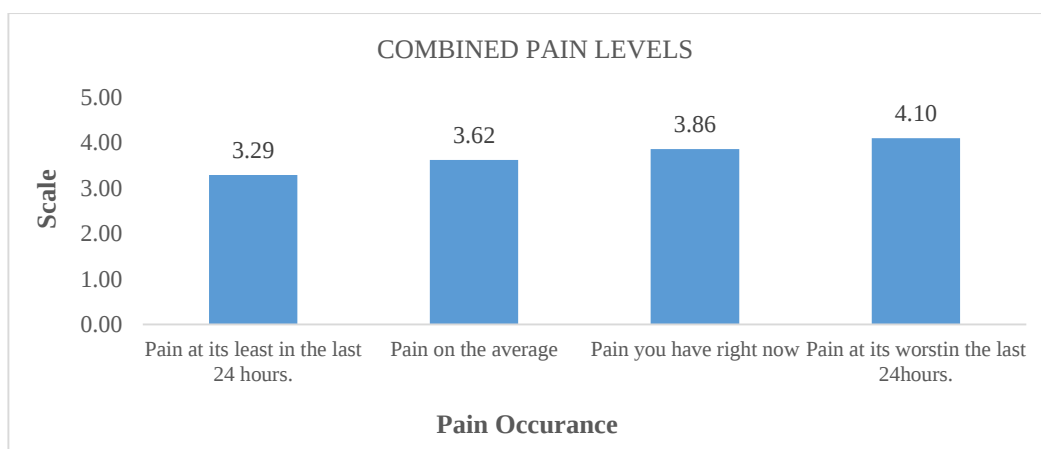


Figure 6: Combined Pain Levels

The following Table 2 shows medications received by the respondents for their pain management.

Table 2: Treatment or medication for pain

Treatment or Medication for pain	n	%
Tramadol capsules	56	15.4
Tramadol/ paracetamol tablets	32	8.5
Aceclofenac/paracetamol tablets	9	2.4
Prednisolone tablets	10	2.7
Diclofenac tablets	51	14
Co-codamol tablets	49	13.6
Besemax tablets	33	9
Goldgesic tablets	64	17.5
Stopayne tablets	34	9.5
Celecoxib capsules	6	1.7
Indomethacin capsules	9	2.4
Migril tablets	5	1.3
No medication	7	2

The results of the research in Table 2 above showed that the most common treatment for pain used by the patients for pain relief was Goldgesic tablets as reported by 64 (17.5%) participants, followed by Tramadol Capsules as reported by 56 (15.4%) participants, and Co-codamol tablets as reported by 49 (13.6%) participants. Use of Indomethacin Capsules and Aceclofenac/Paracetamol Tablets was reported by 9 (2.4%) participants. Only 7 (2%) participants reported that they did not use any medication to relieve pain during the study.

With respect to the amount of relief provided by the medication or treatment for pain taken by the patients in the past 24 hours, 106 (29%) respondents reported experiencing major relief from the medication they were taking for pain management and a similar proportion reported experiencing moderate relief. 102 (28%) respondents experienced minor relief from medication and those who experienced insignificant relief were 51 (14%) participants.

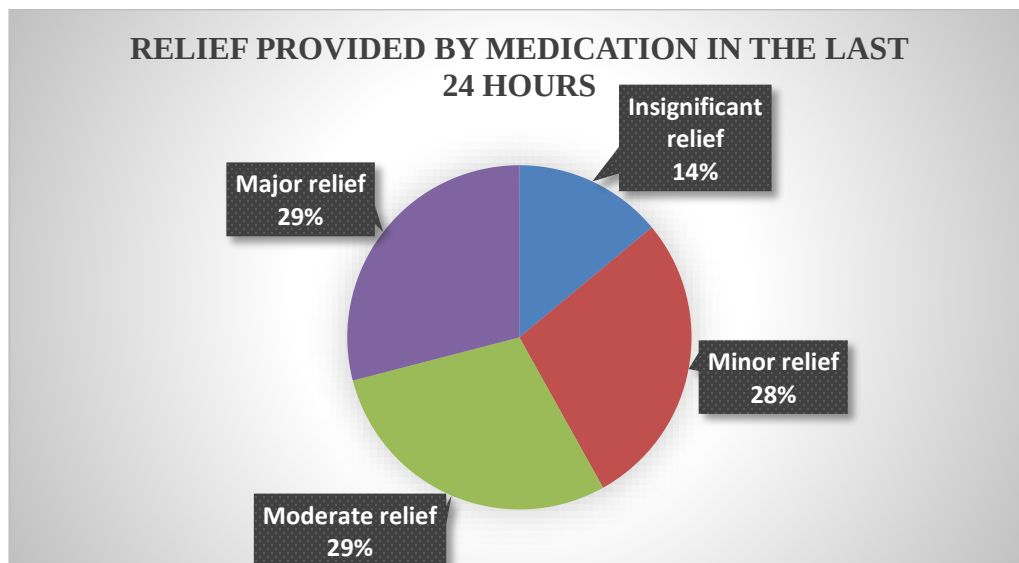


Figure 7: Relief provided by medication in the last 24hrs.

Lastly, the respondents were asked, on a scale of 0-10, how pain in the last 24 hours had interfered with their quality of life with respect to general mood, walking ability, relations

with other people, normal work, sleep, general activity and enjoyment of life. Results obtained show that “Enjoyment of life” was the most interfered with a score of 4.29, followed by the participants’ “General Activity” which scored 4.24. “General mood” was affected least, with a score of 2.14.

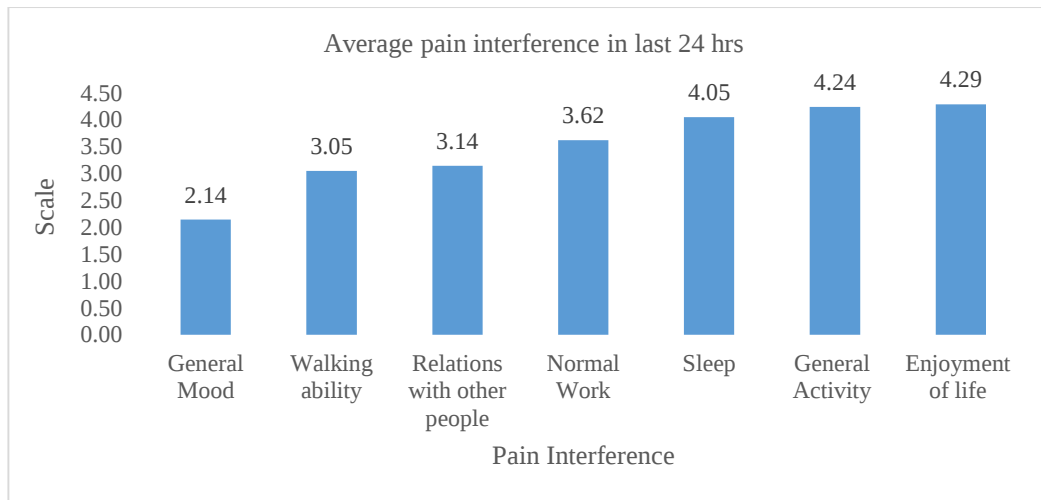


Figure 8: Average interference caused by pain in the last 24hours

Table 3: Correlation between average pain felt & pain interference

Interference of pain with quality of life	Average pain felt	
	Pearson Correlation	Sig. (2-tailed)
General Activity	.36	.10
General Mood	.00	1.00
Walking Ability	-.05	.82
Normal Work	.21	.36
Relations With Other People	-.38	.08
Sleep	.14	.53
Enjoyment of Life	.01	.98

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

With respect to the correlation between average pains felt and pain interference, the results of this research show that there is weak and non-significant correlation between the stated variables. These results are shown in Figure 8: Average interference caused by pain in the last 24hours

Table 3 above.

4.2.4 Pain prevalence in the study population

The lifetime prevalence of pain in this study was 66.7% (n = 365; 95% CI: 0.69 – 0.82), $p < 0.02$. There was 39%, (n = 365; 95% CI: 0.23 – 0.96), $p < 0.034$, point prevalence of pain reported by the study participants.

Table 5: Logistic regression model and factors associated with chronic pain

Variables	Adjusted RP	CI 95%	p value
Pain intensity	1.16	(1.11; 1.24)	0.02
Interference with daily life activities	1.3	(1.03; 1.28)	0.01
Constant	.140		0.000

4.2.4.1 Likelihood of opiate analgesic overuse as a result of pain burden

The researcher created a model to predict the likelihood of opiate analgesic overuse, our dependent variable, from various independent variables, namely enjoyment of life, average pain felt, walking ability, sleep, number of body parts with pain, relief on pain from medication, general activity, number of medications taken to relief pain, relations with other people, general mood and normal work, obtained from the brief pain inventory form using regression analysis.

Summary showed that R value (or the multiple correlation coefficient) was 0.782 and this indicated a good quality level of prediction of the dependent variable that is “Likelihood of opiate analgesic overuse”. The model summary also showed that the R Square (or the coefficient of determination) was 0.612 and was proportion of variance in the “Likelihood of opiate analgesic overuse” our dependent variable that could be explained by the independent variables (Table 4). This means that our independent variables explain 61.2% of the dependent variable “Likelihood of opiate analgesic overuse”.

Table 4: Summary Model - Predicting how well the model fits

Model	Change Statistics				Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
	R	R Square	Adjusted R Square							
1	.78 ^a	.61	.60		.27	.61	50.61	11	353	.00

a. Predictors: (Constant), Enjoyment of Life, Average Pain Felt, Walking Ability, Sleep, Number of Body Parts With Pain, Relief on Pain from Medication, General Activity, Number of Medication taken to Relief Pain, Relations With Other People, General Mood, Normal Work

4.2.4.2 Description and correlation of predictors of likelihood to overuse opiate analgesics.

Table 5 shows that the predictors with the highest mean was pain relief from medication recording 4.76 (3.19); followed by enjoyment of life recording 4.29 (3.35); followed by pain interference on general activity recording 4.24 (2.47); and pain interference on sleep 4.24 (2.66). Additionally, the results of the table show that interference of pain on sleep had a negative strong and significant correlation with “Likelihood of opiate analgesic overuse” by patients, with a correlation value of -0.55 (0.01). This means that as the pain interference on sleep of pain patients increases the “Likelihood of opiate analgesic overuse” decreases by a factor of 0.55. This means that most patients with pain who are having trouble to sleep are likely not going to overuse opiate analgesics. However, the number of pain relief medication used by patients had a positive and strong but non-significant correlation value of 0.54 (0.82). This means that as the number of pain relief medication used by patients to relieve pain, it follows that the “Likelihood of opiate analgesics overuse” by patients also increases by a factor of 0.54. Nevertheless, the majority of the independent variables selected to establish correlation with the likelihood of opiate analgesics overuse amongst patient participants had a weak and not statistically significant correlation ranging from -0.13 to 0.20

Table 5: Independent variables for predicting likelihood of opiate analgesics overuse

	Descriptive	Correlation
	Mean (Std. Deviation)	P-Val (Sig. Val)
Likelihood of opiate analgesic overuse	2.95 (1.47)	1
No. of Pained Body Parts	1.38 (0.67)	0.12 (0.04)*
Average Pain Felt	3.67 (2.79)	-0.04 (0.86)
No. Pain Relief Medication	1.48 (0.93)	0.54 (0.82)
Pain Relief from Medication	4.76 (3.19)	0.20 (0.38)
General Activity	4.24 (2.47)	-0.07 (0.78)
General Mood	2.29 (2.67)	0.39 (0.83)
Walking Ability	3.38 (2.82)	-0.09 (0.69)
Normal Work	3.76 (2.14)	-0.1 (0.68)
Relations With Others	3.29 (3.38)	-0.13 (0.58)
Sleep	4.24 (2.63)	-0.55 (0.01)*
Enjoyment of Life	4.29 (3.35)	0.17 (0.43)

*. Correlation is significant at the 0.05 level (2-tailed).

4.2.4.3. Predictors of the likelihood of opiate analgesics overuse from regression models

On bivariate analysis, number of pain relief medication; pain interference on walking ability; and pain interference on normal work were not statistically associated with likelihood of opiate analgesic overuse at ($p=0.82$), ($p=0.69$) and ($p=0.68$) respectively as shown in *Table 6*. Independent variables that were found to be statistically significant from the model were number of pained body parts at [OR:0.52(95% CI:0.33-0.83) $p<0.025$], average pain felt in the last 24 hours at [OR:1.14(95% CI:1.04-1.25) $p<0.05$], pain relief obtained from medication at [OR:0.92(95% CI:0.85-0.99)], pain interference on general activity at [OR:1.4(95% CI: 1.25-1.57) $p<0.05$], pain interference on mood at [OR:0.82(95% CI: 0.74-0.92) $p<0.05$], pain interference on relations with others at [OR: 1.12(95% CI: 1.04-1.2) $p<0.05$], pain interference on sleep at [OR: 1.87(95% CI: 1.61-2.17) $p<0.05$] and pain interference on enjoyment of life at [OR:0.91(95% CI: 0.84-0.99) $p=0.02$].

Table 6: Logistic regression outputs for predictors of the likelihood of opiate analgesics overuse

	B	S.E.	Wald	df	Sig.	Odds Ratio Exp(B)	95% C.I. for EXP(B) Lower Upper	
No. of Pained Body Parts	-.66	.24	7.64	1	.00	.52	.33	.83*
Average Pain Felt	.13	.05	8.23	1	.00	1.14	1.04	1.25*
No. Pain Relief Medication	-17.75	2513.88	.00	1	.99	.00	.00	.
Pain Relief from Medication	-.08	.04	4.33	1	.04	.92	.85	.99*
General Activity	.34	.06	31.95	1	.00	1.4	1.25	1.57*
General Mood	-.19	.06	12.23	1	.00	.82	.74	.92*
Walking Ability	.04	.05	.80	1	.37	1.04	.95	1.14
Normal Work	.02	.06	.09	1	.76	1.02	.91	1.14
Relations With Others	.11	.04	8.85	1	.00	1.12	1.04	1.20*
Sleep	.63	.08	67.48	1	.00	1.87	1.61	2.17*
Enjoyment of Life	-.09	.04	5.16	1	.02	.91	.84	.99*

OR= Odds Ratio; *significant

4.2.4.4 ANOVA Results

The results from the ANOVA test show that the independent variables statistically and significantly predict the patients' "Likelihood of opiate analgesic overuse" of the model, with $F(11, 35) = 50.61$, $p < 0.0005$ meaning the regression model was a good fit for the data.

Table 7: ANOVA - Statistical significance of the model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	40.23	11	3.65	50.61	.00 ^b
Residual	25.51	353	.07		
Total	65.73	364			

4.2.4.5 Multivariate logistics regression of likelihood to overuse opiate analgesics

The research results from multivariate logistics regression in Table 8 showed that all independent variables were statistically significant except for "Normal Work" ($\text{sig} = 0.15$). The four most significant independent variable predictors in the model were: pain interference on sleep at $[\text{OR}: 0.07(95\% \text{ CI}: 0.06-0.08)p < 0.005]$; pain interference

with general activity at [OR: 0.06(95% CI:0.05-0.08)p<0.005]; pain interference on relations with others at [OR: 0.03(95% CI: 0.02-0.04)p<0.005]; and average pain felt at [OR: 0.03(95% CI: 0.01-0.04)p<0.05].

Table 8: Multivariate logistic regression model of likelihood to overuse opiate analgesics.

Coefficients for Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	95%CI for B	
	B	Std. Error	Beta	t		Lower Bound	Upper Bound
(Constant)	1.60	.08		19.40	.00	1.44	1.77
No. of Pained Body Parts	-.29	.03	-.442	-8.54	.00	-.35	-.22*
Average Pain Felt	.03	.01	.171	3.92	.00	.01	.04*
No. Pain Relief Medication	-.13	.02	-.267	-5.15	.00	-.17	-.08*
Pain Relief from Medication	-.04	.00	-.257	-6.33	.00	-.05	-.02*
General Activity	.06	.01	.359	7.92	.00	.05	.08*
General Mood	-.05	.01	-.275	-5.04	.00	-.06	-.03*
Walking Ability	-.04	.01	-.227	-3.51	.00	-.06	-.02*
Normal Work	-.02	.01	-.101	-1.44	.15	-.05	2.00
Relations With Others	.03	.01	.206	4.32	.00	.02	.04*
Sleep	.07	.01	.429	11.75	.00	.06	.08*
Enjoyment of Life	-.02	.01	-.123	-2.91	.00	-.03	-.01*

*statistically significant

The estimated model coefficients shows that the equation to predict "Likelihood of opiate analgesic overuse" in patients from the independent variables was:

Likelihood of opiate analgesic overuse= 1.60- .29(Pained body parts) + 0.03(Average pain felt) - 0.13(Number of pain relief medication) - 0.04 (Pain relief from medication) + 0.06(pain interference on general activity) - 0.05(pain interference on general mood) - 0.04(pain interference on walking ability) –0.02(pain interference on normal work) +

0.03(pain interference on relations with others) + 0. 07(pain interference on sleep) - 0.02(pain interference on enjoyment of life)

4.2.5 Assessment of knowledge and perceptions of clinicians on opiate analgesics

4.2.5.1 Response Rate Health Care Givers or clinicians

The response rate in Table 9 shows that 61(70.9%) out of 86 clinicians participated in this research, thus making an appropriate response rate.

Table 9: Response rate for clinicians

Response Categories N=86	n	%
Responded Successfully	61	70.9
Unusable Responses	4	4.7
Did Not Respond	21	24.4

4.2.5.2 Demographics characteristics for clinicians

The socio-demographic information of the clinicians who participated in this research showed that the average age of the respondents was 37.27(SD±5.13) years; 33(54.5%) respondents were female; and 17 (27.3%) respondents were medical doctors. Of the respondents, 16(27.3%) had attained degrees as their highest level of education; and the majority of the respondents had working experience of more than 10 years after attaining their first medical qualification, owing to 33(54.5%) participants.

Table 10: Socio-demographic characteristics of clinicians

Characteristic	Category	Frequency n (%)
-----------------------	-----------------	----------------------------

Age	Average	37.27 (SD±5.13)	
Sex or Gender	Female	33	54.5
	Male	28	45.5
Race	African	61	100
Occupation	Nurse	44	72.7
	Medical doctor	17	27.3
Highest level of education	Diploma	28	45.5
	Post-grad diploma	11	18.2
	Degree	16	27.3
	Post-grad degree	6	9.1
Working Experience	<2 years	6	9.1
	2 – <5 years	16	27.3
	5 – <10 years	6	9.1
	≥10 years	33	54.5

4.2.5.3 Assessment of Perceptions and Knowledge about Opioids analgesics

The results from Table 14 below show that the average knowledge score of the clinicians with respect to perceptions and knowledge about opioid analgesics, was $(6.2727/12) * 100 = 52.3\%$. Lowest mark was $(4/12) * 100 = 33.3\%$ and the highest mark was $(8/12) * 100 = 66.7\%$. 36 (58.3%) clinicians passed the opioid analgesics test as they scored above 50% of the knowledge assessment.

Table 11: Assessment of clinicians' knowledge and perceptions on opiate analgesics

Characteristic	Category	Frequency	
		n	(%)
Trained in opiate analgesics use for pain management	Yes	33	54.5
	No	28	45.5
Principles of importance and safety when prescribing opiate analgesics			
Non-opioid treatment is recommended for chronic non-malignant pain	Yes	36	59
	No	25	41
The lowest effective dosage should be prescribed	Yes	55	90.2
	No	6	9.8
Always exercise caution when prescribing opioids and monitor all patients	Yes	61	100
	No		
Urine drug testing prior to opiate therapy	Yes	28	45.5
	No	22	36.4
	Don't know	11	18.1
Avoid concurrent use of Opiates with benzodiazepines	Yes	54	88.5
	No	7	11.5

No role of Aspirin & NSAIDS in metastasis management	Yes	17	27.3
	No	44	72.7
Patients with known substance abuse can get opiate analgesics	No	50	81.8
	Don't know	11	18.2
Most common opiate analgesic side effect	Constipation	55	90.2
	Other, specify	6	9.8
Ceiling dose for opioids	Yes	33	54.5
	No	22	36.4
	Don't know	6	9.1
Limiting long-term opioid use due to analgesic tolerance	Yes	33	54.5
	No	11	18.2
	Don't know	17	27.3
Discussion with patients on opiate analgesics use	Yes	61	100
Pressure from patients to prescribe opiates	Yes	44	72.7
	No	17	27.3
Factors associated with opiate analgesic overuse			
Inadequate training of healthcare workers	Yes	50	81.8
	No	11	18.2
Misperceptions by healthcare workers	Yes	55	90.2
	No	6	9.8
Doctor Shopping	Yes	44	72.7
	No	17	27.3
Pain burden	Yes	54	88.5
	No	7	11.5
Insufficient regulatory structure	Yes	28	45.9
	No	33	54.1
Third Party payers	Yes	10	16.4
	No	51	83.6
Availability of guidelines	Yes	54	88.5
	No	7	11.5
Final Score	Mean (Std. Deviation)	6.27 (1.56)	

Table 12: Descriptive Statistics

					Skewness		Kurtosis	
	Min	Max	Mean	Std. Deviation	Statistic	Error	Statistic	Std. Error
Knowledge Score	4.00	8.00	6.27	1.56	-0.36	0.66	-1.47	1.28

4.2.5.4. Analysis of clinicians' knowledge and perceptions on opiate analgesics, including factors deemed to cause over use of these medicines

The clinicians' knowledge and perceptions on opiate analgesics was considered suitable proxy for identifying factors influencing the overuse of opiate analgesics during the study. Thus, regression analysis was run to predict the factors influencing opiate analgesic using independent various variables drawn from the clinicians' knowledge and perceptions about opiate analgesics.

4.2.5.4.1 Descriptive statistics and correlation of clinicians' knowledge and perceptions and influence on overuse of opiate analgesics

The following is a list of descriptive statistics and correlation of various independent variable on clinicians' perceptions were proxy of factors influencing overuse of opiate analgesics.

Table 13: Descriptive statistics and correlation of clinicians' knowledge and perceptions and influence on overuse of opiate analgesics

	Descriptive Statistics		Correlation	
	Mean	Std. Dev	r-value	p-value
Factors influencing opiate analgesic overuse	1.27	0.47	1	
Inadequate training of clinicians	1.82	1.17	-0.08	0.81
Clinicians' misperception	1.73	0.79	-0.59	0.05
Doctor Shopping	1.09	0.30	-0.19	0.57
Pain Burden	1.73	0.47	0.38	0.24
Insufficient regulatory structure	1.73	0.47	0.38	0.24
Third Party payers	1.09	0.30	0.19	0.57
Availability of guidelines	1.55	0.67	0.11	0.74
Principles of importance and safety when prescribing opiate analgesics	1.73	0.90	0.43	0.19

*Correlation is significant at the 0.05 level (2-tailed).

The results of the research show that the mean (standard deviation) perception of clinicians' misperception was 1.73 (0.79). The correlation between clinicians' misperception and influence to overuse opiate analgesics had an r-value of -0.59 and a p-value of 0.05, showing that as "clinicians' misperception" increase, "influence to overuse opiate analgesics" decreases by a factor of 0.59. The mean (standard deviation) perception of "pain burden" was 1.73 (0.47). Likewise, the correlation between "pain burden" and "influence to overuse opiate analgesics" had a r-value of 0.38 and a p-value of 0.24, this implies that as "pain burden" increases the "influence to overuse opiate analgesics" increases by a factor of 0.38.

4.2.5.4.2 Bivariate analysis of clinicians' knowledge and perceptions on factors influencing opiate analgesic overuse

The researcher ran bivariate analysis in order to select independent variables which are significant and suitable for creating the clinicians' model that will be used to predict factors influencing opiate analgesic overuse as a proxy of knowledge and perceptions of clinicians. Knowledge on principles of importance and safety when prescribing opiate analgesics was the only statistically significant factor in that regard at [OR=3.21(95% CI: 1.59-6.48) $p < 0.05$].

Table 14: Bivariate analysis of clinicians' knowledge and perceptions on factors influencing opiate analgesic overuse

	B	S.E.	Wald	df	Sig.	Odds Ratio Exp(B)	95% C.I. for EXP(B) Lower Upper	
Inadequate training of clinicians	-.23	.26	.84	1	.36	.79	.48	1.31
Clinicians' misperception	-20.71	5351	.00	1	.99	.00	.00	.
Doctor Shopping	-20.45	17975	.00	1	.99	.00	.00	.
Pain Burden	20.80	10048	.00	1	.99	107698 3009	.00	.
Insufficient regulatory structure	20.80	10048	.00	1	.99	107698 3009	.00	.
Third Party payers	-20.48	16408	.00	1	.99	.00	.00	.
Availability of guidelines	.34	.41	.68	1	.41	1.41	.63	3.16
Principles of importance and safety when prescribing opiate analgesics	1.17	.36	10.52	1	.00	3.21	1.59	6.48

OR= Odds Ratio; *significant

4.2.5.4.3 Model summary R-value and r-squared

The R-value of the model was 0.87, indicating that the model was good quality for prediction of the dependent variable. R-Squared was 0.76 meaning that our independent variables explain 76% of our dependent variable i.e. factors influencing to overuse opiate analgesics. These results are shown in Table 17 below.

Table 15: Model Summary – Factors influencing overuse of opiate analgesics

Model	R	R Square	Adjusted R Square	Std. Error		Change Statistics			
				of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.87 ^a	.76	.73	.24	.76	24.24	7	53	.00

a. Predictors: (Constant), Inadequate training of healthcare workers, Misperception by HCW, Doctor Shopping, Pain burden, Insufficient regulatory structure, Third party payers, Availability of guidelines, Principles of importance and safety when prescribing opiate analgesics

4.2.5.4.4 ANOVA - Statistical Significance of the Model

The results from the ANOVA test show that the model's independent variables statistically and significantly predict the proxy of "knowledge and perceptions of clinicians" that is "influence to overuse opiate analgesics", with $F(7, 53) = 24.24$, $p < 0.0005$ meaning the regression model is a good fit for the data.

Table 16: ANOVA – Factors influencing overuse of opiate analgesics

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	9.67	7	1.38	24.24	.00 ^b
Residual	3.02	53	.06		
Total	12.69	60			

a. Predictors: (Constant), Inadequate training of healthcare workers, Misperception by clinicians, Doctor Shopping, Pain burden, Insufficient regulatory structure, Third party payers, Availability of guidelines, Principles of importance and safety when prescribing opiate analgesics

4.2.5.4.5 Multivariate logistic regression model of factors influencing opiate analgesics overuse

The research results from multivariate logistics regression in Table 19 showed that insufficient regulatory structure ($p=0.62$) and principles of importance and safety when prescribing opiate analgesics ($p=0.1$) were not statistically significant factors influencing opiate analgesic overuse. The two most statistically significant factors influencing opiate analgesic overuse were lack of availability and adherence to guidelines at [OR: 0.36(95% CI: 0.27-0.45) $p<0.05$] and inadequate training of clinicians at [OR: 0.12(95% CI: 0.04-0.19) $p<0.05$]. Other statistically significant factors were clinicians' misperception, pain burden and doctor shopping, all at ($p<0.05$).

Table 17: Multivariate logistic regression model of factors influencing opiate analgesics overuse

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	95,0% Confidence Interval for B	
	B	Std. Error	Beta	t		Lower Bound	Upper Bound
(Constant)	1.87	.25		7.38	.00	1.36	2.38
Inadequate training of clinicians	.12	.04	.29	3.17	.00	.04	.19*
Clinicians' misperception	-.51	.07	-.84	-7.31	.00	-.65	-.37*
Doctor Shopping	-.42	.15	-.25	-2.86	.00	-.71	-.13*
Pain Burden	-.19	.11	-.19	-1.75	.04	-.42	.03*
Insufficient regulatory structure	.07	.13	.04	.50	.62	-.20	.33
Principles of importance and safety when prescribing opiate analgesics	.11	.06	.15	1.69	.10	-.02	.22
Lack of availability and adherence to guidelines	.36	.05	.69	7.83	.000	.27	.45*

* statistically significant

The estimated model coefficients show that the equation independent variables in order to predict "factors influencing overuse of opiate analgesics" which is our proxy of the "knowledge and perceptions of clinicians" in patients was:

Factors influencing opiate analgesic overuse = $1.87 + 0.12(\text{inadequate training of clinicians}) - 0.51(\text{clinicians' misperceptions}) - 0.42(\text{doctor shopping}) - 0.19(\text{pain burden}) + 0.07(\text{insufficient regulatory structure}) + 0.11(\text{principles of importance and safety when prescribing opiate analgesics}) + 0.362(\text{availability of guidelines})$.

4.2.6 Opiate analgesics prescription patterns at health care facilities

The following section shows the research results conducted with respect to Opiate analgesics prescription patterns at Health Care Facilities. The results of the frequencies highlighted by the respondents are documented in Figure 7 and Table 20 which are presented below.

4.2.6.1 Response rate of health care facilities

The response rate shows that 20 (80%) of the targeted Sample Size of 25 Health Care facilities participated in this research.

Table 18: Response rate for health care facilities

Response Categories N=25	Frequency	Percentage
Responded Successfully	20	80.0%
Unusable Responses (not fully completed or contains multiple errors or multiple answers)	1	4.0%
Did Not Respond	4	16.0%

4.2.6.2 Frequency of prescriptions by category of prescriber

The frequency of prescriptions by category of prescriber shows that in 2020 doctors on average wrote 2.3 opioid prescriptions, whereas nurses on average wrote 1.2 opioid prescriptions. However, the frequency of prescriptions by category of prescriber shows that in 2021 doctors on average wrote 1.8 opioid prescriptions, whereas, nurses on average wrote 1.7 opioid prescriptions.

4.2.6.3 Frequency by type of opiate analgesic

The frequency by type of opiate shows that in 2020 codeine on average had 1.8 prescriptions, whereas morphine on average had 1.3 prescriptions. Whereas, the frequency by type of opiate shows that in 2021 codeine on average had 2 prescriptions, whereas morphine on average had 1.2 prescriptions.

4.2.6.4 Frequency by the number of days prescribed

In 2020, the typical length of prescriptions for opioids of <7days had an average of 1.8 prescriptions, whereas that of 7-14 days on average had 1.7 prescriptions. In 2021, prescriptions with typical length of < 7 days was approximately 1, whereas those

prescribed for 7-14 days were an average of 2.5 prescriptions. Tramadol and Morphine were opiate analgesics of choice during the study and nurses prescribed more opiates than doctors in 2021.

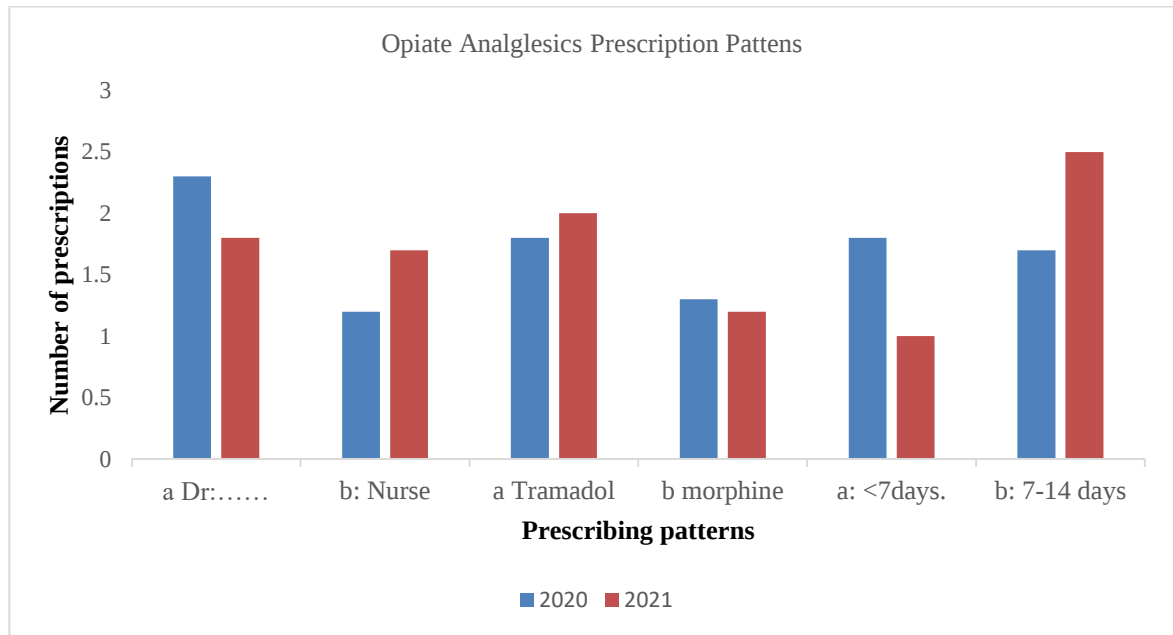


Figure 8: Opiate analgesics prescription patterns at health care centres

Summary

The results of this research show that likelihood to overuse opiate analgesics with regards to pain burden is dependent on the number of pained body parts, average pain felt, number of pain medication being taken by the patients, and pain interference on general activity; general mood; walking ability; sleep and enjoyment of life. Furthermore, factors influencing opiate analgesic overuse in the study were found to be clinicians' misperception; inadequate training of clinicians; doctor shopping; lack of availability and adherence to guidelines; and pain burden. With regards to prescribing patterns of opiate analgesics, nurses prescribed more opiate analgesics than doctors in 2021 compared to 2020 and the typical length of opiate analgesic prescriptions was more than 7 days in 2021.

These findings complement factors influencing opiate analgesic overuse, particularly inadequate training of clinicians as observed earlier.

CHAPTER 5 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The discussion, conclusions and recommendations chapter of this research will be used to showcase the researcher's closing remarks with respect to "Opiate Analgesics Over-Use In Bulawayo: A Root Causes Follow Up Pharmacovigilance Study 2020-2021". This chapter is based on the research results that were analysed and presented in this research's preceding chapter, also this chapter partially highlights the research problem, literature review, research methodology used and the limitations with respect to coming up with a sound conclusion and recommendations of this research.

5.2 Discussions

5.2.1 Patients Presenting with Pain on Consultation

The results of the research show that the majority of the patient respondents were female. This could be explained by the fact that females generally have better health seeking behaviours than males, they present with pain in more body areas compared with males and they have higher activity levels compared to males. Males should be encouraged to seek healthcare services early to avoid disease progression as the early stages of the disease may be characterized by pain. Awareness campaigns by way of social activities, such as marathons and other sports matches, can be held by various organizations in a bid to achieve this.

Respondents who reported to have felt similar pain before accounted for 76% of the participants, with most reports of pain felt in the torso back and the torso front. This could be a result of the formal nature of employment shown in the demographic characteristics of the patients associated with exposure to ergonomic hazards in their various working

conditions. Similar results were obtained by Blyth (2019) who reported that the burden from musculoskeletal pain were on the rise in low- and middle-income countries due to risk factors like population growth, aging, obesity, injury, and sedentary lifestyles.

The results of this research also showed that there was a low amount of relief of pain with respect to the relief provision brought about by the medication or treatment in the past 24hours. This could be due to a mismatch between the nature and severity of pain felt by the patients and the medication's dosage as pain classification may be difficult to express. Results from a study by Cole (2002) highlighted that the classification of pain was complicated and could be a source of misperception of treatment plans for most clinicians, which may contribute to ineffective dosages for alleviating pain in patients. Furthermore, in as much as opioids are well-known to be effective at treating various types of acute pain, they may not be as effective, like NSAIDS, at treating low back pain as ordinarily believed by clinicians and patients alike. Henceforth, related misconceptions may result in suboptimal relief from pain medication being taken.

The point prevalence of pain in this study was found to be 39%. Similar findings were reported by (Chiwaridzo, Charmaine, & Dambi, 2018) in their study titled 'Prevalence of low back pain in physiotherapy students in Zimbabwe' where they found pain burden to be 38.9%. Though this prevalence is relatively low, it can be compounded by delays in diagnosis or misdiagnoses and inappropriate or insufficient care for comorbidities. Pain brings about societal issues that spread beyond people and their suffering. Precisely, the opioid medicines that are effective for multiple people suffering from pain likewise are subject to misuse/abuse, and safeguarding their availability for those in need of them and refraining them from abusers requires multidisciplinary efforts at all levels.

The enigmatic nature of pain assessment was evidenced by an almost average rating of combined pain levels, with a highest score of 4.1. This subjectivity was reported in a study by Manjiani *et al.*, (2014), that it was difficult to know the level of pain the next person was experiencing, hence it should be highly assumed that pain is present when a patient says it is, at whatsoever intensity they say it is. Pain should be therefore treated adequately and holistically.

Patients' rating of the pain felt could be clouded by how the pain they felt interfered with their quality of life with respect to their daily activities. Results from this study show that enjoyment of life and general activity were most affected by the pain the participants were feeling. The average pain felt, general activity and lack of sleep were some of the significant causes of the likelihood to overuse opiate analgesics for pain management. It is logical to long for relief when more body parts are in pain and side effects of opiate analgesics such as sedation and mental fog may be desirable in wanting to address lack of sleep from the pain being felt.

Associated extramedical use of opiate analgesics can cumulatively add to the overuse of opiate analgesics as suggested by Degenhardt *et al.*, (2019) whose report highlighted that sleeplessness and inadequate sleep may be influential in raising drug use and addiction risks. Similar findings were also recorded by Fields (2011) who alleged that high prevalence of opioid drug overuse was attributed to the fact that opiates reduce anxiety; produce mild sedation and gives a palpable sense of well-being, often to the point of euphoria. Effectively treating pain may help reduce lost potential and productivity, resultant minimal, lost quality of life and addiction associated with opiate analgesic

overuse. Furthermore, non-pharmacological treatments for insomnia should be offered as first-line management for individuals in severe pain.

5.2.2 Clinicians' Knowledge and Perceptions on Opiate Analgesics Use

The assessment of clinicians showed that the knowledge and perceptions possessed by the respondents was moderate (52.3%), knowledge gaps existed with most of the respondents on principles of opiate analgesic use for management of chronic non-malignant pain as indicated by the scores obtained. This study's findings show that there is a need for supplementary education on opioid use in chronic pain treatment for clinicians in Bulawayo. Similar findings were reported in a study by Patel *et al.*, (2016) in Canada where mean knowledge score was 56.3%. Insufficient knowledge may result in exaggerated prescribing patterns of opiate analgesics where clinicians perceive wrongly the need for pain treatment with opioids, resulting in the overuse or misuse of opiate analgesics by pain patients which may be clinically hazardous to them.

Clinicians' perceptions served as proxy for influencers of opiate analgesic overuse. Those that were significantly associated with overuse of opiate analgesics from the study included doctor shopping, lack of availability and adherence to clinical guidelines of opioid prescribing and pain burden. Pressure put on clinicians by their patients to prescribe opioids for them even when they are not clinically indicated and/or for longer than recommended durations may be due to a need to relieve pain or sleep problems, avoiding withdrawal symptoms and extramedical use of the opioids. In order to minimize heeding to this ill, clinicians ought to learn more about the significance of pain prevention, means to prevent the shift from acute to prolonged pain, efficient and economical ways of treating

pain, and how to avert other physical and psychosomatic conditions allied with pain. That way they are able to advise the public on substance abuse prevention.

5.2.3 Opiate analgesics prescription patterns at health care facilities

The results of the research indicated an increase in the use of Tramadol in pain management by clinicians in the year 2021 and in the typical length of the opiate analgesics. This could be due to unavailability of treatment guidelines or minimal adherence by clinicians to them. Irrational prescribing is disreputable and may greatly reduce the standard of medication therapy, leading to extensive hazards, including greater incidence of adverse events and possible drug-drug interactions (Garg, Vishwakarma, Sharma, Nehra, & Saxena, 2014). This is bound to increase patient treatment cost and increase likelihood of addiction, especially with opiate analgesics. In contrast, results from a study by (Kiang, Humphreys, Cullen, & Basu, 2020) showed that typical length of prescriptions containing opioids was limited to 7 days only, in accordance with treatment guidelines for acute pain treatment with opiate analgesics.

Strategies aimed at ensuring adequate supply of current clinical guidelines and use of suitable and enforced regulation are needed to promote more rational use of opiate analgesics in the setting. Furthermore, promoting changes in prescriber behaviour, through passive electronic health system interventions and academic detailing, can help support the safe use and prescribing of opiate analgesics while conserving access to correct pain treatment. Findings from this study provide priority areas for clinicians, medicine regulators and policy makers to address in dwindling the opioid epidemic that is fast growing globally.

5.2.4 Summary

Pain commonly affects the quality of life of an individual, and opioids are prescribed to treat pain, however patients end up misusing opioids as they seek to alleviate both acute and chronic pain which may potentially lead to dependence. Observations of prescription sales of opioids have worryingly increased 3fold from 582 units to 1916 units in the last five years, hence prompting the current investigation in this research. Thus, the main purpose this study was to determine factors influencing the over-use of opioid analgesics in Bulawayo from 2020-2021. The researcher used quantitative research based methods to identify factors leading to patients opioid drug overuse, knowledge of clinicians with respect to opioid drug overuse, and also the opiate analgesics prescription patterns at health care facilities.

The major findings of this research is that pain felt or faced by patients and its effect on the quality of life of the patients influences one's likelihood to overuse opiate analgesics. The main unexpected results found in this research is that there is a high element of clinicians over prescribing opioid drugs mainly due to pressure from patients who present with different levels of pain and are seeking effective and efficient relief from pain. The main implication of the findings of this research on public health is that it has shown that the prescribed opioid drug may be actually insufficient to effectively and efficiently relieve pain from patients, thus resulting in people in pain to over dose opioid drugs so that they may relieve pain quicker and to satisfactory levels. Hence, there is need for a multisectoral approach to curb this opioid epidemic by looking for and implementing better ways to prevent and treat pain effectively without creating opioid addicts as a result of overdose or overuse of opiate analgesics.

The limitations of this research study were that the cross-sectional study did not allow for assessment of pain fluctuations over time. More so, the research only focused on opioid drug overuse amongst patients who presented their pain for consultations. Thus, the majority of people who might have been in pain and could not afford to seek consultations from clinicians were not included in this research and they may be at risk of opiate analgesic overuse. Therefore, the results of this research may not be a true representation of the actual predictors of the likelihood to overuse opiate analgesics. The results of this research will be shared with administration boards of all health facilities from which data was collected, those governing health professional bodies such as Zimbabwe Medical Association (ZIMA) and Zimbabwe Nurses Association (ZINA) and the directorate in the Ministry of Health and Child Care (MOHCC) for their adoption and dissemination of the findings to all clinicians and tailor-make interventional solutions in areas of need using some of the recommendations stated herein. The main aim of dissemination of these findings is that they will be used to seek new ways of reducing opioid drug overuse amongst patients

5.3 Conclusions

From this study's outcomes, it can be concluded that there is low pain burden among the study participants, though pain's interference on individuals' life activities such as sleep, general mood and activity, relations with others and enjoyment of life are likely to cause overuse of opiate analgesics by patients. Most favoured opiate analgesics by clinicians were Tramadol, Goldgesic and Morphine, and are widely available in the study setting.

Additionally, healthcare workers were moderately knowledgeable about opioid analgesics in the study and the typical length of opioid prescriptions for treatment of chronic non-

malignant pain exceeded the recommended 7 days according to clinical guidelines as most clinicians reported being pressured by their patients to prescribe opiate analgesics for them even when they were not clinically indicated.

Finally, perceptions of healthcare workers in the study identified inadequate training of clinicians, prescribers' misperceptions, doctor shopping and unavailability and failure to adhere to clinical guidelines as factors influencing opiate analgesics overuse in Bulawayo city.

5.5 Recommendations

With regards to this research, the researcher recommends in-depth training of all clinicians on associated benefits and risks of opioids and alternatives. Optimal utilization of risk-mitigation strategies to prevent addiction and overdose should be emphasized during the training sessions. The training platforms can be co-ordinated by respective facility administration boards and through continuous education co-ordinators of medical associations during presentations in their meetings. Continuous competency assessments would be of great help in identifying areas requiring attention the most in bridging knowledge gaps. Furthermore, curricula on appropriate use of opioids must be strengthened for all healthcare students, through respective Deans responsible for medical faculties at tertiary institutions.

Additionally, the researcher recommends availing current essential clinical guidelines, such as the EDLIZ, in adequate amounts to suffice all prescribing clinicians through the directorate in the Ministry of Health and Child Care (MOHCC), to promote and ensure safe and appropriate analgesic prescribing. Other recommendations for the highlighted office include conducting awareness campaigns to the public on proper use and disposal

of opiate analgesics, including overdose education. Educated persons are able to advocate for and consent to appropriate pain treatment, including use of opiate analgesics. Intensifying addiction treatment is another recommendation which the researcher believes can assist in containing opiate analgesic use, especially by investing in opioid addiction surveillance and rehabilitation, as well as educating healthcare workers in preventing, identifying and treating opioid addiction.

More so, the researcher recommends that presidents of health professional bodies, such as ZIMA and ZINA, ensure that prescribing guidelines are adhered to by clinicians by means of investigation high risk prescribers and dispensers and repelling lax and permissive treatment laws through prescription drug monitoring products. Improving use of integrated electronic health systems among facilities, through facility administration boards, can help to track and monitor opiate usage by patients so as to regulate prescribing and dispensing of these medicines, and in turn curb doctor shopping.

5.6 Suggestions for Further Study

The researcher recommends the following possible areas for further study:

- A longer prospective study on factors influencing opiate analgesic over use, involving more study sites, can be carried out nationally so as to enable generalizing study findings thereof
- A study to determine prevalence of opiate analgesic overuse in chronic non-malignant pain of and its associated factors can advise on the burden of the opioid epidemic locally and offer platforms for addiction treatment.

- A research can also be done to investigate the effectiveness and robust nature of medical training platforms and facilities with respect to the provision of opiate analgesics
- A research, can also be done to assess the advanced technology used to identify, track and manage patients who have opioid overdose challenges and how that can be integrated in current health systems

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APPENDICES

APPENDIX 1: Questionnaire for Patients Presenting with Pain on Consultation

Questionnaire number:

Section A: Socio-demographic factors

Question number	Question	Response	Instruction
1	Date of interview		/...../ DD/MM/Y Y
2	What is your age on your last birthday in years?		
3	Gender	☐ Female ☐ Male	
4	Check the race	☐ African ☐ Caucasian ☐ Asian ☐ Mixed race	
5	Which of the following is the appropriate classification for your place of residence?	☐ High density ☐ Medium density ☐ Low density	
6	What is your marital status?	☐ single ☐ Married ☐ Separated ☐ Divorced ☐ Widow ☐ Cohabiting ☐ Other ,Specify	
7	What is the highest level of education you attained?	☐ None ☐ Primary ☐ Secondary ☐ Tertiary	
8	What is your employment status?	☐ Not employed ☐ Self-employed ☐ Formally employed	

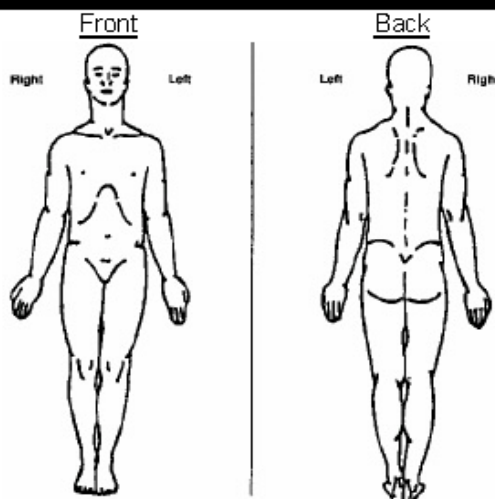
		☐ student ☐ Other, specify	
9	What is your religion	☐ Apostolic ☐ Pentecostal ☐ Orthodox ☐ Traditional ☐ Islam ☐ None ☐ Other, Specify	
9	Do you smoke cigarettes?	☐ Yes ☐ No	
10	Do you drink alcohol?	☐ Yes ☐ No	
11	What is your average monthly income?	☐ 0-100 USD ☐ 100-200 USD ☐ 200-500 USD ☐ 500-1000 USD ☐ Over 1000 USD	

Section B: Brief Pain Inventory Short Form

1. Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain today?

☐ Yes ☐ No

2. On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.



3. Please rate your pain by marking the box beside the number that best describes your pain at its **worst** in the last 24 hours.

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
No Pain Pain As Bad As You Can Imagine

4. Please rate your pain by marking the box beside the number that best describes your pain at its **least** in the last 24 hours.

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
No Pain Pain As Bad As You Can Imagine

5. Please rate your pain by marking the box beside the number that best describes your pain on the **average**.

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
No Pain Pain As Bad As You Can Imagine

6. Please rate your pain by marking the box beside the number that tells how much pain you have **right now**.

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
No Pain Pain As Bad As You Can Imagine

APPENDIX 2: Researcher questionnaire (Questionnaire for clinicians)

Questionnaire number:

Section A: Socio-demographic factors

Question number	Question	Response	Instruction
1	Date of interview		/...../..... DD/MM/YY
2	What is your age on your last birthday in years?		
3	Gender	☐ Female ☐ Male	
4	Check the race	☐ African ☐ Caucasian ☐ Asian ☐ Mixed race	
5	Occupation?	☐ Nurse ☐ Medical doctor	
6	What is your highest professional qualification?	☐ Diploma ☐ Post-graduate diploma ☐ Degree ☐ Post-graduate degree	
7	How long have you been working since you attained for first medical qualification?	☐ <2 years ☐ 2 – <5 years ☐ 5 – <10 years ☐ ≥10 years	

Section B: Perceptions and Knowledge about Opioids analgesics

Question number	Question	Response	Instruction
Knowledge assessment			
8	Have you ever received a specific training in pain management including opiate analgesics use?	☐ Yes ☐ No	
9	Which are the key principles of importance to improve patient care and safety when considering opiate analgesics use?	☐ Non-opioid and non-pharmacological therapy is preferred for chronic pain outside of active cancer, palliative and end of life care ☐ When opioids are used, the lowest effective dosage should be prescribed to reduce risks of opioid disorder and overdose ☐ Providers should always exercise caution when prescribing opioids and monitor all patients daily ☐ Don't know	
10	When prescribing opiates for chronic pain, clinicians should use urine drug testing before starting therapy	☐ Yes ☐ No ☐ Don't know	Required
11	Use of Opiates concurrently with benzodiazepines should be avoided whenever possible?	☐ Yes ☐ No ☐ Don't know	
12	Aspirin and other non-steroidal anti-inflammatory drugs have no role in the management of metastatic disease	☐ Yes ☐ No ☐ Don't know	

13	It is unlawful to prescribe opiates to a patient with known substance abuse	☐ Yes ☐ No ☐ Don't know	
14	Which is the most common opiate analgesic side effect	☐ Constipation ☐ Other, specify ☐ Don't know	
15	There is a ceiling dose for opioids?	☐ Yes ☐ No ☐ Don't know	
16	Analgesic tolerance limits long-term opioid use	☐ Yes ☐ No ☐ Don't know	
Perceptions			
17	Do you ever discuss with your patients the risks and benefits of opiate analgesics use?	☐ Yes ☐ No	
18	Do you sometimes feel pressurized by your patients to prescribe opiates when not clinically indicated?	☐ Yes ☐ No	
19	Which of the factors do you perceive to be associated with opiate analgesic overuse? a) Inadequate training of healthcare workers b) Misperceptions by healthcare workers c) Doctor Shopping d) Pain burden e) Insufficient regulatory structure f) Third Party payers	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes	

	e)Availability guidelines	of	☐ No	
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APPENDIX 3: Tool to assess the opiate analgesics prescription patterns

Name of health facility:

Date of assessment:

2020				2021			
Frequency of prescriptions with an opiate	Frequency of prescriptions by category of prescriber (Dr: a, Nurse: b	Frequency by type of opiate (a: codeine, b; morphine, etc.)	Frequency by the number of days prescribed (a: <7days, b: 7-14 days, etc.)	Frequency of prescriptions with an opiate	Frequency of prescriptions by category of prescriber (Dr: a, Nurse: b	Frequency by type of opiate (a: codeine, b; morphine, etc.)	Frequency by the number of days prescribed (a: <7days, b: 7-14 days, etc.)
	a b	a b	a b		a b	a b	a b

APPENDIX 4: Informed consent for the questionnaire

My name is Rumbidzai Mutsiwa, a final year MPH student at Africa University. I am carrying out a study on identifying root causes of opiate analgesics over-use in Bulawayo, Zimbabwe. Purpose of the study is identify the factors leading to opiate analgesics over-use and come up with recommendations which will be useful in mitigating against this public health problem. You were selected for the study as you are a patient who presented with pain during consultation, or you are a clinician in Bulawayo. Should you decide to participate you will take about twenty minutes to answer questions asked by the interviewer. The researcher will address the sensitive questions in a respectable manner and maintain the information obtained confidential. The participant is also free to divulge the information voluntarily. It is essential to note that there are no material benefits attached to the study. The participants will only get health benefits. All the information obtained would be kept confidential, no names or any other identification will appear on questionnaires. However coding of questionnaires will be done using serial numbers. Privacy will also be maintained. Participation in this study is on voluntary basis. Should the participant feel unable to participate, the action will not affect their relationship with the participant organization or any authority. If they chose to participate they are free to withdraw their consent and discontinue participation without penalty. Please feel free to ask any questions pertaining to the study. You may take as much time as necessary to make a decision. If you have decided to participate in this study kindly sign the form in the spaces provided below as an indication that you have read the information and have agreed to participate.

Name of Research Participant

Please print Date

Signature of Research Participant or

Legally authorized representative

If you have any queries, questions or concerns beyond those addressed by the researcher or anything to with the research, like your rights as a research participant. If you feel you have been treated unfairly, and would like to talk to someone other than the researcher feel free to contact, the Africa University Research Ethics Committee on telephone. (020) 60075 or 60026 extension 1156 or email aurec@africa.edu.

Name of researcher-----