Implication of Regulated Cannabis Legalisation on Wellbeing and Economic Growth

By

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ABSTRACT

This is a thesis on the cost benefit analysis of cannabis legalisation, public (mis)perception about cannabis usage and cannabis users, the medical application of cannabinoids and their commercial and industrial potential in the new global political economy. The study shows that, although there are misconceptions about cannabis, there is still much to unpack about its effects on human well-being. Drawing on both qualitative and quantitative cross-country dataset from Ghana and South Africa, the study employed a logit model to address the following questions: (a) What does society know about cannabis and its industrial and medical applications? (b) What is the evidence-based scientific claims of cannabis regarding human well-being? (c) What are the existing gaps between perception and knowledge? Among the contributions, this study clarifies the often-misunderstood position of cannabis in society and illuminates the blind side of the role of cannabis as an economic enabler in the post pandemic world. More importantly, while some schools of thought project cannabis as a gateway drug to the infernal realm, this study provides evidenced based on real-time practical experience from well-informed and educated users.

The study provides a model for regulated cannabis legalisation, a proper guide on value-added supply chain mechanism, and guiding principles to ensure the model functions properly, based on lessons and best practices from countries that have legalized cannabis, such as the Netherlands, Canada, Lesotho, Malawi, Zambia, South Africa, and Zimbabwe. This study further establishes empirical and theoretical foundations for the key thematic subjects of cannabis use, as well as a policy direction pertaining to its regulated legalisation, prohibition, or decriminalization in Ghana and South Africa.

Given the disconnect between knowledge and perception about cannabis, the study recommended knowledge enhancement and adequate advocacy on the pros and cons of cannabis for society to enhance understanding of the benefits and its side effects to provide evidence-based guidance on the medical application and industrial potentials.

Keywords: Cannabis; CBD; THC; Health; Industry; Economic Growth, migraine; cancer, anxiety, perception, Ghana, South Africa.
JEL Classification: H75, I18, K23; K42.

DECLARATION

I, **Emmanuel Quarshie** with student number 2245031, hereby declare that this research report is my work, except as shown in the references and acknowledgements. It is submitted in fulfilment of the requirements for the award of the Doctor of Philosophy at the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any degree or examination at this or any other university.

Emmanuel Quarshie

Signed on August 4, 2022

DEDICATION

To my Granny, Ms. Gladys Amaku Lawerh

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One looks back with appreciation to the brilliant teachers, but with gratitude to those who touched on our human feelings. As posited by Carl Jung, "the curriculum is so much necessary raw material, but warmth is the vital element for the growing plant and the soul of a child". During this PhD journey, I met great people to whom I owe a debt of gratitude and appreciation. They provided directions and highly cherished opinions on this thesis.

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

AfCFTA	African Continental Free Trade Area
AIDS	Acquired Immunodeficiency Syndrome
CBG	Cannabigerol
CBC	Cannabichromene
CBD	Cannabidiol
DEA	Drug Enforcement Administration
ECS	Endocannabinoid system
GDP	Gross Domestic Product
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
LSD	Lysergic acid diethylamide
NCC	Narcotic Control Commission
NGOs	Non-Governmental Organizations
PNDC	Provisional National Defence Council
PNDCL	Provisional National Defence Council Law
PPP	Private Public Partnership
PPPA	Private Public Partnership Agreement
PTSD	Post-Traumatic Stress Disorder
SIP	Social Information Perception
SMEs	Small, Medium Enterprises
THC	Tetrahydro cannabidiol

THCV	Tetrahydrocannabivarin
UN	United Nations
UNODC	United Nations Office of Drug Control

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The ongoing debate over the increasing use of cannabis has centered on public health, psychiatry, and social welfare research, with little focus on its economic implications. Despite being illegal in both the Global North and Global South, cannabis remains one of the most popular social drugs, with varying patterns of use for medicinal, industrial, and recreational purposes. Even among researchers who support or oppose the use and legalisation of cannabis, knowledge about the plant, its benefits, and its side effects have been clouded by prejudice and subjective views. Consequently, regardless of scientific advances, it is difficult to establish a firm model based on the actual therapeutic benefits of cannabis in any clinical experiment.

Even among medical practitioners in developing countries, little is known about cannabis use. Furthermore, those with sufficient plant knowledge are unlikely to educate the public about well-established caveats. Some plausible explanations include the negative social stigma attached to cannabis due to years of misinformation, deliberate fabrication, and outright propaganda by pharmaceutical, clothing, paper, pulp, and other industries that see cannabis as a threat to their bottom lines.

When cannabis is mentioned on any platform, it is frequently associated with social ills, further entrenching negative views without empirical evidence. Despite the abundance of literature on cannabis use, existing clinical studies on (dis) have proven that cannabis health risks are limited and fragmented. When all evidence is considered together, it is inconclusive. An overdose was recorded when the literature mentioned a substance's health risks (Josephson & Goode, 2014; Josephson & Goode, 1971; UNODC, 2017). Furthermore, studies that compared cannabis use

with other substances such as alcohol concluded that alcoholics are more prone to violence, with no significant evidence of cannabis use (Galanter, 1986; Humphreys & Torgerson, 1965; Wei et al., 2004). In rare cases where a positive relationship is observed, such cases reveal that these individuals combine cannabis with alcohol, implying that alcohol users are more likely to be violent (Windle, 1988). Similarly, despite the growing rumours and unverified claims, it is difficult to prove the psychoactive effects of cannabis.

As a result, establishing a firm stance on the real and potential effects of cannabis among countries that have legalized it, those that are about to legalize it, and anti-cannabis countries have reopened the research window for further inquiry on first, people's perceptions of cannabis and its use; second, the welfare implications of cannabis use for medicinal and industrial purposes; third, the comparative costs and benefits of zero, partial, and full legalisation; and fourth, the relationship between cannabis use and economic growth.

1.2 Problem Statement

Regulated cannabis legalisation for medicinal and industrial purposes has remained controversial for various reasons. While countries that have legalised cannabis have reservations about their health and social effects, countries considering legalisation continue to hold divergent views on the substance (Luginbuhl, 2001). Most countercultural human rights activities, such as the legalisation of same-sex marriage, rely heavily on perception. The legalisation of cannabis is a central issue and the subject of ongoing debate. In African nations, where legalisation is still in its infancy, perceptions are rooted in religion, culture, and unproven beliefs.

Most anti-cannabis viewpoints rely heavily on earlier studies that employed inefficient methods, which may have produced misleading results (Goode, 2009). For example, the cases in Harry J. Anslinger and others, who criminalised cannabis, used non-scientific approaches

and depicted racist symbolism. Harry J. Anslinger was the first commissioner of the Federal Bureau of Narcotics, which laid the groundwork for the modern-day DEA, and was the man behind the marijuana ban for all the wrong reasons[1]. This has led to the creation and enforcement of laws that have resulted in "wrongful convictions, incarceration, and deaths both within the United States of America and beyond its borders" (Daumichen, 2018). A plausible explanation for this is the persistent false social stigma associated with cannabis plants (Bottorff et al., 2013). This is rooted in the exaggeration of its 'perceived' negative effects and the corresponding downplaying of its positive benefits (Kalant, 2016). Critics have focused on the perceived negative effects of cannabis on mental health, psychoactive behaviour, and social services without a clear understanding of the significant positive role of regulated cannabis legalisation in the medical and industrial fields (Svrakic et al., 2012). Some studies vehemently refute the legalisation and medical use of cannabis based on subjective opinions that lack empirical justification or scientific evidence (Bottorff et al. 2013).

The actual effects of cannabis on the human mind and body can be investigated thoroughly. In both research and policy circles, a greater understanding of the effects of cannabis legalisation for medicinal and industrial purposes will help close the knowledge gap. This will enable scholars, policymakers, and key stakeholders to fully comprehend how to sustainably manage the legalisation of cannabis to minimise its negative effects and maximise its positive contributions to economic growth, sustainable development, and well-being. It is important to note that individual characteristics, psychological makeup, family upbringing, and social exposure vary greatly; thus, idiosyncratic cases of the effects of cannabis, which are typically abused, cannot be representative of its actual effects. Dealing with such causal relationships necessitates improved scientifically controlled experiments to measure each stage of pre-

[1] https://www.cbsnews.com/news/harry-anslinger-the-man-behind-the-marijuana-ban/ Accessed December 9, 2022

exposure changes in human behaviour. To date, there is insufficient evidence on the relationship between cannabis use and its effects on certain diseases, psychoactive activities, and social disorders.

In Jamaica and Costa Rica, where cannabis use is prevalent, studies have found no significant differences in physical abilities or abnormalities among users. In Jamaica, where a high risk of hypoxia was detected among smokers, cannabis users smoked tobacco. It is essential to recognise that some of these studies are plagued by methodological difficulties, such as small sample sizes, selection biases, and endogeneity issues (Rubin & Comitas, 1975; Finket al., 1976; Coggins, 1977). The 2012 World Health Organization report and the 2013 Mental Health Report confirmed that 25 percent of patients suffered from schizophrenia and schizotypal and delusional disorders, while only 9 percent were affected by psychoactive substances, with no further breakdown of which substances constitute psychoactive substances (Curley & Attwood, 2019; UNODC, 2017, 2018).

This is consistent with the findings of a study conducted on college students, which concluded that an individual's relationship with his or her parents, family background, and social values have a significant explanatory capacity for any motivational syndrome observed in patients, whereas cannabis use provides little evidence (Borgen, 1973; Mellinger et al., 1976; Miranne, 1979). It is therefore evident that the number of psychoactive effects associated with cannabis lacks empirical support, as it has become nearly impossible to distinguish between users and non-users in terms of behavioural changes (Magliozzi et al., 1983). Although the views of those opposed to the use of cannabis may have been amplified, evidence supporting this claim is lacking, particularly in African nations. Therefore, additional research into the perception, welfare implications, and role of cannabis in economic growth is required to dispel public

ignorance, provide answers to medicinal benefits, and provide governments with facts to consider for its regulated legalisation.

While the chunk of the attention about cannabis focuses on the negative side, it is noteworthy that the (un)known benefits cannot be overemphasized. The therapeutic potential and cancer chemotherapeutic benefits of this plant are not limited to effective treatments of tetanus, convulsive disorders, neuralgia, migraine, dysmenorrhoea, postpartum psychoses, senile insomnia, depression, gonorrhoea, and opium or chloral hydrate addiction. Individuals with terminal cancer can also be treated with cannabis (Grinspoon, 2001; Mikuriya, 1969).The high emphasis on the mental effects of cannabinoids, with little focus on their pharmacological benefits, may be attributed to the desire of pharmaceutical agents to flex their monopolistic muscles in the field (Cohe & Stillman, 1976; Lemberger,1980).

As a perfect substitute for cisplatin, which causes severe nausea and vomiting, cannabis has been used to treat patients undergoing chemotherapy. Out of a total of 20 patients, 14 reported definite antiemetic effects from the [2]Tetrahydrocannabinol (THC) with no one from the placebo on the 22 courses of the drug used (Sallan et al., 1975). While clinical experiments highlight the efficiency of THC, uncertainty about the future effects of proponents against cannabis has been magnified to ignore the benefits derived. Thus, exploring the welfare implications of cannabis use is imperative to gain firm ground in understanding the real effects.

While the governments of many African countries continually prohibit and criminalise cannabis, Africa provides the most conducive and economically viable environment for its cultivation. Despite the prohibitive laws, African countries continue to be among some of the

[2] Tetrahydrocannabinol (THC) is one of at least 113 cannabinoids identified in cannabis. THC is the principal psychoactive constituent of cannabis. With chemical name-trans-Δ^9-tetrahydrocannabinol, the term THC also refers to cannabinoid isomers.

top suppliers, as well as transit points for cannabis. The common assertion by individuals against legalisation that prohibition helps to reduce trafficking and use is flawed, given that data from countries such as Ghana are among the top countries in Africa where trafficking and use of this plant is high (Curley & Attwood, 2019). While the drug is illegal for recreational use according to PNDC Law 236, patients who need cannabis for medicinal use can acquire it with a licence. Critics highlight that the cost associated with the prohibition and criminalisation of cannabis is higher than its benefits, given that there is no association between cannabis use and psychoactive or deviant behaviours. In their study, Maier, Mannes, and Koppenhofer (2017) conclude that changes in the crime rate among different states have no relationship with (de)criminalization of cannabis.

Instead of maintaining the position to sentence individuals possessing cannabis for either recreational or industrial use, constructing a model of cannabis potential that will estimate parameters for scenarios where legalisation is at the embryonic stages and compare the results to zero, partial, and fully legalised regimes is essential. This approach will provide an in-depth understanding of the real implications (both negative and positive) of total legalisation against total prohibition and/or partial prohibition. In effect, a standalone three-policy option to assess the costs and benefits of cannabis or its absence is essential to rethink the debate at the policy level. Such information will not only affect the legal landscape of the plant, but also affect societal perceptions and attitudes towards cannabis and its use.

Even for relatively minor offences, such as possession and use of drugs, Ghana's cannabis laws are strict. Anyone found in possession of a narcotic substance is subject to ‘imprisonment for a term of not less than ten years,’ according to the Narcotic Drug Law of 1990[3]. Although it is considered a lesser offence, the use of a narcotic drug still carries a minimum five-year prison

[3] https://www.unodc.org/res/cld/document/gha/narcotic-drugs-control-law_html/ghana-narcotic_drugs_control_law_90.pdf Accessed December 8, 2022

term. However, Ghana has a high rate of cannabis use. The nation was listed as the top cannabis consumer in the world[4] in the 2014 United Nations report; however, two years later, it ranked third. Treating drug use and dependence as public health issues is one of the stated goals of Ghana's new drug law.

Under the new law, the punishment for drug possession for persons[5] has been changed from a prison sentence to a fine of 200–500 penalty units (equivalent to GHC 2,400–6,000). This does not imply that drug use has been legal, as some media outlets have claimed. As a result, they will provide alternatives to incarceration rather than putting individuals in prison for up to ten years for the simple act of possessing drugs for personal use. According to reports, during times of declining global cocoa prices, cannabis was a source of income for cocoa farmers. Cannabis and cocoa were reportedly interplanted with cocoa farmers (Akyeampong 2005; Bernstein 1999). According to a police investigation report from 2001, some Ghanaian farmers thought that growing cannabis was more profitable than growing maize (Salifu, 2001; Akyeampong, 2005).

Capitalising on the advantageous trade route to legalise cannabis, it has been estimated that both medicinal and recreational uses will earn a country, such as Ghana 326.4 million US dollars by 2023 (African Cannabis Report, 2019). Further enquiry to measure the tangible and intangible (direct and indirect) costs and benefits of legalising cannabis with regulation will serve as a platform for further dialogue by policymakers. Part of this study is devoted to a cost-benefit analysis of the legalisation of cannabis with regulation and how this can translate into tangible economic growth.

[4] https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Ghana-is-3rd-consumer-of-marijuana-globally-Report-451744 Accessed December 8, 2022
[5] https://idpc.net/blog/2020/04/parliament-of-ghana-passes-historic-new-drug-law-paving-the-way-for-a-west-african-approach Accessed December 8, 2022

1.3 Research questions

In assessing the key issues raised regarding the legalisation of cannabis for medicinal and industrial use, the following questions will serve as a guide for this project:

1. What is the comparative effect of the prohibition, decriminalisation, or regulated legalisation of cannabis in Ghana?
2. What are the implications of cannabis decriminalisation in South Africa?
3. How does the public perceive cannabis, its use, and its users in Ghana and South Africa?

The above research questions will be answered based on theoretical underpinnings, which will guide the type of dataset, structure, and content of the questionnaire to be administered. The legalisation of cannabis will be successful and regulated solely based on people's understanding and perception of the plant and its uses. Consequently, a multidimensional view of an individual's perception of cannabis is measured using personal, cultural, societal, and religious perspectives. Husserl's phenomenological framework, which measures lived experiences free of perception and bias (Husserl, 1970), was used to assess the subjective views of cannabis users. In effect, individuals will be provided evidence of the medicinal, recreational, and industrial benefits of cannabis. The questions asked in the first stage were repeated to account for any deviations in the perceived and actual effects of cannabis.

Husserl's framework will help the researcher to dispel the preconceived notions about cannabis, its effects, and its use in the transcendental world. Overall, the phenomenological approach to understanding the interaction between medical cannabis use and subjective well-being provides a better understanding of the essence of an individual's decision to use medical cannabis based on personal experience. This study used a case-based approach to describe an individual's experience with medical cannabis for any underlying health condition to assess the effect of medical cannabis on self-reported well-being. In effect, the study will have the

necessary information to conclude that an individual is likely to hold a certain perception of cannabis based on sociodemographic and other covariates, given the measured factors. This method attempts to determine whether an individual's response without cannabis information will be the same as that when provided with cannabis information. This will aid in distinguishing prejudice from ignorance and objectivity as well as in accounting for any psychometric properties shared by individuals.

This study employs well-being measures that transcend happiness, pleasure, and satisfaction and account for individuals' personal and social well-being, which is theoretically robust, empirically reliable, and policy-relevant at the national level in the second research question that measures the welfare implications of cannabis. This study used data from demographic health, mental health, and living standard surveys to support primary data that specifically focused on the association between cannabis and individuals' perceived quality of life (well-being). This approach is important because total reliance on known objective indicators, such as GDP, education, crime rates, and consumption levels, among others, is not truly reflective of individuals' well-being at any given time.

Other studies have found a negative relationship between economic development and personal wellbeing. Using both hedonic and eudaimonic measures will in effect provide a true picture to inform policies on the true impact of cannabis use and well-being. This goal is also motivated by existing research that has shown that cannabis has a significant positive impact on deadly and non-communicable diseases, such as cancer, tetanus, convulsive disorders, neuralgia, migraine, dysmenorrhoea, postpartum psychoses, senile insomnia, depression, and gonorrhoea, as well as opium or chloral hydrate addiction.

African countries lack the human, infrastructure, and financial resources to implement robust conventional medical systems. All healthcare outcomes and human development indicators

place Africa at the bottom of league tables. Addressing the numerous health challenges related to access, equity, depth, and breadth of coverage necessitates significant social engineering and paradigm shifts. This is the point at which research that helps illuminate the role of indigenous plants in healthcare, as well as the provision of relatively inexpensive and easily accessible complementary solutions, becomes important.

It becomes expensive for African countries with annual budget deficits to enforce cannabis possession laws because policing, adjudication, and sentencing require separate budgets. Above all, anyone found in possession of cannabis faces a ten-year prison sentence (Curley & Attwood, 2019). Similarly, the government's budget for the prison department for the administrative, physical, and psychological needs of prisoners sentenced to cannabis possession will increase. Moreover, examining the economic benefits of legalising cannabis for medicinal, recreational, and industrial purposes can help offset some, if not all, of the annual budget deficit. As a result, this study creates a model that carefully analyzes the zero, partial, and total legalisation of cannabis, highlighting all associated costs and benefits to the country.

In terms of cannabis's role in economic growth, it is important to note that despite government prohibition of the plant, revenue from regulated cannabis legalisation for medicinal and recreational purposes has been significant. For example, Miron (2005) stated that the US government would save $7.7 billion annually by reducing the use of law enforcement, the cost of the criminal court system, and the cost of corrections associated with incarcerating individuals. In terms of revenue generation, their study concludes that if cannabis is taxed like any other consumable, it will generate $2.4 billion per year, whereas it will generate $6.2 billion per year if taxed at the rates used for alcohol and tobacco. While the revenue generated by cannabis legalisation is significant, there are no significant differences between states that have legalised cannabis and those that have declared the plant illegal (Maier et al., 2017). For

example, in Ghana, legalising cannabis is expected to generate $326.4 million by 2023 (African Cannabis Report 2019). The associated monetary and non-monetary cost of regulated legalisation was a missing piece that prompted this study. Furthermore, there is a risk of misspecification because there are no reliable data on cannabis cultivation or the cost of the plant at the individual and national levels. Thus, the necessary conclusions will be considered to examine the viability and feasibility of regulated cannabis legalisation using cost-benefit analysis from Monte Carlo simulated datasets.

1.4 Research objectives

This project investigates the effects of regulated cannabis legalisation in Africa. Specifically, this study sought to address the following specific objectives:

1. To provide policy implementation guidelines for countries legalising cannabis for medical and industrial use.
2. To assess the public perception of cannabis users in Ghana and South Africa.
3. To investigate the implications of cannabis medical usage among users in South Africa.

1.5 Significance and Justification for the study

This study provides a methodologically robust and empirically relevant contribution to the literature on cannabis, using a theoretically appropriate approach. Given the contextual and contentious nature of cannabis and information disconnect among Africans, this study also addresses perceived views about cannabis and proceeds to provide good practices in its use. In addition, due to the unending controversies in countries that have legalised (Haroutounian et al., 2021; Hall et al., 2019; Maier, Mannes, & Koppenhofer, 2017; Hall & Lynskey, 2016) and those that are yet to consider such decisions for medicinal and industrial purposes (Barry, Hiilamo, & Glantz, 2014; Caulkins et al., 2015), it is imperative to give keen attention to the cannabis plant within research and policy circles, with a focus on its benefits, cost, how to

embark on regulated legalisation, and sustainable management. This study not only examines the significance of cannabis legalisation but also estimates the relative importance of cannabis against other driving substances that influence individuals' (ab)normal behaviour following the use of cannabis. In effect, this research addresses perception issues that provide information on the welfare implications of its medical application and provides a policy guideline on how to add value to medical and industrial uses when legalised.

1.6 Ethical Considerations

Undoubtedly, dealing with a plant whose legal status has been questioned for decades means that there are significant ethical issues to be considered. The plant, its users, and researchers form a sensitive core of an emerging body; therefore, ethical clarity must be prioritised. This is because cannabis users and researchers represent a legally minor population that is exposed to risks and societal stigma among other forms of multiple vulnerabilities. Therefore, it was important to seek explicit consent from key respondents at the outset of the research. The study ensured that the survey was purposeful, with the researchers not possessing an unlimited and unfettered use of recorded interviews. Anonymisation and the use of pseudonyms were effected wherever possible, and collected data were kept secure, ideally encrypted at rest and in transit during the entire stages of the research to ensure privacy and protection of the identity, profiles, and portfolios of key respondents. Confidentiality in terms of information use and dissemination was a significant focus in terms of data use and management as emphasised by some empirical researchers.

1.7 Structure of the thesis

This thesis is structured into five (5) chapters, the first chapter provides the background, motivation for the study, objectives, and research questions. It also provides insights into the significance and justification of this study. Chapter two (2) focuses on the implications of

regulated cannabis legalisation on value addition to both medical and industrial research and applications. Chapter three (3) explored the effect of medical cannabis use on self-reported well-being with a specific focus on chronic pain, migraine, cancer, and stress and anxiety management. The fourth chapter presents a comparative assessment of how individuals residing in Ghana and South Africa perceive cannabis and its users. The fifth chapter draws on the key findings in the summary, provides the conclusion and policy recommendations, and provides pathways for future research.

CHAPTER TWO

CANNABIS LEGALISATION IN GHANA: IMPLICATIONS FOR VALUE-ADDITION IN MEDICAL AND INDUSTRIAL RESEARCH AND APPLICATIONS

2.1 Introduction

Cannabis is an ancient plant species. Over the last 35 million years, it has provided humans with food, medicine, and guidance. It has built an industry and rebuilt lives. Cannabis also has numerous health benefits. The earliest written records date back to 2737 BC, when a Chinese emperor endorsed cannabis as the leading herb for the treatment of over 100 ailments and diseases. Since the last century, humanity has been at odds with various indigenous plants and animal species whose existence provides alternative paths to different realms of existence. This has sparked an age-long debate, and has led to the criminalisation of some indigenous plants such as peyotes, ayahuasca, iboga, and cannabis, among others. For several reasons, the cannabis debate has been one of the most enduring, visible, and studied topics in the history of prohibitions. Cannabis is widely available and simple to cultivate in almost any environment. Because there are no supply constraints, a constant flow can always be guaranteed. Furthermore, cannabis extracts can be made by anyone willing to spend a few minutes learning how and why the plant works.

It is worth noting that the growing wave of campaigns to project the potential benefits of cannabis translates into a reorientation of society and a paradigm shift in the legislative architecture of nations. For instance, Ghana's recent legalisation of cannabis use for medicinal and industrial purposes is a testament to its current shift. In the field of medical cannabis, existing data indicate that the plant works by interacting with complex networks in the body

through the endocannabinoid system (ECS), which is naturally produced by the body to help regulate pain and appetite, mood, memory, stress response among other activities. The two most popular active compounds isolated over the last three decades are tetrahydrocannabinol (THC) and cannabidiol (CBD)[6]. When ingested, endocannabinoid receptors rebalance the body by mimicking or disrupting the ECS.

The legalization of cannabis for medicinal, recreational, or industrial purposes dates back to the 1300s. While legal status varies across countries globally, the common systems governing cannabis are the United Nations Single Convention of Narcotic Drugs[7], the Convention of Psychotropic Substances[8] and the Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances[9] ratified by countries in 1961, 1971 and 1988 respectively. In Africa, the king of Madagascar was the first to outlaw cannabis, even with capital punishment for individual users. This fight against the plant spread globally until the late 1930s when Burma legalized cannabis production by issuing licenses to growers and all supply chain actors. Japan also followed the call to establish a cannabis control law that facilitates licensing and compliance among all supply chain actors, while monitoring and regulating the market to deal with unlicensed dealers.

In recent years, several countries have begun to rethink the medicinal and industrial potential of cannabis despite its continued prohibition for recreational use (Canada, Georgia, Paraguay, and Uruguay), and about 33 states in the United States have initiated legal procedures to facilitate the legalization of cannabis for medicinal purposes. In Africa, Comoros was one of the first nations to legalize cannabis use in 1975, while Lesotho granted the first-ever 21st-

[6] Over 500 compounds have been isolated since the 1990s. We believe further and deeper research will unearth more dynamics of the plant that is not currently known by modern science.
[7] https://treaties.un.org/doc/Treaties/1964/12/19641213%2002-14%20AM/Ch_VI_15.pdf Accessed May 28, 2020
[8] https://www.unodc.org/pdf/convention_1971_en.pdf Accessed May 28, 2020
[9] https://www.unodc.org/documents/treaties/organized_crime/Drug%20Convention/Commentary_on_the_united_nations_convention_1988_E.pdf Accessed May 28, 2020

century African medical cannabis license on the continent. Malawi, Zimbabwe, and Zambia legalized South Africa for both medical and scientific purposes. Ghana is the next country in Africa to have joined the legalisation of regulated cannabis for medical and industrial purposes after several calls and debates about its legal status.

Because of the favorable climatic and geographic location of Ghana and other regions, prospects for industrial and commercial cannabis production are even more promising, especially in light of recent adjustments to both local and global economies. Assuming a superficial look at the evidence, it is safe to say that industrial-scale cannabis production has had a significant impact on GDP in many countries by supplying materials for the production of important goods like biofuel and bioenergy as well as textile fibres and other textile-related products (Curley & Attwood, 2019; Fike, 2016; Karus & Vogt, 2004; Keller, 2013; Kraenzel et al, 1998; Kreuger et al, 2011; Luginbuhl, 2001; Rehman et al, 2013; Żuk-Gołaszewska & Gołaszewski, 2018).

There is no doubt that a great deal of effort has been expended in research on the various uses and applications of this multidimensional plant based on these preliminary reviews. This study opens the door to the scholarly discussion of various aspects of cannabis, particularly in light of the recent wave of legalisation that is sweeping the world. The author believes that as the truth behind draconian laws begins to seep into the consciousness of the public, who are looking for effective, affordable remedies for various ailments, cannabis and other indigenous plants that have been falsely classified as Schedule 1 will be freed to play their impactful roles in our daily lives.

This chapter seeks to provide policy implementation guidelines for countries legalizing cannabis for medical and industrial use. The outline of the chapter is as follows: the Ghanaian economy and Cannabis, the geography of Ghana and Cannabis Cultivation, a eview of

medicinal Cannabis; Delta-9 THC, the human brain and behavioural patterns; conceptual model for cannabis policy options; legalisation policy options model; policy guide for regulated cannabis legalisation; industrial potential for cannabis legalisation; value-added supply chain actors in the cannabis industry; alternative approach to growing cannabis in Ghana; processing of cannabis; and the distribution of cannabis products in Ghana.

2.2 The Ghanaian Economy and Cannabis

Ghana's economy follows a pattern established in other places with a similar predatory and exploitative development paradigm. To that end, despite evidence indicating the efficacy of orthodox medication among patients, Ghana lacks the technology, infrastructure, and financial resources to implement robust orthodox medical systems (Ayitey-Smith, 1986; Gyasi, Mensah, Adjei & Agyemang, 2011; Sato, 2012). Furthermore, the orthodox medical system as a whole is ineffective in meeting the health needs of countries such as Ghana, where myelinated populations are harmed by numerous artificial derivatives that treat symptoms but never cause diseases. In terms of budgetary requirements, less than 6 per cent of GDP in Ghana is allocated to the healthcare sector with a high doctor-to-patient ratio estimated at 7374[10], inadequate hospital beds, healthcare equipment and unequal distribution of healthcare delivery facilities across the country are major challenges that warrants attention. Part of this is a reflection of the inability of existing health care models based on an allopathic approach to responding adequately to the realities of the health challenges facing mankind, and the failure of the government to tap into the emerging traditional medicine sector, which employs about 200,000 individuals[11] (Ghana Health Workforce Observatory, 2011). Significant social engineering and a complete rethinking of the current model are required to address the numerous health challenges related to access, equity, depth, and breadth of coverage. This is the point at which

[10] https://ghanahealthservice.org/downloads/Facts+Figures_2018.pdf Accessed May 28, 2020
[11] https://www.moh.gov.gh/wp-content/uploads/2016/02/Ghana-hrh-country-profile.pdf Accessed May 28, 2020

research of this kind becomes important in illuminating the role of indigenous plants in healthcare and the provision of relatively inexpensive and easily accessible complementary solutions.

Ghana experienced average annual economic growth of close to seven percent in the three years prior to the COVID-19 pandemic, making it one of the economies in the world with the fastest rate of expansion. Ghana maintained a growth rate of 0.5 percent in 2020 and recovered with a growth of 5.4 percent in 2021[12] despite the economic slowdown brought on by the pandemic. However, the economy is heavily reliant on the export of raw materials, such as gold, cocoa, oil, and gas, making it susceptible to slowdowns in the global economy and falls in commodity prices. Over the next three years, GDP growth is anticipated to be higher than five percent on average. The largest contributor to Ghana's GDP is the services sector, which made up 49% of GDP in 2021 as a result of expansion in the ICT, health, and education service sectors, among others. Following the industrial sector, which contributes 30% of GDP, is the agricultural sector, which makes up roughly 21% of GDP. About 45% of Ghana's workforce is employed in agriculture, primarily small landowners[13].

In addition to its traditional industries of agriculture, mining, and more recently, oil and gas production, Ghana is experiencing rapid growth in its digital, financial services, education, and franchising sectors[14]. Despite being one of Africa's fastest-growing economies, Ghana has experienced a significant economic fallout, with volatile and unsustainable growth. In recent years, the Ghanaian economy has been plagued by rising public debt, fiscal slippages, rising

[12] https://www.trade.gov/country-commercial-guides/ghana-market-overview#:~:text=Beyond%20its%20traditional%20industries%20of,franchising%20sectors%20are%20growing%20fast.
[13] https://www.trade.gov/country-commercial-guides/ghana-market-overview#:~:text=Beyond%20its%20traditional%20industries%20of,franchising%20sectors%20are%20growing%20fast.
[14] https://www.trade.gov/country-commercial-guides/ghana-market-overview#:~:text=Beyond%20its%20traditional%20industries%20of,franchising%20sectors%20are%20growing%20fast. Accessed December 8, 2022

youth unemployment, lopsided distribution, worsening inequality, household poverty, and infrastructure deficits such as roads, railways, and health and education facilities. In 2019, the government's spending on health in Ghana amounted to roughly 1.4 percent of the country's GDP. Spending increased by 0.29 percentage points from 2017 to 2018. 1.09 percent of the nation's GDP was spent on domestic general government health care in that year[15]. In 2018, the government of Ghana spent nearly four percent of its total Gross Domestic Product (GDP) on education. Between 2008 and 2019, government spending in the sector fluctuated, with the highest shares recorded in 2011 (8.14 percent of GDP) and 2012 (7.92 percent of GDP). Furthermore, the lowest levels of educational spending were in 2017 (3.62 percent of GDP) and 2018 (3.99 percent of GDP)[16]. The country already spends about $1.2 billion per year on infrastructure, equivalent to about 7.5 percent of GDP[17]. Despite being a Lower-Middle Income Country with impressive social protection schemes, Ghana's spending on social protection as a percentage of GDP is less than 1%, which is even lower than average spending in Low-Income Countries[18].

With recent declines in exports and the significant impact of global oil prices, a country requires innovative diversification, sustainable fiscal debt, and a sound economic environment. This would allow the private sector and small and medium-sized enterprises (SMEs) to thrive, as well as trending but unconventional products with the potential to rebuild the economy. A measured approach to cannabis for medical and industrial purposes is one such timely and feasible opportunity that can provide a safety net and an alternatively viable livelihood strategy, particularly in uncertain times and crises. Examining the economic benefits of legalizing

[15] https://www.statista.com/statistics/1124307/ghana-domestic-general-government-health-expenditure-as-share-of-gdp/ Accessed December 8, 2022
[16] https://www.statista.com/statistics/1186294/gdp-share-of-government-spending-on-education-in-ghana/ Accessed December 8, 2022
[17] https://openknowledge.worldbank.org/handle/10986/3366?show=full Accessed December 8, 2022
[18] https://www.unicef.org/ghana/media/4336/file/Budget%20Brief%20-%20Social%20Protection.pdf Accessed December 8, 2022

cannabis for medicinal or industrial purposes could help offset some, if not all, of the annual budget deficit.

Despite the prohibition, revenue from regulated cannabis legalization for medicinal and recreational use has been significant elsewhere. Miron (2005), for example, stated that $7.7 billion spent to enforce prohibition annually will be saved by the US government in terms of reduced use of law enforcement, the cost to the criminal court system, and cost of corrections regarding incarcerating individuals. In terms of revenue generation, the study concluded that cannabis would generate $2.4 billion per year if taxed like any other consumable, whereas $6.2 billion would be generated if taxed at the rates used for alcohol and tobacco. While the revenue generated by cannabis legalization is significant, there are no significant differences between states that have legalized cannabis and those that have declared the plant illegal (Maier et al., 2017). For example, in Ghana, legalizing cannabis is expected to generate $0.38 million from the medical cannabis market and $326 million from the recreational market by 2023 (African Cannabis Report, 2019). A well-planned and well-guided legalisation framework will improve health and medical research, expand supply chains, and stimulate new value addition through industrialization. Ghana has all the ingredients necessary for the thriving cannabis industry.

Ghana's GDP may increase as a result of new legislation. Although the country's economy may benefit from new legislation, industry entry requirements need to be carefully considered. Ghana should learn from the licensing practices in place today in Africa, which appear to be bad for investors and local farmers. The licensing process should be open-ended and provide a foundation for regional business owners to enter the hemp market. For instance, in Lesotho, where the steep $37,000 license fee is only affordable by large corporations, small-scale farmers are still growing marijuana illegally. The cannabis industry in Africa appears to be dominated by foreign nations, according to data from Malawi and Eswatini (Prohibition

Partners 2019). In order to prevent the abuse of the license that has been granted, the cultivation must also be strictly supervised.

Because the production of industrial hemp can lead to the development of numerous extraction industries, the licensing system must favour local investors and farmers to strengthen the manufacturing sector in Ghana. To improve its ability to control and profit from the production of cannabis, Ghana can collaborate with organizations in China, Canada, and the USA that have carried out various types of research into the production of hemp.

2.3 The Geography of Ghana and Cannabis Cultivation

Unlike other agricultural plants, cannabis can be grown organically because it thrives and can withstand most environmental and climatic conditions without any nutritional supplements. However, extreme desert climates and high mountainous regions are not ideal for the plant because they require a well-balanced combination of tropical temperatures, regular precipitation, and stable humidity. Therefore, an ideal environment and climatic conditions for the industrial cultivation of cannabis are a tropical region coupled with well-drained soil that is naturally rich in organic matter. Specifically, cannabis plants require between 12 and 14 h of daylength sunshine (estimated at 15 °C during the night and 32 °C during the night), 40–70 per cent humidity during the growing stage, and 30–50 per cent humidity during the flowering stage in well-aerated loamy soil composed of a pH between 6 and 7.5, rich in organic matter (at least soil with 3.5 % organic matter). These preconditions for cannabis cultivation mimic the exact climatic conditions in Ghana, making the country the best fit for well-coordinated industrial cultivation of cannabis for its medical and industrial benefits.

Ghana[19] is in the tropics and one of the few countries in the equatorial region. Average daily temperatures range between 25º C and 35º C (77 °F and 95 °F, respectively). The country is situated in West Africa along the Guinea coast at latitudes of 4-12°N and is strongly influenced by the West African monsoon. Ghana experiences an average annual rainfall of 1184 mm, with an average relative humidity of 85 per cent, mean monthly sunshine of 2,372 h, and an average high monthly temperature of 29º C with the lowest at 25º C. Due to the African monsoon wind, the country is characterized by two major seasons: wet (rainy) and dry. In terms of rainfall, the northern part of the country experiences rainfall from May to September. Rainfall occurs from April to October in the central part of the region, whereas the south receives rainfall between April and November. On the other hand, the east coast experiences a short annual rainy season between April and June, with disruptions around July and August until September to October, when another rainy season is experienced.

Given the slight dynamics across the landscape, the country experiences mild temperatures around the higher and mountainous regions and relatively higher humidity along the east coast, whereas the northern part is characterized by hot and warm temperatures. The southern part experienced the highest rainfall, with annual precipitation levels slightly above 1500 mm. It is important to highlight that the variation in rainfall across the country is not as wide as the driest regions that record at least 1000 mm of rainfall annually, maintaining a steady balance in the country, which is still favourable for agricultural activities. During the wet seasons, daily temperatures are pegged around 31-32 °C (88-90 °F) between December and January, and 34 °C in February. Similarly, the central and northern belts experienced a temperature of 35 °C (95 °F) in December and January, coupled with dry air and cold nights. There is sunshine throughout the year, which is well-positioned close to the central and northern regions. The

[19] https://www.meteo.gov.gh/gmet/regional-weather/. Accessed May 28, 2020

strategic geographical location of the country and the existing climatic conditions are clear indications that commercial production of cannabis for medical and industrial purposes appears relatively cheaper, and promising since this will provide the economy with the necessary competitive edge, required market share and the comparative advantage domestically, continentally and internationally. Although the growth of cannabis is relatively easier, especially in the tropics, it is important to emphasize that the purpose of growing the plant influences the type of specific soil to use and the type of soil nutrients that must be present. In addition, the target market and consumption patterns may influence the growing conditions. Despite these modifications, we are convinced that Ghana has the right conditions for a reasonable risk-adjusted return on any investment in its cannabis industry.

2.4 Review of Medicinal Cannabis

It is critical to highlight the benefits of cannabis in changing the public and societal perceptions of its medicinal, recreational, and industrial uses. It is also critical to understand how various compounds interact with the human body in order to restore balance and healing. Over the last few decades, the US Drug Enforcement Administration (DEA) has evolved cannabis from various schedules. Cannabis is classified as a Schedule 1 drug, which means that it has no accepted medical use and is thought to have a high potential for abuse, with the possibility of severe psychological and/or physical dependence. Cannabis is classified in the same category as heroin, lysergic acid diethylamide (LSD), (3,4)-methylenedioxymethamphetamine (ecstasy), methaqualone, and peyote (Controlled Substance Act 1970). So far, there is no scientific evidence to support this classification of cannabis and other indigenous plants.

Other authors have concluded that the criminalisation of cannabis for medicinal, recreational, and industrial purposes is based on a lack of scientific evidence and that DEA has increased worldwide (Bottorff et al., 2013; Frame & Cannabis, 2010; Goode, 2009; Maier et al., 2017;

Stringer & Maggard, 2016). This is one of the many reasons for further investigation into the potential benefits of cannabis as well as providing a foundation for discussion about its legalisation. This section reviews scientific works on the benefits of cannabis provides knowledge to clarify public ignorance of the subject and builds a model for three cannabis legalisation policy options.

Cannabis has been discovered to be one of the most medicinally useful plants, with significant health benefits and little or no psychoactive effects when administered at appropriate doses, both in ancient times and now. Pacher and Kunos (2013) discovered in their study that when the activities of the endocannabinoid system are carefully modulated, the therapeutic benefits derived from it are promising. This aids in the treatment of a wide range of diseases, including obesity/metabolic syndrome; cachexia; chemotherapy-induced nausea and vomiting; tissue injury; neurodegenerative, cardiovascular, and inflammatory disorders; and pain. Although the study found some levels of complications, such as obesity, these were due to challenges with limited knowledge in the field. Therefore, more research in this area is needed for the effective use of cannabis for all human health needs.

The role of cannabis in the endocannabinoid system has shifted from simply rebalancing physical build-up and breakdown to combating diseases and injuries (Bachhuber et al., 2014; Vandrey et al., 2015). Bonn-Milleret et al. (2014) examined the specific coping strategy motivations, frequency of cannabis and alcohol use, and mental health among patients with post-traumatic stress disorder using a convenient sampling technique (PTSD). They concluded that patients rely on cannabis to cope with their condition, sleep well, and reduce their risk of suicide (Bonn-Miller et al., 2014). Relying on opioids for treatment exposes its consumers to opioid addiction and death due to their negative effects (Bachhuber et al., 2014; Pedersen &

Skardhamar, 2010). Their findings are consistent with those of Lim, See, and Lee (2017) and Swift, Gates, and Dillon (2005), who investigated the effect of cannabis on PTSD.

Cannabis became the first organic anti-pharmacological product to cure epilepsy with zero or few (manageable) side effects in another area of pressing health needs that have not received full recovery from pharmaceutical products. It has now been generally accepted that cannabis is the best cure for individuals (mostly children) with epilepsy (Devinsky et al., 2016; Kaplan, Offermann, Sievers, & Comi, 2017; Russo, 2017; Saade & Joshi, 2015; Sulak, Saneto and Goldstein, 2017; Viggiano et al., 2016). Tzadok et al. (2016) concluded that CBD treatment had a significant positive effect on the seizure load. Most of the children (66/74, 89%) reported reduction in seizure frequency: 13 (18%) reported 75–100% reduction, 25 (34%) reported 50–75% reduction, 9 (12%) reported 25–50% reduction, and 19 (26%) reported <25% reduction. They also realized an improvement in behaviour and alertness among patients with epilepsy treated with cannabis, with a significant enhancement in their language, communication, motor skills, and sleeping pattern .

Hill (2015) also concluded that cannabis use for "chronic pain, neuropathic pain, and spasticity due to multiple sclerosis is supported by high-quality evidence. Six trials that included 325 patients examined chronic pain, 6 trials that included 396 patients investigated neuropathic pain, and 12 trials that included 1600 patients focused on multiple sclerosis." He argued that "these trials had positive results, suggesting that cannabis or cannabinoids may be efficacious for these indicators". However, only a few cases of adverse reactions, such as somnolence, fatigue, gastrointestinal disturbances, and irritability, have been reported. This resulted in the discontinuation of therapy in these five patients. Despite the contextual nature of these studies, which included different patients with dissimilar health issues at varying degrees of severity,

there was agreement that CBD-rich cannabis used to treat seizures in children aged infant to 18 is significantly effective in providing them with a relieved life.

It is important to note that the current significant benefits of cannabis in the field of medicine do not come close to the true potential of the plant, given that this is a developing field and research is still being conducted to unearth the unknown benefits of medicinal cannabis. The delay in such realization stems from the fact that this plant has been illegal for a long time because of the long and vicious war (Svrakic et al., 2012). The arguments against cannabis is more political than scientific, without any established moral hegemony (Bottorff et al., 2013; Goode, 2009; Maier et al., 2017; Stringer & Maggard, 2016). Studies on cannabis and crime have not established any form of association (see Pedersen & Skardhamar, 2017; Pedersen & Skardhamar, 2010). Given the above implications of cannabis on health, it is critical to conduct additional research on this plant, particularly at an early stage of legalisation.

2.4.1 Delta-9 THC, the Human Brain and Behavioural Patterns

The effect of cannabis on humans has been widely debated without adequate reliance on robust scientific research by both schools of thought from the far-right or a far-left stance. As cannabis has been classified as a Schedule 1 drug, scientists go through an arduous bureaucratic process to obtain a licence to access a limited quantity of cannabis before conducting research. However, recent advances in scientific research and the progressively evolving policy landscape about regulated cannabis legalisation have resulted in significant strides in providing a middle playground on a compliance scheme for all key players in the cannabis plant's value-added supply chain. The fight for or against cannabis legalisation is deeply rooted in either an unfavourable or favourable sentiment displayed about the only single psychoactive compound in the cannabis plant that causes intoxication and has been linked to psychoactive behaviour and schizophrenia to some extent. The psychoactive substance in cannabis, delta-9 tetrahydro-

cannabinoid (-9-THC), stimulates the neurons in the reward system to release the signalling chemical (dopamine) by increasing the activities of endocannabinoid receptors through dopaminergic neurons at a faster rate than in the normal human brain (Reinarman et al., 2011). This section examines the effects of high THC cannabis on the human brain and body.

The transmission mechanism of THC-rich cannabis in the human brain remains a paradox in the field of research, a dilemma in its use, and a major policy debate. There is a divergent view on the impact of cannabis on the human brain and body. The associated positive and negative effects of cannabis use are attributed to dosage and underlying health conditions among other factors (Roitman et al., 2014). Therefore, experiencing the impact of a high-THC strain of cannabis is contingent on a better understanding of the dosage intake, mode of administration, expectations formed by individual subjects, underlying health condition, individual vulnerability levels, family history of psychoactive behaviour and its combination with other substances. Notable among the effects of high-THC cannabis are hallucination, illusion, delusion, paranoia, restlessness, and psychosis (Svrakic et al., 2012).

Low doses of THC-rich cannabis are associated with antidepressant effects, as well as the feeling of euphoria; however, an increase in dosage beyond the threshold based on an individual's potential may lead to acute depression, paranoia, psychoactive behaviour, and schizophrenia. Prolonged heavy use of THC-induced cannabis, especially among teenagers who are still undergoing brain development, will lead to brain malfunctioning that affects pleasure, memory, thought, and sensory perception. In addition, this leads to abnormal development of the hippocampus as well as physical dependence on the plant.

It is important, therefore, to highlight that chronic consumption of cannabis, especially in high-THC strains is associated with an impairment that affects cognitive[20] behaviour, memory,

[20] Solowij, N. (2006). *Cannabis and cognitive functioning*. Cambridge University Press.

motor[21] coordination and attention behaviour which can last for a maximum of two days. This is mostly prolonged or shortened based on individual placebo effects. Substantial scientific evidence points to the fact that frequent and chronic users of high THC-dominated cannabis develop schizophrenia[22] and/or other psychoactive disorders (Casadio et al., 2011; Morgan & Curran, 2008). Individuals within the brain development age group are at a high risk of oppositional, psychoactive, and schizophrenic behaviour.

Although recreational cannabis use is unquestionably harmful, it is a valuable source of medicine for almost all diseases. However, there is a lack of consistency in the synthesis, translation, and communication of scientific research into the cannabis policy landscape among key policymakers, stakeholders, and boundary partners. Regardless of the foregoing, we believe that any individual cannabis user should consider his or her underlying health condition, dosage, mode of administration, and most importantly, from reliable, licensed, and experts backed by scientific research.

2.5 Conceptual Model for Cannabis Policy Options

Illegal status should not be an option for a plant with between 143 and 190 million users worldwide, representing between 3.3 and 4.4 percent of the adult population (UNODC, 2017, 2018, 2019). On the other hand, studies that looked at the cost-benefit analysis of cannabis legalisation predicted that legalising cannabis would reduce crime and black market transactions (Shanahan and Ritter, 2014). One plausible reason for this conclusion could be that people who use cannabis can buy it from licensed stores. Revenue mobilization becomes easier because tax evasion is no longer an option. It is now clear that reservations about cannabis are more for those who use it recreationally to 'get high' (Bottorff et al., 2013; Hall &

[21] Crean, R. D., Crane, N. A., & Mason, B. J. (2011). An evidence-based review of acute and long-term effects of cannabis use on executive cognitive functions. *Journal of addiction medicine*, *5*(1), 1.
[22] Andréasson, S., Engström, A., Allebeck, P., & Rydberg, U. (1987). Cannabis and schizophrenia a longitudinal study of Swedish conscripts. *The Lancet*, *330*(8574), 1483-1486.

Lynskey, 2016). This point can be counter-argued since regulated legalisation will ensure that a balanced or CBD-rich production ratio is emphasized to modulate the strains from a THC-rich cannabis (Roitman et al., 2014).

2.5.1 Legalisation Policy Options Model

The model in Figure 1 analyzes the costs and benefits of each policy option to provide different policy options for either prohibition, decriminalization, or legalisation of cannabis in developing countries. This provides a thorough understanding of the true impact of cannabis prohibition, decriminalization, or legalisation to inform policy changes in Africa. Governments spend resources on policing, adjudication in law courts, and sentencing cannabis-related crimes in case of prohibition due to the plant's numerous unintended consequences. Because the law states that anyone found with cannabis for recreational or industrial purposes is automatically guilty and sentenced to ten years in prison, governments will devote resources to administrative, physical, and maintenance costs for a cannabis-related prisoner for ten years. This act not only deprives individuals of fundamental human rights, but also imposes a high cost on the entire household with a prisoner in terms of psychic, monetary, and non-monetary costs. The loss of both human and social capital, as well as the impact on the household and societal stigma associated with such individuals, are issues that the government cannot manage carefully. The benefits of prohibition are mostly attributed to a reduction in psychoactive issues caused by substance cannabis abuse.

Monetising such costs against the benefits of prohibition provides a clear picture of the viability of such policy options. When compared to the benefits of decriminalizing cannabis, the decision is not efficient, feasible, or viable according to the utilitarian approach. Countries consistently record their annual budget deficits. Furthermore, because the plant is illegal, black market trade will increase. This occurrence will increase the proclivity of social vices that are

unrelated to cannabis; however, because they are illegal products, any form of crime will be wrongfully attributed to cannabis. In effect, the prohibition policy option stipulates that cannabis-related issues will increase the government's cost of policing, adjudication, and sentencing as opposed to the benefit of a reduction in cannabis-related psychoactive issues by individuals who abuse cannabis.

The second policy option, decriminalisation, has a much more flexible status than the first because individuals who possess cannabis under this policy option are not legally considered guilty of any crime if they have a necessary permit. The challenge with this option is its bureaucratic nature, as the application of a permit, waiting period, and resources required before using cannabis become disincentives for people who use it for medicine, recreation, and/or industrial purposes. Taking this aspect into account, it unequivocally resembles the first policy option, prohibition, which still costs the country money. Consequently, the decriminalization policy option will benefit the country by regulating the use of cannabis for medicinal, recreational, and/or industrial purposes, thereby reducing any form of cannabis abuse that leads to psychoactive issues. Due to the bureaucracies involved in obtaining permits for cannabis use, there will be an increase in black market operations, which will increase crime rates and the cost of policing, adjudication, and sentencing borne by the government despite the benefit of a reduction in cannabis-related psychoactive issues experienced by cannabis users.

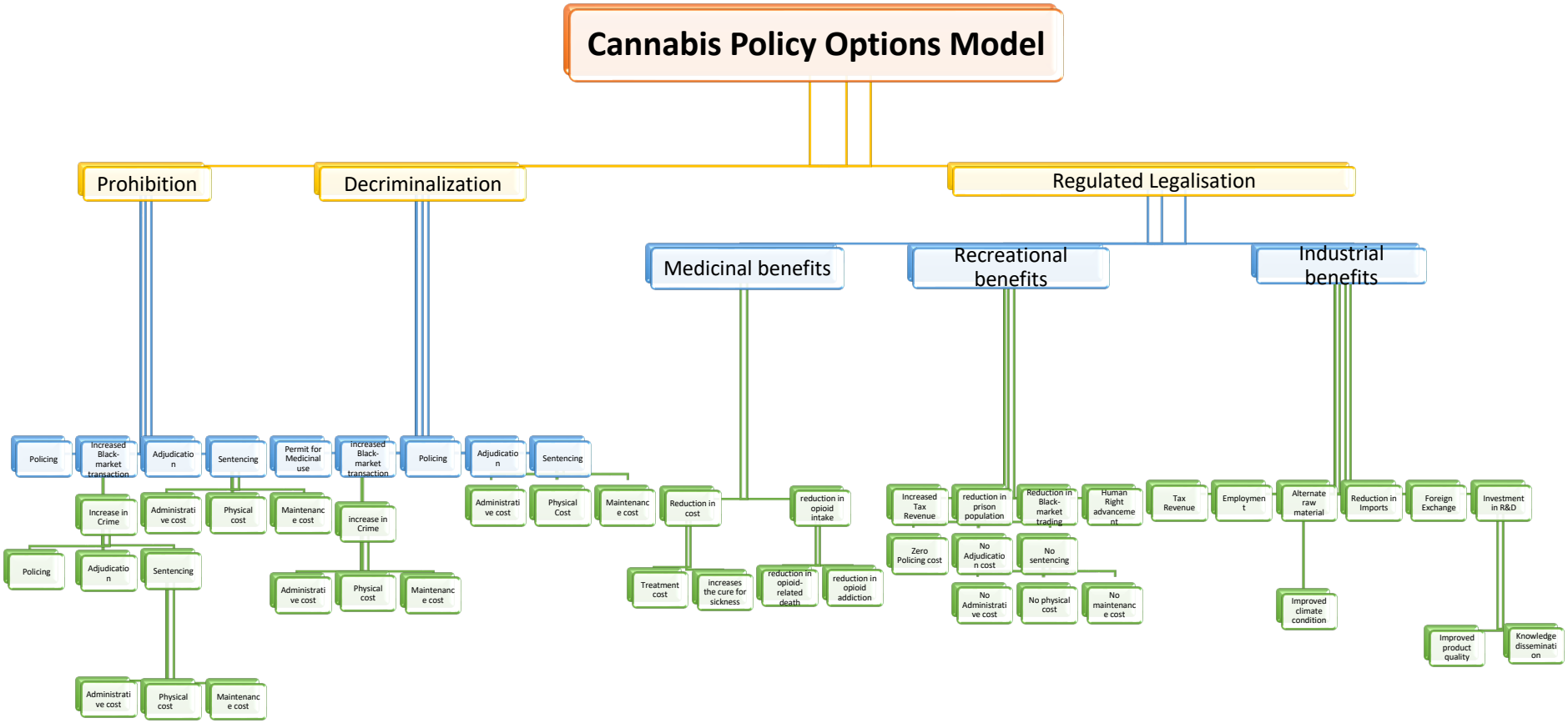
The final policy option, regulated legalisation, proposes that cannabis be fully legalised to fully exploit its medicinal, recreational, and industrial benefits while regulating its use among individuals who do not qualify to use it. This approach not only generates tax revenue, foreign exchange, and other benefits for the country but also provides the country with biofuel options for power supply. Cannabis has greater potential for transforming the manufacturing sector in

terms of improving and enhancing the quality of existing locally made products as well as introducing new ones.

While this study does not presuppose that this approach will be without challenges, it provides a detailed analysis of every cost associated with its regulation for a win-win policy for Africa. Individual cannabis abuse is the anticipated cost of cannabis legalisation. Despite this, it is critical that this study emphasises that there is no addiction to any substance; however, addiction is a health issue that must be addressed separately, rather than attributing addiction issues to specific products. Therefore, cannabis does not contain addictive substances and must be evaluated in the same way as any other product, both ideologically and objectively.

In general, the implementation of medical cannabis policies can involve a variety of costs such as those associated with regulatory infrastructure, education and outreach, and research and development. Additionally, there may be economic costs and benefits to consider, such as the potential impact on the healthcare system and economy. Ultimately, the specific costs associated with different policy options will depend on a variety of factors and would need to be carefully considered on a case-by-case basis.

Figure 1 Cannabis Policy Options Model



Source: Constructed by Authors (2020)

2.5.2 Policy Guide for Regulated Cannabis Legalisation

The legalisation of cannabis in Ghana for medicinal and industrial purposes not only has revenue-generating potential, foreign exchange, and other benefits for the country, but also provides the country with options in the field of biofuel for power supply. In terms of the manufacturing sector, cannabis has greater potential for transforming the sector to improve and enhance the quality of existing locally made products, as well as to introduce new ones. The envisaged cost associated with cannabis legalisation is abuse by individuals, despite the fact that recreational use has not been featured in legalisation. Therefore, it is necessary that various authorities in charge of policing, monitoring, and controlling the use of substances be empowered to efficiently manage the use of cannabis in the country.

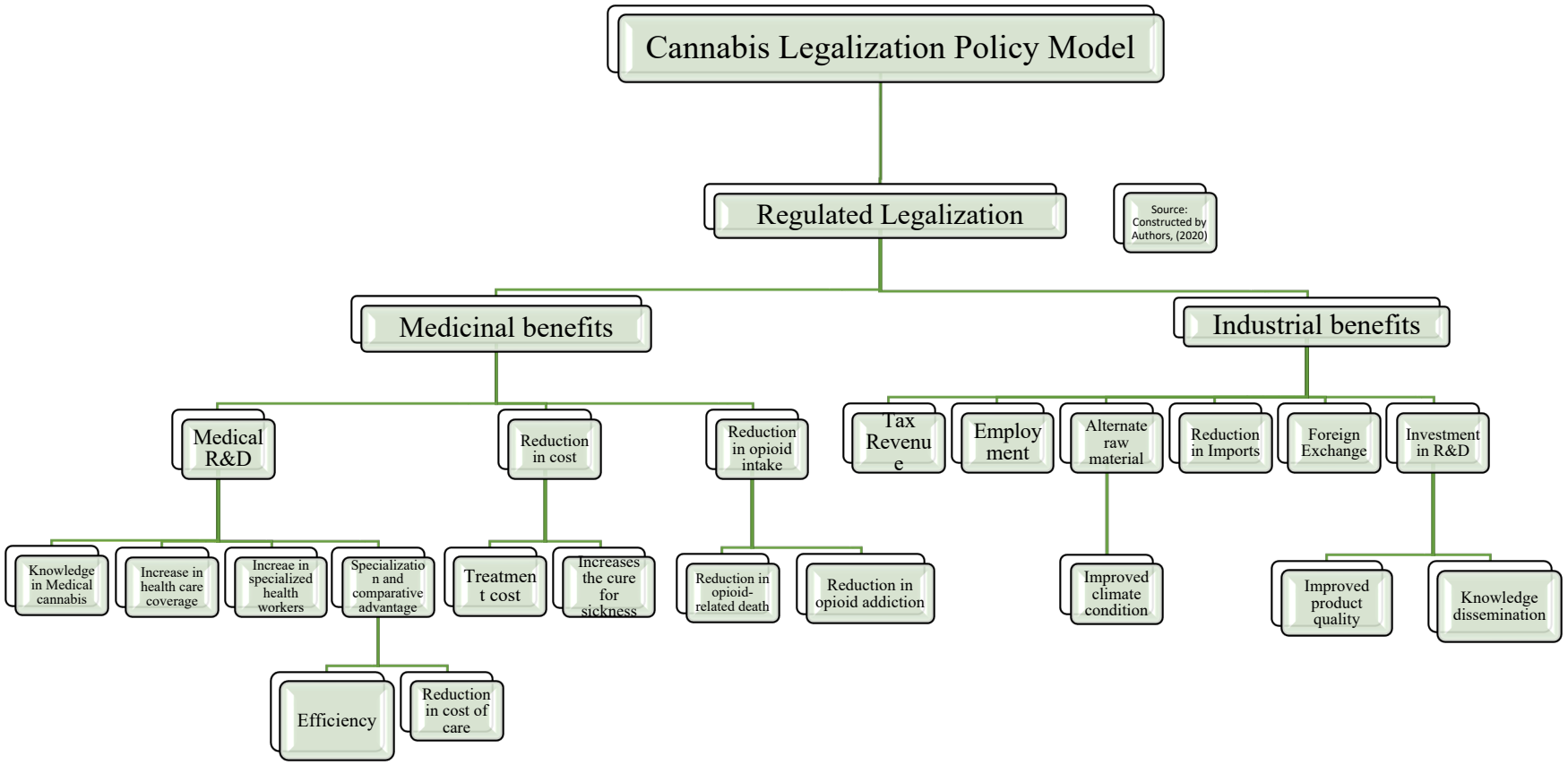
According to Owusu, Arthur, and Aboagye, (2021), the strain of cannabis legalized by the government of Ghana has no psychoactive effects, because the THC levels of these strains will not exceed 0.03%. This suggests that the suspected psychoactive implication of cannabis legalisation is lacking empirical grounding, since there is little to no evidence to point out any slight negative association with legalised cannabis for medical and industrial purposes. In relation to the dependence properties of this plant, it is clear that addiction is a health issue that must be dealt with singularly and in isolation rather than attributing it to products consumed. Therefore, the lack of scientific and empirical evidence to support the claim that cannabis has an addictive substance serves as a point of departure for our work to treat the plant like any other product ideologically and objectively in this assessment.

While public perception has completely influenced views on cannabis use, research indicates that alcohol and tobacco users are more likely to be violent, abusive in their homes, and more likely to initiate assault (Cherpitel, 1994; Galanter, 1986; Heishman et al., 1997; Lachenmeier & Rehm, 2015). To reiterate this, a longitudinal approach on how alcohol use impacts

aggression among adolescents by White (2002) found that a large majority of the drug-related sexually assaultive crimes involved alcohol use while cannabis use was underreported in offenses against person also; cannabis was selected as the drug most likely to decrease assault.

Therefore, maintaining the illegal status of cannabis is a major hindrance to undertaking rigorous research to unleash both the medical and industrial potential of the plant, while also acknowledging its associated adverse effects. This also serves as a sound foundation to better understand chemical makeup, potential uses, and side effects that will inform policy formulation and provide rich information for individuals, households, communities, countries, and the world. In effect, regulated cannabis legalisation is an effective, timely, and realistic policy option and a flexible approach, as it serves as a useful point of departure to undertake evidence-based research to unpack knowledge in order to better inform the populace about the potential benefits for medicine and industry as well as its associated risks (Crépault, 2014; Maier et al., 2017; Miron, 2005; Moeller, 2012; Shanahan & Ritter, 2014; Svrakic et al., 2012).

Figure 2 Policy Guide for regulated cannabis legalisation



Source: Constructed by Authors (2022)

2.6 Industrial Potential for Cannabis Legalisation

To gain a comprehensive understanding of the industrial cultivation of cannabis, it is necessary to first examine the demand for this plant. The importance of cannabis in the industrial sector cannot be overstated. This has increased its demand in the pharmaceutical, textile, fibre, paper, pulp, and oil industries. Therefore, it is worthwhile to discuss their role in the industrial sector in greater detail. Cannabis is the most efficient and high-quality raw material used in the paper industry. One acre of cannabis can produce the same amount of paper as three acres of a conventional paper-producing tree. In addition, paper made from cannabis will last 150 years longer than paper made from conventional trees. Above all, whenever[23], a paper made of cannabis is torn or wet, all one needs to do is set the damp pieces the way they should be and let them dry (Luginbuhl, 2001).

Between 2008 and 2009, the government of Pakistan invested approximately US$ 9 billion to import energy after the country experienced a severe economic downturn as a result of insufficient power supply. This led to the shutting down of major industries such as textiles and small-scale businesses. In the textile industry, cannabis can produce three times the amount of fibre made from cotton, 10 percent of the irrigation used, and a quarter of the land area used for cultivation. Thus, cannabis has a transformative edge and is a scalable opportunity for individuals, cooperatives, communities, and Ghana. The net profit of an acre of cannabis in the USA is $1, 200 compared to $400 from cotton, $350 from corn and $250 from soybean, with even higher net profits made from cannabis oil (Forbes, 2019).

[23] This conclusion was made by Herer, Jack. In his work “TI1e Emperor Wears No Clothes. Van Nuys CA.: HEMP Publishing, 1993. (Kenex@kent.net.) "Re: a student with hemp questions:' E-mail to April Luginbuhl (aprillu@yahoo.com). 1 July 1999” cited by Luginbuhl (2001)

After realising the potential benefits of cannabis as a form of energy supply (biofuel energy with little or no adverse environmental implications), Pakistan resorted to this approach. This was not only a breakthrough but also an alternative power supply. It has also saved the country's fortune from the importation of energy while ensuring a clean and sustainable supply to address climate change (Rehman et al., 2013). Therefore, cannabis has a conversion rate of approximately 97% to biodiesel, with a low sulphur dioxide emission rate. Even in the automotive industry, cannabis oil is used by manufacturers: it is used by BMW, Audi, Ford, General Motors and Mercedes Benz to manufacture plastic for their vehicles. The recently manufactured Mercedes C-class contains 20 kg of cannabis plastic (Hemp Times 2017). An acre of hemp can produce 1800 gallons of biofuel, which is equivalent to two barrels of oil. Given that hemp can be harvested every three months, an acre yields eight barrels of biofuel. Against the backdrop of the energy and power crisis in Ghana, focusing on the industrial production of hemp has the potential to flatten power and energy crisis curves. Additionally, since the government holds patents for mass production, this will serve as additional revenue for the government of Ghana.

Karus and Vogt (2004) also highlighted that within the Eurozone, cannabis contributed significantly to the paper and pulp industries, with a modest contribution to the automotive industry. Furthermore, the study observed that approximately 95% of the cannabis produced was used as animal bedding. In terms of consumable food supplies, cannabis has been widely recognised as a super food since it contains 33 percent of the protein needed by the body with about 35 percent of essential fatty acids, that includes Omega 3, 6 and 9 as well as Gamma Linolenic Acid (GLA). It also contains all nine amino acids and produces six times more the Omega-3 acid that can be found in raw tuna and it is also high in dietary fibre. These are essential nutrients needed by the body for cell growth and improvement in the immune, nervous, circulatory, skeletal, pulmonary, and other systems to fight cancerous, tumorous,

inflammatory, and chronic pain in the body to improve the health of the individual (Bachhuber et al., 2014; Svrakic et al., 2012). In the agricultural sector, cannabis has been found to be environmentally resilient and can withstand harsh weather conditions with significant economic benefits.

Cannabis has been found to be one of the few plants that has roots deep enough for percolation and nutrient cycling. When grown densely, it naturally prevents the growth of weeds without any investment in weedicides, pesticides, or herbicides. Cannabis has also been found to serve as a pesticide whenever it is cycled with cereals by farmers who embark on crop rotation. Specifically, it helps reduce up to 80 percent of the damaging nematode cysts that destroy soybeans (Luginbuhl, 2001). Such benefits of cannabis are timely and convenient for Africa, which grapples with poor yields in agriculture and high losses in production, even though agriculture has remained the bedrock of the continent for millennia.

In terms of environmental preservation, cannabis is one of the best plants for trapping carbon in the environment. In fact, a metric metric of cannabis traps 1.5 metric tonnes of carbon in the atmosphere, which has significant implications for carbon tax credit (Rehman et al., 2013). This review summarises a few major studies on the medicinal and industrial benefits of cannabis, with rich arguments to carefully examine the hidden treasures of the plant. It is important to note that the type of cannabis used in manufacturing all these products is low in THC (less than 0.1%), with no psychoactive effects.

The preceding review summarises a few major studies on cannabis's medicinal, recreational, and industrial benefits, with rich arguments to carefully examine the plant's hidden treasures. While these studies have provided useful information, it is important to note that the cases observed were primarily from developed countries in the north. Consequently, a study from Africa is greatly appreciated because it offers a different contextual argument for cannabis.

This will affect public perception because lived experiences will be evaluated using a phenomenological framework. Furthermore, a model for examining different policy options such as prohibition, decriminalisation, and legalisation is required, and performing a cost-benefit analysis of its regulated legalisation will be extremely beneficial in contributing to the existing emerging knowledge in research and policy circles.

2.7 Value-added Supply Chain Actors in the Cannabis Industry

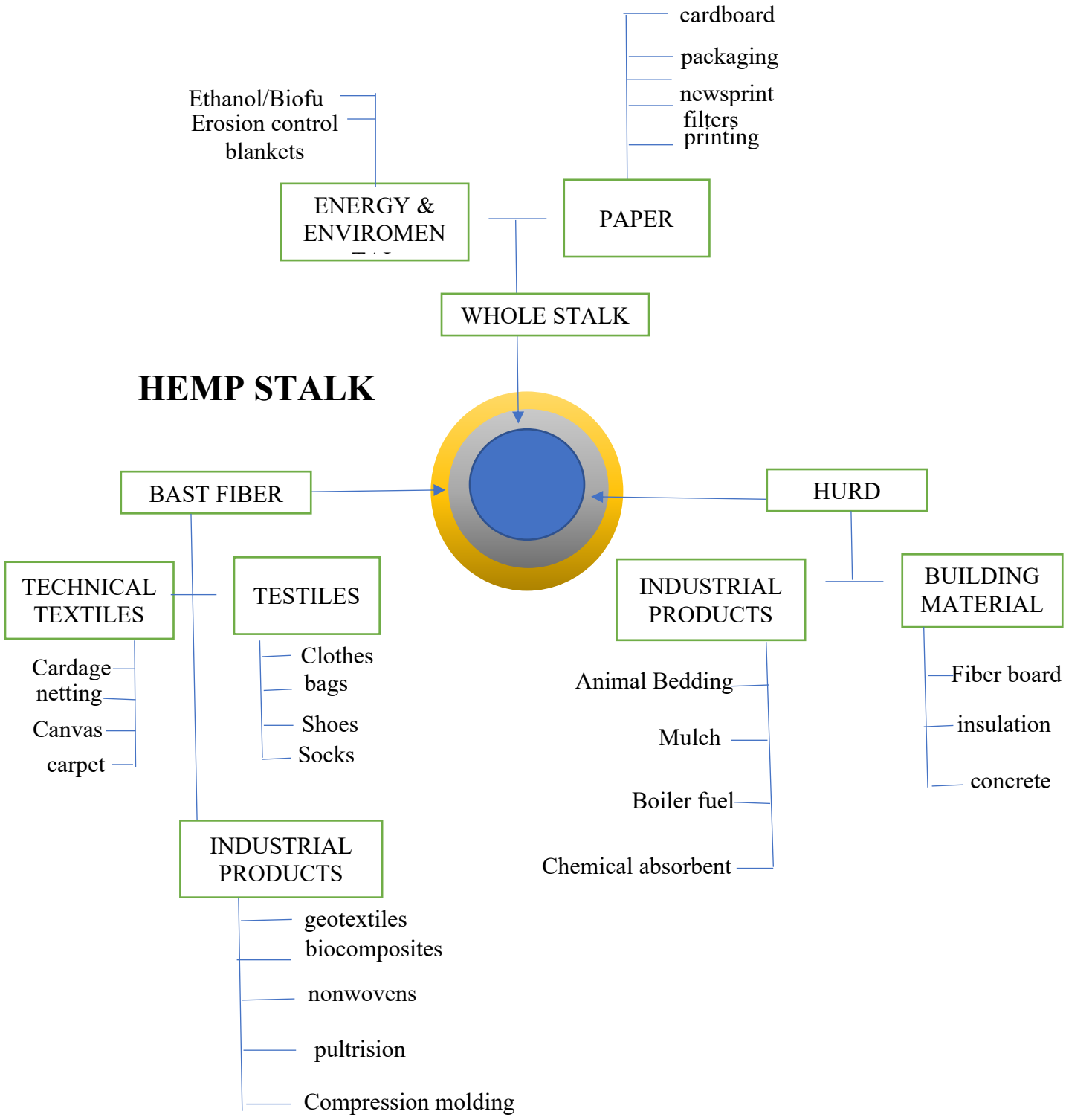
A better understanding of the cannabis legalisation model is contingent on a holistic, comprehensive, and cross-cutting analysis from the viewpoint of both the supply and value chain actors comprising growers, processors, distributors, consumers, and regulators, among other key actors in the supply and value chain. To outline the role of all actors, this section provides the detailed role, responsibility, and contribution of each agent in the supply and value chain. Given the long illegal status of cannabis cultivation, possession, and use in Ghana, an important prerequisite for decriminalisation and legalisation is a binding legal policy framework with guiding principles that specify both medicinal and industrial cultivation of cannabis. Our work indicates the potential benefits of cannabis for industrial and medicinal purposes based on existing literature, policy frameworks, and best practices from countries that have legalised its use. Once the initial hurdles have been cleared, this is the beginning of the free and unfettered use of cannabis for various purposes.

It is important to highlight the differences between Hemp and Cannabis, since there is little understanding of the populace, which affects their perception of the plant. The type of cannabis legalised by the government is hemp, which differs from cannabis in terms of its use and chemical content. Hemp contains less than 1% of delta-9 THC, the chemical component that is associated with making individual users 'high'. A better understanding of the types and

differences solidifies the foundation for its acceptance as a 'good' plant that benefits humanity, instead of classifying the entire plant as a living devil.

Ghana must build a timely competitive edge and efficient comparative advantage in the cannabis industry for its potential medicinal and economic benefits. However, this depends on a sound, workable, and comprehensive regulatory policy framework, with guiding principles and realistic action plans. Additionally, it is important to have a transparent, open, and formidable investment regime backed by cutting-edge research and development (R&D) with forward-linkage knowledge pathways between theory and practice to engage all key actors and players from growers, regulators, processors, exporters, and consumers among other agents in the value-added supply chain. Such a system backed by reliable empirical research will lead the cannabis industry to ensure standardised and high-quality, unfinished, semi-finished, or finished cannabis products at a relatively lower cost. In effect, ensuring a perfect policy interplay that will prioritise a value-chain system and an equitable investment regime that will be pro-poor in design to revive the poor farming communities in order to provide both their financial and non-financial needs will be necessary and sufficient to recover the maximum returns from regulated cannabis legalisation for medicinal and industrial purposes. Thus, drifting away from its popular name, ‘marijuana’, and proper reclassification of cannabis as an agricultural plant are precursors to dealing with the social stigma and community perception that has swamped the plant for years. In light of this, this section provides preconditions for regulated legalisation with measures for improved health among users from the perspective of supply chain agents spanning producers or growers, distributors, and final consumers. The framework below illustrates the value-added supply chain of industrial cannabis production that provides various uses for cannabis. In addition, there is a separate framework that highlights both the benefits of medicinal and industrial legalisation of cannabis, which will be useful in contributing to the existing emerging knowledge in research and policy.

Figure 3: Value-added supply chain framework of cannabis



Source: Burton (2022)

2.8 Growing of Cannabis

There are many controversies about who has the right and legal backing to grow cannabis, the quantity to grow, the type of strain, and the chemical composition, among other flagged issues, even in countries that have legalised cannabis. While some have proposed that governments should monopolise production, others suggest individual farm ownership, and some promote public-private partnership agreements in terms of cultivation, processing, and distribution, backed by state laws and guiding principles (Whiting et al., 2015; National Academies of Sciences, Engineering, and Medicine, 2017; Resko et al., 2019).

Ghana ranks second in West Africa for illegal cannabis cultivation and exportation (UNODC, 2007). Dr. Akwasi Osei, the country's chief psychiatrist, strongly criticised the call for a national debate on cannabis, who warned that legalising the substance would increase the rate of mental illnesses and drug-related crimes (Jafaru, 2014). Concerning the prevalence of abuse, a newspaper article stated that, in 2013, the Accra Psychiatric Hospital recorded 4,000 cannabis-related outpatient cases. Appiah (2014), who called for an end to the debate over legalising cannabis, also discussed its associated health risks. Hottor (2015) investigated factors that discouraged cannabis non-users from using the substance using a different approach. In addition, among the sampled population, the risk of health hazards was rated the most important reason for not using cannabis.

Little is known regarding the introduction and use of cannabis in Ghana. There is evidence that it was introduced in the early 20th century by veterans of World War 11 from India and Burma. The contribution of Sierra Leonean immigrants and sailors to the spread and commercialisation of cannabis throughout British West Africa cannot be overstated (Boroffka, 1966). Cannabis has flourished extensively throughout Ghana, particularly in cocoa-growing regions, where it provides income support when global prices decline (Akyeampong, 2005).

The growth of cannabis depends on many factors, chiefly the type of community in which it is grown and the socio-cultural makeup of the people, among others. In the Volta region, people have grown cannabis for millennia both in the mountains and valleys. The Volta region has been ranked by the Narcotics Control Board as the leader in cannabis use and cultivation (Ghanaweb, 2016). In the Nsawkaw area of the Bono East Region, Aburi, Koforidua, and others, other traditional cannabis communities exist where the players are different. Different ownership structures exist in these cannabis-growing communities, in which land ownership remains primarily traditional. In Ghana, 80% of the total land area is owned by clans, stools, skins, and families. The state owns 18%, while the remaining 2% is held in dual ownership by the state: the beneficiary interest is held by the community and the legal right is vested in the state (Ministry of Justice, 2000; cited in Kuusaana, Kidido & Halidu-Adam, 2013).

Both Sewornu's (2010) and Duncan's and Brants' (2004) studies found that land ownership was largely vested in lineage or clan and family units and managed by male lineage heads. Factors such as the inheritance system, local traditions and customs, decision-making powers, perceptions, and marital status were identified to affect men and women's access to land. By and large, these factors tend to favour men while placing women at a great disadvantage because issues about women are placed secondary to decisions (Duncan & Brant, 2004). In the Volta and Central regions, land tenure dynamics and livelihoods are significantly male-biased (Owusu et al., Kwami & Tagoe, 2007); as such, owning a cannabis (marijuana) farm would be more male-inclined. In a study by Bugri (2008), more males (66%) than females (55%) perceived customary land tenure as offering better security for agricultural production. This phenomenon was attributed to the religious beliefs and practices between males and females in their communities. Naba Amoa, as cited in Bugri (2008), underscores this assertion in the Upper East Region. However, Kasanga et al. (1996), who covered Wa, Nadowli, and Kumasi, concluded that existing tenure systems do not present significant obstacles to women's access

to agricultural land or inhibit agricultural development among women. They also stated that women who inherit through matrilineal lines for instance in Kumasi usually have an urge over men in knowing the extent and boundaries of family land holdings and are more inclined to pass on such farms to their daughters and granddaughters (Kasanga et. al ibid: cited in Kotey & Yeboah, 2003).

Historical farming activities in Ghana have been undertaken by individuals who receive seasonal support from governments and non-governmental organizations (NGOs). Individual families predominantly own farmlands, with the state controlling only a few pockets of public infrastructure. Based on practices in other countries, such as Canada, which is the leading producer of cannabis in North America and a major exporter to the USA, government monopolies have been proposed (Crépault, 2014). However, this approach may not be feasible given the governance system, political environment, and socioeconomic conditions among other factors that have rendered the agricultural sector almost fruitless in the country.

2.8.1 Alternative Approach to Growing Cannabis in Ghana

The government issuing compliance certificates for growers is a potential method for achieving this effect. This will ensure that the Government of Ghana certifies cannabis cultivators with information on land size, location, number of acres to be cultivated, harvesting equipment, and resources. This provides the government with the information necessary to inspect cannabis plants before, during, and after harvesting, to ensure legal compliance. Given the high levels of corruption in the country, it is necessary to work with the private sector, which is known for its stringent supervision, monitoring, and evaluation, as well as feasibility studies, to identify potential growers with the necessary resources. Occasionally, the government may issue a press release inviting potential growers to apply for a licence to cultivate cannabis. Applicants must undergo screening, interviews, and exhibitions before issuing a cultivation licence. Based on

their knowledge, the government can organise brief workshops to train growers with valid farming licences on best practices. These growers are then assigned field extension officers to assist them in land preparation and harvest.

Due to state failure and a lack of confidence in the public sector, a new wave of private-public partnership (PPP) agreements has emerged. The country has experienced a new age of privatisation of publicly owned firms as well as PPPs. Empirical evidence also highlights the relative importance and efficiency of PPPs and has strongly recommended this model in most sectors, including agriculture (Dong, Wang, & Yang, 2016; Ke, Wang, & Chan, 2010; Osei-Kyei & Chan, 2017).

2.8.1.1 Private-Public Partnership (PPP) Agreement Overview

In developing countries, about 94 per cent of the US $12.1 billion is spent annually on agricultural research by public sector institutions. Private-sector investment in agricultural research is on the rise worldwide and accounts for approximately 35 percent of global investment in research and development (R and D), with approximately US $11.5 billion per annum since the mid-1990s (Pardey & Beintema, 2001; Spielman & Grebmer, 2004; Mangeni, 2019).

Public-private partnerships in agriculture are collaborative mechanisms in which actors in research fields and the private sector share resources and risk and generate innovation for the development of the agricultural sector, including the livestock, forestry, and fisheries sectors. The possible partners include research institutes, universities, public extension agencies, producer associations, businesses, and individual producers in the private sector. In sub-Saharan African countries, these partnerships are often supported by governmental and international cooperation agencies (Mangeni, 2019). Collaborative partnerships are key mechanisms for developing reliable technology delivery streams. Collaborative partnerships

can also effectively bridge the gap between the distinctive competencies of the public and private sectors to better meet farmers' needs. Interactions between state-funded institutions and private sector entities occur in several areas, such as seed production, farm implements and machinery production, disease diagnostics and vaccine manufacturing, value-addition, post-harvest agricultural processing, and product quality testing and evaluation (Mangeni, 2019).

2.8.1.2 Current Status of PPPs in sub-Saharan Africa

Current PPP initiatives in SSA agriculture spur innovation in agricultural development and have various advantages over other non-collaborative institutional arrangements, fostering research and development (IFAD, 2011). Specifically, PPP initiatives in SSA have yielded several advantages. They reduce the costs and risks entailed in research; improve the quality and relevance of research results due to synergies among the partners; and ensure greater adoption by user groups, leading to the accumulation of complementary abilities, skills, and resources in farmers, leading to higher competitiveness and better market positioning as a result of improved competencies. They also promote development and poverty reduction by providing small-scale farmers with access to knowledge and technology (Marco & Paul, 2011). Most PPPs in sub-Saharan Africa are aimed primarily at improving the productivity of food crops for smallholder farmers. However, some private sector multinational companies promote the use of technologies oriented toward large-scale commercial production (Crop Life, 2012).

2.8.1.3 Emerging issues in agricultural PPPs

The potential of the agricultural sector in most emerging economies can only be fully realised when the level of investment required by the sector is met. However, budgetary allocations of governments to the agriculture sector, especially those of developing countries, have been inadequate, necessitating innovative partnerships in the sector to help meet these investment needs. AgriPPPs have been identified as essential catalysts for agricultural modernisation

(FAO, 2016), but their implementation is not devoid of challenges. In their study on international experiences of PPPs for agribusiness development, they concluded that even though agriPPPs contribute significantly to development goals in agriculture, many outstanding issues related to their impact on inclusion and poverty reduction remain to be resolved to enhance their effectiveness (FAO, 2016).

Some of these critical issues include lack of transparency in contractual arrangements, allowing land use rights over large tracts of land at the expense of smallholders (land grabbing), market risks, inability to withdraw from out-grower schemes, sustainability issues, large-scale agriculture also contributing to issues of climate change, lack of participation in decision making by producer groups, and civil society organisations during the formulation of mega-PPPs, elite capture, and gender issues (Oxfam, 2014). Additionally, issues regarding public administration and the lack of a holistic approach to supporting public sector entities in partnerships are critical issues that need attention (FAO, 2016).

The quest by some governments to release large tracts of land for large-scale agriculture by investors has led to the loss of land use rights by smallholder farmers over their farmlands. Additionally, payment of compensation for the transfer of land-use rights from smallholder farmers to investors is often opaque in terms of payment in some of these mega-PPP arrangements. Affected farmers are scarcely consulted in negotiating their compensation packages and payment terms for such compensation. Most often, the government engages investors, and whatever compensation package they decide on is given to landowners without their input. There have been reported cases of government paying compensation, not for the value of the land on which smallholders cultivate their crops, but for the value of the crops on the land.

In addition, in cases where farmers engage in out-grower schemes where they have contracts and buying arrangements with nucleus farmers, the terms and conditions of such buying arrangements and contracts are not transparent, and produce prices are mostly determined by the nucleus farmers. This leads to the exploitation of smallholders engaged in opaque contracts and buying arrangements. There is a need for transparency and involvement of smallholder farmers in negotiating their compensation packages before land use rights are transferred to investors, and these should be documented, and each party involved made to sign. Oxfam (2014) recommended the need for all parties involved in megaPPPs to reconsider issues of transparency, governance, and accountability of existing megaPPPs, and attention should be focused on improving smallholder participation and disclosure of investments.

Large-scale agricultural PPPs tend to require large tracts of fertile agricultural land close to water sources for their operations at the expense of smallholder farmers (Oxfam, 2014). These massive agricultural investments by foreign investors are undertaken for various reasons, some of which include improving the food security situation of their respective countries and for the production of energy (biofuel) for export at the expense of the food security situation of the countries in which these crops are grown. The acquisition of large areas of land could take the form of a concession, a lease (which is often for 30-99 years), or an outright purchase of the land (Zoomers, 2010). According to Kachika (2010), evidence available in 2009 revealed that land deals entered by Ghana, Ethiopia, and Mali involved 452,000, 602,760, and 162,580 hectares of land, respectively. Most of these land deals with foreign investors were promoted by the governments of the respective African countries in their quests to boost agricultural production and attract foreign direct investments into their countries. Despite the legality of some of these deals, they tend to displace and dispose of smallholder farmers. The acquisition of large stretches of farmland by investors for the cultivation of food and energy for export

may result in the disposal of rural communities of their main livelihood sources, which has implications for the fight against poverty and food insecurity in African countries.

Large-scale land acquisition for agriculture purposes by foreign investors further poses challenges to the attainment of Goal 13 of the 2030 agenda of the Sustainable Development Goals (SDGs) of the United Nations. This goal called for immediate action against climate change and its impact which continues to threaten human existence on Earth. Changing the climate negatively affects the livelihoods of resource-poor farmers and further impedes their coping strategies. It also has grave implications for Africa's efforts against food insecurity and extreme poverty and hunger, as well as the ability of the continent to achieve goals 1 and 2 of the SDGs. Smallholder farmers in rural communities are the first victims of the environmental risks of climate change. The transfer of land use rights to investors in the vast area of land for large-scale agricultural production will result in the destruction of forest reserves and natural vegetation cover in these areas.

Additionally, the search for fertile land for agricultural purposes by investors and smallholder farmers may also result in the disruption of ecosystems and biodiversity loss, which can significantly contribute to climate change. A study by the Intergovernmental Panel on Climate Change (IPCC, 2014) revealed that land use change resulting from agriculture, forestry, and other land uses contributed 12 per cent to the total global greenhouse gas emitted between1990-2010. This demonstrates the danger that continuous deforestation and the disruption of the natural vegetation cover in search of farmlands for large-scale agriculture PPPs pose to human survival. The intensive cultivation of such farmlands, which involves the use of inorganic chemicals that leach into water bodies, may negatively impact the environment. The immoderate use of land and water resources may lead to soil erosion and water scarcity.

Large-scale agriPPPs pose further market risks to smallholders by crowding them out of both domestic and international markets. The use of advanced production technologies by foreign investors reduces their production costs, and they also benefit from economies of scale. Thus, they can sell their produce at cheaper prices, and the inability of smallholder farmers to compete with them drives them out of the market. Doubt has also been raised about the sustainability of large-scale agriPPP outgrower schemes because of the high operational costs. Should foreign investors pull out of financing such mega-PPPs, the question of whether such outgrower schemes can continue to operate needs to be considered. This further reveals the risks that farmers face in such schemes (Oxfam, 2014). The exclusion of smallholders from decision-making processes leading to such massive agricultural PPPs leaves much to be desired. This is due to the potential impact of such large-scale acquisitions on their source of livelihood. In addition, some of these arrangements may prefer to work only with men, leaving women, and vice versa. This also raises concerns regarding how gender issues are included in some of these arrangements.

2.8.1.4 Current Status of PPPs in Ghana

Ghana's PPP environment is nascent and has room for significant progress (Oliveros-Romero & Paton-Cole, 2022). The Build-Operate-Transfer (BOT) model is not popular in the agricultural sector of the country because of the challenge of payment of service charges. It is also evident that most of the supposed PPP arrangements in the agricultural sector of Ghan do not meet the key elements in Ghana's PPP policy document (ISSER, 2018). The Government hardly shifted a significant proportion of the risk involved in partnerships to the private sector.

All actors involved in agriPPP arrangements have unique roles and responsibilities, which are determined by the partnership's primary goal. In most agriPPP arrangements, smallholder farmers are regarded as investors and/or beneficiaries of the partnership (ISSER 2018).

Development partners mostly provided funding and technical support during implantation. The public sector is the main financier of agriPPPs. There is no standardised financing structure for agriPPPs in Ghana (ISSER, 2018). The success of agricultural sector PPPs in Ghana is determined by the sector's attractiveness to investors and the clarity and enforcement of contractual agreements. Conversely, risks and uncertainties associated with partnerships, bureaucracy, and a lack of transparency can derail effective PPP collaborations. The national PPP policy is skewed towards the provision of infrastructure, bringing into sharp focus the need for a sector-specific policy in the agricultural sector (ISSER, 2018).

The following preconditions should be in place before PPT can be considered in agriculture and cannabis cultivation. Going forward, there is a need to develop an agriPPP policy/strategy document tailored to the peculiar characteristics of the agriculture sector. Furthermore, there is a need for education and sensitisation of the general public regarding PPPs in the country if the government desires to reap the replete benefits of PPP arrangements. The rationale for setting up the Ghana Incentive-Based Risk-Sharing System for Agricultural Lending (GIRSAL) is good and should be supported. The government of Ghana must continue to create an enabling environment to attract private sector resources and expertise to the agricultural sector, including the development of land banks for agriculture.

A careful approach that Ghana can adopt in the cannabis industry will be contingent on recommendations that follow a detailed review of existing empirical evidence, programs, policies, and legal frameworks on PPPs previously used to assess the viability and feasibility of the cannabis industry. In addition to the above, lessons, proposals, and best practices from other countries will also serve as relevant information that will inform the government of Ghana to propose a more contextual, workable, innovative, and timely production model, such as private individual-owned production, autonomous private community organised growing,

processing, and distribution centres supervised by the government or a hybrid private-public partnership agreement that will facilitate the new economy of exchange through cannabis legalisation for both medicinal and industrial purposes.

2.9 Processing of Cannabis

Cannabis cultivation is required, but not sufficient, to generate anticipated returns. Therefore, processing a plant with added value is essential to maximise investment returns. It is crucial to establish appropriate facilities to ensure a value-added supply chain for cannabis production. This forward linkage strategy maximises resource utilisation for transporting cannabis from the field to the finished product. The lack of value addition and supply chain disruptions in Ghana pose a significant barrier to the sustained growth of the agricultural sector. This includes inadequate road networks, limited and expensive transportation, a lack of storage facilities and warehouses, and the absence of processing factories to transform agricultural products into finished goods. Recognising this sector's weakness is essential for developing a long-lasting solution that will ensure that the legalisation of industrial cannabis will be beneficial to the country.

Government funding is required to construct cannabis processing facilities. This can be accomplished in two ways: using separate processing facilities for medical and industrial cannabis. There are both intermediate and further processing stages within the industrial plant, where the cannabis plant undergoes hulling into food, crushing into oil and cake, and decortication into fibre and hurd, depending on the type of product required. The percentage of cannabis plants processed for medicinal and industrial uses is essential. Based on this, a comprehensive breakdown is required to detail product focus based on the competitive edge and comparative advantage of the industrial hub, similar to the European cannabis industry, which allocates approximately 15% of cannabis to the automotive industry (Karus & Vogt,

2004). Medical cannabis is an emerging field with a growing body of knowledge that provides a better understanding of the potential medicinal benefits of plants.

Given the controversy surrounding its use and effects on users, cannabis has not been included in the pharmacopoeia of many medical schools worldwide. Therefore, Ghana needs the assistance of trained specialists to conduct research on the medical effects of cannabis to provide ground-breaking evidence. In addition, individuals in the fields of medicine, pharmacy, clinical health, and pharmaceutical industries must receive training to gain a proper understanding of the chemical composition, strains, dosage, and application to different categories of patients, who will be monitored over time as part of repeated controlled trials. To ensure proper regulation and control of the illicit use and abuse of cannabis products, individuals working in private dispensaries are required to obtain a valid licence to sell medical cannabis products. The government must strengthen public-private partnership agreements with private individuals who have the necessary resources and do not violate ethical standards on quality assurance and health (mental and physical).

2.10 Distribution of Cannabis Products in Ghana

Cannabis is consumed by diverse populations for various reasons, and it is evident that cannabis grown in Ghana is consumed both domestically and internationally. Consequently, the quantity to be distributed and sold domestically and internationally must be specified. This can be accomplished by conducting market research to determine the average quantity and type of cannabis products consumed monthly, quarterly, or annually by locals. Country-specific situational reports indicate which countries are likely to dominate cannabis exports, allowing Ghana's government and private individuals to engage in bilateral and/or multilateral trade for foreign exchange. To control for a larger market share, it is necessary to create certain cannabis-derived products nationwide as primary consumables. This may include plastics, textiles,

paper, and pulp in addition to other domestic necessities. Product quality, packaging, service delivery, and R&D must be bolstered to gain a competitive edge in the international market, as they are the foundation for gaining a comparative advantage in the resource, product, and service markets.

2.10.1 Approaches to Distribution Methods

From a policy perspective, a publicly owned system governing cannabis distribution would best facilitate the implementation of a range of health-protecting policies (Babor, 2010; Caulkins et al., 2015; Haden & Emerson, 2014; Rehm & Fischer, 2015), whereas a privatised approach would best support commercial interests (i.e. liberalised or 'light-touch' restrictions). This finding is supported by evidence from alcohol privatisation in Canada, wherein the resulting alcohol distribution system maximises commercial benefits and harms public health (Stockwell et al., 2009; Zhao et al., 2013). To protect public health, researchers recommend implementing a publicly owned system for cannabis distribution that operates as a not-for-profit operation (Caulkins et al., 2015).

From a design perspective, a publicly owned system could provide access to cannabis from standalone, single-commodity stores, thus mitigating the potential negative impact associated with exposure to marketing strategies that may be employed within retail environments (Haden & Emerson, 2014). Many public health researchers have recommended approaches to reduce cannabis marketization and exposure to marketing (Haden & Emerson, 2014; Kilmer, 2014; Rehm, Crepault, & Fischer, 2017; Room, 2013; Spithoff, Emerson, & Spithoff, 2015). Supporting calls to reduce exposure to cannabis marketing, researchers have recommended that monopolised retail outlets operate as standalone, single-commodity stores that retail cannabis within 'standardised, neutral, bland' environments (Haden & Emerson, 2014). Regulations targeting retail store design are critical for public health, as researchers studying

alcohol retail have determined that marketing tactics, including product placement, labelling, displays, and co-branding, are risky, particularly for the youth (Grier & Kumanyika, 2010; Mosher, 2012).

Furthermore, researchers have posited that a monopolised cannabis distribution system would decrease youth access to cannabis and population-level use of the drug (Rehm & Fischer, 2015). Importantly, by removing the profit or economic motive from cannabis retail, cannabis sales may occur in a way that provides safe access, without retailer incentive to increase the use and uptake of the drug. A publicly owned system also mitigates several public health risk factors that occur through a privatised distribution system, such as increased product innovation, decreased pricing, and increased access and promotion (Caulkins et al., 2015). Additionally, a privatised distribution system would have a greater incentive to promote use that would harm public health, would have significantly less capacity to control suppliers, would be significantly more likely to promote hazardous cannabis use, and would provide less quality insurance for cannabis products in comparison with a governmental monopoly (Caulkins et al., 2015).

While a publicly owned system would provide an effective means to protect public health (Haden & Emerson, 2014), some of the regulatory benefits associated with this distribution design may also apply to other formats. For example, while neither Colorado nor Washington State has established publicly owned monopolies for cannabis distribution, Washington State has allowed provisions for regions to cap and regulate cannabis retail outlet density, if they choose to do so (Room, 2013). However, the effect of this optional approach has been questioned, given that researchers posit that the cannabis legalisation context in the United States appears to have facilitated the growth of a powerful industry with significant

marketisation potential (Subritzky et al., 2016a). This development is likely to undermine efforts to protect public health through optional density restrictions.

While neither Colorado nor Washington State has implemented strong regulatory approaches from a public health perspective, they have chosen to restrict cannabis retail to separate stand-alone stores (Carnevale et al., 2017; Room, 2013). This may be beneficial for public health in the early stages of legalisation, but caution is warranted as policy longevity and enforcement may be disadvantaged within privatised distribution systems, as corporations' profit and growth motives are likely to advance marketisation and deregulation (Moodie et al., 2013). A publicly owned system would avoid this risk, as this distribution format would better facilitate policy enforcement and longevity (Rehm, Crepault, & Fischer, 2017).

It is important to note that publicly owned monopolies benefit from being able to choose between protecting public health and pursuing profit-maximising practices (Room 1994). Alternatively, private corporations are bound to fiduciary responsibilities of protecting and promoting shareholder profit and are therefore unable to promote the regulatory approaches required to protect public health as this would undermine the success of a commercial model (Subritzky, Pettigrew, & Lenton, 2016b). To ensure the success of a publicly owned governmental system for cannabis distribution, researchers have suggested that the distribution format should operate as a commission that is legally bound to enforce public health objectives (Haden & Emerson, 2014). This would avoid the risk of having a system that operates under a profit-generating paradigm and would provide 'insulation' from the influence of industry and commercialisation pressures (Haden & Emerson, 2014). The lessons learned from the Canadian context of alcohol monopolies demonstrate that government monopolies are not without faults. Some researchers caution that, as many government monopolies operate within

revenue-generating formats, the difference between monopolised and privatised systems may not be so significant (Kalant, 2016a).

However, despite the risk of a system seeking profit maximisation, the risk is still significantly less than would be experienced within a privatised system, as evidenced by research reports analysing the public health impact associated with alcohol privatisation in Canada (Stockwell et al., 2009; Zhao et al., 2013). While some Canadian provinces have maintained semblances of alcohol monopolies, many have transitioned in part or in full to privatised distribution formats (Giesbrecht et al., 2016). Research analysing the impact of alcohol privatisation in Canada demonstrates that privatisation increases access to alcohol, alcohol-related risks (Stockwell et al., 2009), and alcohol-attributable mortality (Stockwell et al., 2011).

These findings are congruent with international research studying alcohol privatization, where the evidence suggests that privatized alcohol retail systems are harmful to public health, while government monopolies offer invaluable health protection (Babor, 2010; Campbell et al., 2009; Popova, Giesbrecht, Bekmuradov, & Patra, 2009; Popova et al., 2012; Grubesic et al., 2012; Hahn et al., 2012; Norstrom et al., 2010). Given the strength of this evidence from the alcohol field, public health professionals caution that the same risks associated with privatisation would also apply to cannabis distribution (Center for Addiction and Mental Health, 2016; Rehm & Fischer, 2015). Rehm, Crepault, and Fisher (2017) stated that if cannabis were to be distributed within a privatised format, the risk to public health would be significant given that commercialisation and harm to public health are likely to be positively correlated (Rehm, Crepault, & Fischer, 2017).

2.10.2 How might the cannabis distribution system impact well-being in Ghana?

With health-focused publicly owned monopolies on one end of the spectrum and commercially focused privatised systems on the other, the debate regarding cannabis distribution has been

presented as complex and, at times, polarising (McColl, 2015). The public health literature highlighted in this report provides a case for implementing a publicly owned system as an ideal distribution format for cannabis. This distribution format would best protect public health when implemented alongside other key regulatory restrictions, such as

- Comprehensive marketing restrictions similar to tobacco control mechanisms
- Health-focused taxation and pricing
- Product restrictions (i.e., prohibiting products with a high concentration of tetrahydrocannabinol; THC)
- Restrictions on Retail Outlet Location, Design, and Density.

Extending beyond the recommendations to distribute cannabis within publicly owned governmental monopolies, other prominent dialogues include discussions regarding whether to retail cannabis within pre-existing alcohol outlets (where a system exists), or within pharmacies that already distribute medical cannabis products. However, the cannabis legalisation position paper from the Canadian Pharmacist Association (2017) makes clear that retail non-medical cannabis within pharmacies may not be ideal, as it may infer and exaggerate the medicinal benefit of nonmedical cannabis products. Despite this, it may be risky for public health if the perception of cannabis is further medicalised, as this may encourage its uptake and use. Regarding the retail of cannabis within monopolised alcohol outlets, this would not be ideal given the risk associated with co-marketing and concurrent use of cannabis and alcohol; if it were the selected distribution format, regulations should ensure an entirely separate retail space for cannabis, including a separate checkout and the prohibition on cross-promotion (Centre for Addiction and Mental Health, 2017).

From a theoretical perspective, the design of a cannabis distribution system acts as the foundation upon which the regulatory framework is built. A privatised distribution system

would facilitate a framework that favours commercial outcomes, whereas a publicly owned system would favour public health. As such, the latter would best serve the collective of Ghanaian communities in a way that respects the structural dimensions of the social determinants of health by creating a cannabis retail environment that prioritises public health over commercial interest. In essence, the chosen distribution format for cannabis or other licit non-medical drugs is perhaps more indicative of political and social values and ideology than of science, evidence, or, to a lesser extent, power. This notion has been explored by Room (1993), who elucidated how socialist or capitalistic values may influence privatisation and monopolisation outcomes. In this sense, the distribution format divides societal values of collectivity and social justice, with individualism and economic justice; similarly, commercial actors may seek to advance individualistic values to evade effective regulation (Beauchamp, 1976; Harvey, 2005). While analysis of this is beyond the scope of this report, it warrants mention that an examination of the ideology underlying a governmental decision regarding how to distribute cannabis may elucidate a deeper understanding of our socio-political system. Will Ghana choose an approach that will best protect public health or prioritise commercial interests?

If Ghana chose to implement privatised cannabis distribution systems, the resulting cannabis industry would likely be capable of utilising hard and soft power tactics to shape pro-industry outcomes in the future, similar to the approaches employed by the tobacco and alcohol industries (Moodie et al., 2013). Certain factors may aid in the creation of a positive public perception of the industry as a benevolent group, as opposed to a corporate actor with progressing self-interest. By creating the perception that the industry is a ‘helpful actor’, the industry may be attempting to effectively create a space for themselves within health policy processes (Dorfman et al., 2012). This may be congruent with the industry’s goal of attempting to differentiate itself from the less positively regarded tobacco industry (as the tobacco industry

has been largely excluded from all policy dialogues; Hall 2017). This is despite the fact that the cannabis industry may have 'learned well from the tobacco industry', a risky prospect for public health (Subrtizky, Lenton, & Pettigrew, 2016a).

Finally, even if Ghana chose to implement a privatised cannabis distribution system with retail store location and design controls similar to (the optional) approach in Washington State, deregulation may be a likely distal outcome as the power of the cannabis industry grows in strength. This is relevant as researchers caution that the cannabis industry may strategize to exploit weaker regulations and loopholes (Subritzky, Lenton, & Pettigrew, 2016b) and may attempt to progress liberalized, commercial goals through the application of a 'powerful lobby' (Caulkins et al., 2015). Furthermore, researchers caution that as the cannabis industry develops, so too will its capability to exert political influence is targeted at shaping public policy processes (Barry & Glantz, 2016).

Even barring this evidence and debate, Ghana would still be wise to pursue a more heavily restricted publicly owned government system for cannabis retail, as researchers and public health professionals have illuminated how it would be difficult for a privatised cannabis distribution system (or otherwise a light-touch regulatory approach) to transition towards heavier regulations once the system is in operation (Caulkins et al., 2015). In this sense, privatisation offers close to a 'no going back' regulatory position. Given that Ghana is not an innovator in cannabis legalisation, a more cautious, amendable approach would be wise and justifiable (Pacula et al., 2014). Table 1 presents the Cannabis Action Plan for Regulated Legalisation in Ghana.

Table 1 Cannabis Action Plan for Regulated Legalisation

Priority Area	Best practices, lessons, guiding principles and action plans
Production/Growing	o A first option for growers is based on the existing legislation where growers need a certified license issued from a responsible agency that would keep the rules fair for all players. The rules around cannabis legislation is a pathetic copy and paste version of what the North Americans have evolved over the years for their temperate climates. They are also suitable for large scale producers. A second option which is even superior is to allow production to flourish without any centralised intervention. For a plant of balance, all concerns would be sorted without human intervention. It is precisely government intervention over the years that has brought up the current challenges. And it is the fear of the ruling elite that makes cannabis cultivation a problem. o The certified licensing approach is practiced in Lesotho, Malawi, South Africa, Zimbabwe and Zambia. Existing licenses allow for only medicinal research and use. In Ghana, both medical and industrial use is emphasized. The preconditions for obtaining license, and the cost involved excludes local entrepreneurs and delivers the emerging cannabis industry into the hands of foreign conglomerates and concerns. The study proposes that individuals who would like to cultivate for small scale use should go into production straight away without need for any licenses. For growers targeting foreign markets and consumers, government

	should regulate, and steer the incentives for both the small and large scale grower.
Processing	○ This industry is best driven by private initiative, however, government has a role in providing the necessary public goods that make the cultivation and utilisation of the plant more beneficial and easy. ○ Expertise in the field must be engaged through any form of meaningful coalition, committee and/or commission that will administer all the affairs of cannabis right from the farm to the final consumer. ○ Medical and pharmaceutical labs interested in investing in the new industry can maximise their potential by providing processing equipment and plants and trained expertise. ○ An intermediate or long term plan is needed to add medical cannabis to the medicine curricular and pharmacopeia. The Nile Valley Multiversity has developed advanced level courses on different aspects of the plant from growing to final consumption and research institutes and universities can contribute to this effort to deepen the research. ○ Quality control assurance is needed to monitor and constantly check the quality of cannabis products. This must also include recycling system to limit or avoid any form of wastage and negative spill overs that will be hazardous to nearby community members.

Distribution	o Cannabis distributers need to be regulated. Licenses based on needs approach, equity and capability in order to regulate any form of black market trade, influx of fake products by other agents and also, to ensure there is regulated use domestically. o At the international level, government must tighten regulations in order not to allow unscrupulous actors to export fake products that will reduce the international trust and good will for Ghana's cannabis products. o There must be checks in place to deal with corruption and corrupt officials. o Internet sales and distributions must be properly tracked to ensure that right customers are engaged. This will help boost cyber security and checkmate fraudulent practices. o In terms of labelling and packaging, it is important to include information on the chemical make-up, instruction on usage, dosage, and respective manufactured and expiry dates as well as key side effects of consumption to pre-inform consumers before using cannabis products.
Pricing	o Pricing of cannabis products must be based on market research and consumer behaviour at the individual, household and national levels. o Taxing must be based on how individual consumers perceived tax, current and projected economic situations and existing revenue regulatory frameworks in the country.

	○ Economically, using both elasticities of demand and supply will also inform the decision on how best to share the tax burden on different types of cannabis products.
Cannabis Governance	○ Cannabis governance must include but not limited to ethics, compliance, diversity and inclusion. ○ In terms of ethics, there must be guiding principles and policy frameworks that will clearly define, explain and reinforce conducts acceptable in the cultivation, processing, distribution and final consumption of cannabis products for either medicinal or industrial purposes. ○ Government must ensure there is transparency, accountability and clearly defined laws in place to deal with any incidence of corruption. ○ Any member issued cannabis license for either growing, processing or distribution must comply with all protocols, laws and guiding principles that will ensure consistent and regular assessment, monitoring and evaluation for a smooth operation in the industry. This must apply to any form of use – medicinal or industrial. ○ In line with the UN SDGs which promotes shared growth for all without leaving any one behind, government must put social protection measures in place that promotes zero discrimination and equal opportunity for all citizens without leaving no one behind.
Public Education	○ Cannabis growers and organisations such as the Nile Valley Multiversity and government design programmes that will provide

	a better understanding of cannabis, its potential benefits and associated risks to the larger population. o Programmes must also focus on all segments of cannabis users and potential users that will educate them on both the industrial and health needs and types of cannabis products that may be of help. o Both the medical benefits and associated risks must be made clear to general public to understand better their needs and all forms of possibilities in using cannabis products. o Media contents that advertise cannabis products for firms must do that based on compliance to every ethical protocol so as to be able to make sales without misleading the general population.

Source: Author's Construct (2022)

2.11 Conclusions

Ghana responded to the call to legalise cannabis for medicinal and industrial use in March 2020. To better understand the role of cannabis in medicine, industry, and associated risks as well as to address public perception and social stigma, there is a large gap in research and knowledge. This study contributes to the demand for knowledge and research by setting the pace of cannabis research, providing a better understanding of the potential medical and industrial benefits of the plant, and highlighting its risks. The study also provided a model for regulated cannabis legalisation, a proper guide on value-added supply chain mechanisms, and guiding principles to ensure the model functions properly, based on lessons and best practices from countries that have legalised cannabis, such as the Netherlands, Canada, Lesotho, Malawi, Zambia, South Africa, and Zimbabwe.

There is evidence that the cannabis prohibition lacks empirical support. It was founded on the propaganda and politics of the alcohol, tobacco, textile, and paper industries. In cannabis-related medical research, it has been observed that cannabis, in the correct dose and the right hands, cures a wide variety of diseases. Industrial cannabis is extensively used in the pharmaceutical, textile, paper, pulp, oil, biofuel, and automotive industries. This study also revealed that chronic cannabis use, especially in high-THC strains, is associated with impairments in cognitive behaviour, memory, motor coordination, and attention that can last up to two days. Individuals within the age range of brain development are highly susceptible to oppositional, psychoactive, and schizophrenic behaviours. High THC consumption during pregnancy results in low birth weight and problems with foetal development. Cannabis is a valuable source of medicine for nearly all diseases, although acute and prolonged recreational use is harmful.

Before growing, distributing, and consuming cannabis, it is essential to identify all the key actors in the value-added supply chain to better comprehend their roles at each stage of the cannabis industry. This establishes the foundation for defining policy frameworks, protocols, action plans, and guiding principles that can effectively direct the cannabis industry from the farm to the final consumer. Therefore, a proper cannabis governance and policy framework must promote compliance, ensure inclusion, and comprehend ethics to achieve shared growth for all without leaving anyone behind. For the industry to flourish in Ghana and elsewhere, domestic laws must evolve, appropriate regulations must be enacted, and a level-playing field must be established for all citizens.

A better understanding of how medical cannabis can be regulated, advanced, and incorporated into mainstream medicine, pharmacy, and traditional medical curricula and pharmacopoeias is required for future research. Additionally, future research must focus on how Africa can

maximise its market share and competitive edge and gain a comparative advantage in a more innovative, cost-effective, and value-added approach to the commercial cannabis industry that will yield maximum benefits in both the medical and industrial sectors, especially in the era of the African Continental Free Trade Agreement (AfCTA).

CHAPTER THREE

MEDICAL CANNABIS USE AND SELF-REPORTED WELLBEING: EVIDENCE FROM SOUTH AFRICA

3.1 Introduction

Anecdotal and empirical research supports multiple health benefits of medical cannabis (Hoffenberg et al., 2017; Svrakic et al., 2012). However, the ongoing debate over the expanding use of medical cannabis has centred on public health, psychology, and social welfare research, with little focus on the economic ramifications. Cannabis remains one of the most popular social drugs, despite its illegal status in many nations (Kitchen, Kabba, & Fang, 2022), with different patterns of use for medicinal, industrial, and recreational purposes. Even among researchers who support or oppose cannabis use and legalisation, knowledge about the plant and its advantages and side effects have been obscured by bias and subjective viewpoints. As a result, despite scientific advances, it is impossible to establish a strong foundation for the actual therapeutic value of cannabis in clinical experiments. In underdeveloped countries, there is a minimal understanding of cannabis, particularly among medical practitioners. Furthermore, those with sufficient plant expertise are unlikely to educate the public with well-established caution. Some potential explanations include the negative societal stigma connected to cannabis because of the prohibition of the movement's number of years of misinformation.

Cannabis is frequently associated with social issues on any platform. This reinforces its negative views without considering any empirical evidence. Despite the abundance of literature on cannabis use, existing clinical studies on (dis) health risks are limited and fragmented. When all evidence is considered together, it is inconclusive. An overdose was recorded when the literature mentioned a substance's health risks (Josephson and Barry, 2014; Josephson & Goode, 1971;

UNODC, 2017). As a result, establishing a firm stance on the real and potential effects of cannabis among countries that have legalised it, those that are about to legalise it, and anti-cannabis countries has reopened the research window for further enquiry on people's perceptions before using cannabis and comparing them to real-time experience from its medical use.

Regulated cannabis legalisation for medicinal and industrial purposes has remained a source of contention for various reasons. While countries that have legalised cannabis have reservations about their health and social effects, those that are considering legalisation have mixed feelings about it (Luginbuhl, 2001). Most counter-cultural human rights activities, such as the legalisation of same-sex marriage, have relied heavily on perception. Cannabis is a key focus area, with arguments for and against legalisation. In African countries, where legalisation is still in its early stages, perceptions based on religion, culture, and unknown beliefs play a key role in most community and country development decisions.

Although much of the focus on cannabis is on its negative aspects, it is worth noting that its unknown benefits cannot be overlooked. The plant's therapeutic potential and cancer chemotherapeutic benefits include effective treatments for migraines and pain. Individuals who have terminal cancer, on the other hand, can be treated with cannabis (Grinspoon, 2001; Mikuriya, 1969). Evidence of such treatment success has been provided in the literature. One study reported that Medical Cannibis (MC) relieved migraines more than non-cannabis products (75.82% vs. 51.01%) (Gibson, Hitchcock, Bryan, & Bidwell, 2021). In addition, among participants who relied on non-cannabis products and cannabis therapy, MC provided better relief ($p < 0.001$) (23), with a sustained effect after controlling for migraine severity ($p = 0.03$) (Gibson et al., 2021). In an online survey of MC users, there was an equivocal report of the usefulness of MC on headaches, with 39% (64/164) of patients reporting MC as ineffective at all (no change in headache days), although 8.5% (14/164) reported that MC was very effective (50–

100% reduction in headache days) (Kuruvilla, Mehta, Ravishankar, & Cowan, 2021). According to Hill, Palastro, Johnson, and Ditre, (2017), a recent meta-analysis of clinical trials of cannabis and cannabinoids for pain found modest evidence supporting the use of cannabinoid pharmacotherapy for pain. Recent epidemiological studies have provided initial evidence for a possible reduction in opioid pharmacotherapy for pain because of increased implementation of medical cannabis regimens (Hill et al., 2017).

In medicine, cannabis has been identified as one of the most important plants with significant health benefits and little or no psychoactive effects when administered at appropriate doses. This chapter provides feedback on medical cannabis use and self-reported well-being in terms of chronic pain management, stress and anxiety coping strategies, migraine treatment, and cancer treatment.

The use of cannabis in the treatment of chronic pain, cancer, anxiety, and migraine has been well documented in scientific literature (Baron, 2015; Baron et al., 2018; Rajapakse & Davenport, 2019). An extensive literature review of the clinical use of cannabis and cannabinoids was conducted by Baron (2015) with a focus on migraine and other headache disorders. The author argues that mounting evidence supports the idea that medical cannabis plays a therapeutic role in a wide range of illnesses, especially chronic pain disorders such as headaches. Although most evidence is case-based, anecdotal, or laboratory-based, some studies suggest that medicinal cannabis and cannabinoids may play a role in various headache disorders, including migraine and cluster headache. Randomised clinical trials are needed to confirm and further evaluate the potential role of cannabis and cannabinoids in the treatment of headache disorders.

The following are some potential benefits of studying the effects of medical cannabis on self-reported well-being in South Africa.

It can help identify conditions that may benefit from the use of medical cannabis. By studying the effects of medical cannabis on self-reported well-being, researchers can gain a better understanding of the medical conditions that may be effectively treated with cannabis. This information can be used to guide healthcare providers in making treatment decisions for their patients.

This can provide insights into the potential risks and side effects of using medical cannabis. Although cannabis has been shown to have potential therapeutic benefits, it can also have potential side effects. By studying the effects of medical cannabis on self-reported well-being, researchers can gain a better understanding of the risks and side effects, which can help inform patients and healthcare providers about the potential risks and benefits of using cannabis for medical purposes.

This can help improve access to medical cannabis for patients who may benefit from its use. By providing evidence of the potential benefits of medical cannabis, research on this topic can help increase access to cannabis in patients who may benefit from its use. This could be particularly important in South Africa, where access to medical cannabis is limited.

Overall, studying the effects of medical cannabis use on self-reported well-being in South Africa can provide valuable insights into the potential benefits and risks of using cannabis for medical purposes. This information can help inform healthcare providers, policymakers, and patients regarding the potential use of medical cannabis in various conditions.

The rest of the chapter provides both theoretical grounding and empirical evidence of the effect of cannabis on self-reported well-being, how the phenomenological framework is incorporated in unpacking the evidence, and, finally, an anecdotal case-based self-reported narrative analysis on the effect of cannabis on the subjective well-being of users.

3.2 Cannabis Legalisation in South Africa

The Constitutional Court of South Africa upheld the legalisation of recreational cannabis in September 2018 after centuries of prohibition. Public health programs are responsible for improving the health of the general population, and many South Africans and government agencies see this ruling as directly counterproductive. Even though many people are happy about the decision, they are likely to have unfavourable effects on their health-related actions and outcomes (Volkow et al., 2016). Because of this ruling, the country's already overburdened healthcare and welfare systems will be pushed to their breaking points. The burden of the HIV/AIDS and tuberculosis pandemics is exacerbated by cannabis use because it decreases adherence to antiretroviral therapy and worsens the management of HIV-related symptoms among people living with HIV (Bonn-Miller, Oser, Bucossi, & Trafton, 2014). The ruling also necessitates a legislative amendment to accommodate the change, so policymakers and health service providers need to consider how this will affect the public and social aspects of healthcare.

Legalisation of cannabis is a major threat to national security because it can lead to the use of dangerous substances (Hetzer & Walsh, 2014). For example, to protect minors, the intended regulation for use will be difficult to implement, because there are no strategies in place for doing so. South Africa is currently struggling to regulate the sale and use of alcohol and cigarettes; adding regulations on cannabis would increase the demand for regulations that are unlikely to be met or effectively implemented without additional resources. This rule has legal ramifications, necessitating regulations that put the public's health ahead of the desires of cannabis consumers and the industry's profits (Barry & Glantz, 2016). South African policymakers need to develop strategic and comprehensive controls to achieve the minimum harm associated with cannabis use, as this rule does not support efforts to prevent and reduce harmful effects resulting from recreational use.

3.2.1 The ramifications of legalising cannabis on society and the economy

Globally, those living in poverty are more likely to engage in health-risking behaviours, whereas those living in economically disadvantaged areas are more likely to be dependent on cannabis (Hopfer, 2014; Barry & Glantz, 2016). More black people, who are disproportionately likely to use cannabis, will be relegated to lower socioeconomic status as a result of legalisation (Ramlagan, Peltzer, & Matseke, 2010; KarrikerJaffe, 2011). There is a vicious cycle of trauma and substance abuse in communities in which both are prevalent. People in these communities turn to drugs and alcohol to deal with the emotional fallout of their traumatic experiences (Hammersley, 2011). The Constitutional Court also acknowledged the wide range of social problems that arise as a result of cannabis legalisation. The ruling does not provide any solutions to the resulting social problems, such as mental health issues, criminal activity, or any other difficulties that have arisen. Substance abuse is a major problem in South Africa; however, few effective programs have addressed this issue.

The country is currently facing difficulties in strengthening its health systems to enable acceptable standards for ordinary healthcare services, and there is little emphasis on substance abuse prevention. As a result, the legalisation of cannabis occurs when it is more difficult to devote resources (both human and financial) to prevention. There is a pressing need to pinpoint at-risk populations and implement preventative measures right now (Plüddemann, Flisher, McKetin, Parry, & Lombard, 2010), and that demand is only going to grow once recreational use is legalised.

The legalisation of cannabis and its impact on well-being and economic growth is an interesting case because cannabis's role as a gateway drug to other illicit substances for people with mental illness is a major public health issue in South Africa (Secades-Villa, Garcia-Rodrguez, Jin,

Wang, & Blanco, 2015). Despite claims, the negative data on medical cannabis use, some of which are highlighted in this study, far outweigh the positive data.

Additionally, numerous alternative treatments are both safe and effective and can be administered according to the doctor's recommendation. Smoked cannabis poses a significant risk to public health and places an additional financial burden on the South African healthcare system if legalised. Interventions to prevent, manage, or treat the increasing prevalence of mental illnesses have not kept pace with this problem. If more people start using cannabis as a result of this legalisation, the situation will only worsen as more people will require treatment for addiction and other mental disorders related to cannabis use.

Hospitalization due to cannabis-related complications is regarded as a serious outcome (Jouanjus, Leymarie, Tubery, & Lapeyre-Mestre, 2011). Driving under the influence of alcohol remains a persistent problem in South Africa despite the best efforts of traffic officials and law enforcement agencies (Meel, 2007; Lewis, 2014; Rogeberg & Elvik, 2016). This problem is expected to worsen as more people start using cannabis, which has no readily available diagnostic tests despite rendering users incapacitated (Rogeberg & Elvik, 2016). Some experts in public health and behavioural sciences believe that the tragedy of road accidents should be treated as a public health issue rather than a police or legal matter.

It is the poor who are disproportionately affected by the correlation between poverty and substance abuse (Kalichman, Simbayi, Kagee, Toefy, Jooste, Cain, & Cherry, 2006; Mulia, Schmidt, Bond, Jacobs, & Korcha, 2008; Wasserman & Clair, 2010). Thus, the gap between the rich and poor will widen even further (Jaffe, 2011).

Another reason for concern regarding cannabis use is its impact on users' offspring (Vassoler, Byrnes, & Pierce, 2014). The legalisation of cannabis is likely to have a negative effect on the health and social well-being of people in South Africa. After ruling in favour of the cannabis

legalisation, the Constitutional Court gave parliament two years to amend the Drugs and Drugs Trafficking Act. Parliament's strategy for minimising the negative effects of the ruling's implementation remains unclear. Those in the South African government who opposed the legalisation–including the Justice and Constitutional Development Ministry, the Police, the Health and Social Development Ministry, the National Director of Public Prosecutions, Doctors for Life, and other NGOs - now face the herculean task of dealing with the fallout of a ruling they did not support, and which does nothing to protect or improve the public's health.

South Africa does not have the economic, social, or labour capacity to deal with the fallout from legalising recreational cannabis use. The effects of cannabis use, especially among youth and low-income communities, were most acutely felt. Other studies have focused on the economic analysis of the demand for cannabis (Riley, Vellios, & van Walbeek, 2020), and the critical issues in the debate on decriminalisation or legalisation of cannabis in South Africa (Parry, 2002; Perkel, 2005; Rothberg, 2017). These studies failed to critically evaluate the impact of legalised and regulated cannabis on well-being from the perspective of cannabis users. The current study delves deeply into the implications of medical cannabis use in South Africa and the comparative effect of prohibition, decriminalisation, or regulated legalisation of cannabis in Ghana.

3.3 Empirical perspective

3.3.1 Positive effects of the use of cannabis

With the advancement of modern technology in the medical and neuroscience fields, the focus of the recent migraine discourse has shifted from finding a cure to understanding how it occurs. Hormones and chemical cells in the brain play a role in the occurrence of migraine. When neurotransmitters are overused in the human brain, specifically in the hypothalamus, causing the release of vasoactive peptides, the neuron receptors that connect the head and neck regions are

threatened, resulting in inflammatory disorders such as headache, which can be classified as migraine (Lochte et al., 2017).

Other theories contend that migraine pain is caused by waves of activity in groups of excitable brain cells. These cause chemicals, such as serotonin, to constrict the blood vessels. This can cause the blood vessels to narrow throughout the body. When serotonin or oestrogen levels fluctuate, some people experience migraines. Serotonin levels may affect both sexes, whereas oestrogen levels may affect only women. Because of the monthly variations in hormonal levels experienced by women during their menstrual cycles, they are more likely than men to suffer from migraines (Stewart et al., 2008; Waters & O'Connor, 1975).

To change the public and societal perceptions of cannabis's medicinal, recreational, and industrial uses, it is critical to highlight the benefits of the plant while informing individuals who are concerned about the effects of high THC that producing cannabinoid-rich cannabis plants is enormously beneficial and sufficient to meet the majority of human medical, recreational, and industrial needs. This serves as the foundation for discussions on legalisation. This section empirically reviews scientific works on the benefits of cannabis, provides knowledge to clarify public ignorance of the subject, and constructs a model for three policy options for legalisation.

In medicine, cannabis has been identified as one of the most important plants with significant health benefits and little or no psychoactive effects when administered at appropriate doses. Pacher and Kunos (2013) discovered in their study that when the activities of the endocannabinoid system are carefully modulated, the therapeutic benefits derived are promising. This aids in the treatment of a wide range of diseases, including obesity/metabolic syndrome; cachexia; chemotherapy-induced nausea and vomiting; tissue injury; neurodegenerative, cardiovascular, and inflammatory disorders; and pain. Although the study found some levels of complications, such as obesity, these were due to challenges with little knowledge in the field.

Therefore, more research in this area is needed for the effective use of cannabis for all human health needs. As a result, the role of cannabis in the endocannabinoid system has shifted from simply rebalancing physical build-up and breakdown to combating diseases and injuries (Bachhuber et al., 2014; Vandrey et al., 2015). Bonn-Miller et al. (2014) used a convenient sampling technique to investigate specific coping strategy motivations, frequency of cannabis and alcohol use, and mental health among patients with post-traumatic stress disorder (PTSD). They concluded that patients rely on cannabis to cope with their conditions, sleep well, and reduce their proclivity to commit suicide (Bonn-Miller et al., 2014). Due to the negative effects of these opioids, relying on them for treatment exposes people to opioid addiction and death (Bachhuber et al., 2014; Pedersen & Skardhamar, 2010). Their findings are consistent with those of Lim, See, and Lee (2017) and Swift, Gates, and Dillon (2005) both of which investigated the effect of cannabis on PTSD.

Cannabis became the first organic antipharmacological product to cure epilepsy with zero or few (manageable) side effects in another area of pressing health needs that have not received full recovery from pharmaceutical products. Cannabis is now widely accepted as the most effective treatment for people (mostly children) suffering from epilepsy (Devinsky et al., 2016; Kaplan, Offermann, Sievers, & Comi, 2017; Russo, 2017; Saade & Joshi, 2015; Sulak, Saneto & Goldstein, 2017; Viggiano et al., 2016). Tzadok et al. (2016) concluded that CBD treatment had a significant positive effect on the seizure load. Most children (66/74, 89%) reported a reduction in seizure frequency: 13(18%) reported 75–100% reduction, 25(34%) reported 50–75% reduction, 9(12%) reported 25–50% reduction, and 19(26%) reported <25% reduction. They also observed an improvement in behaviour and alertness in patients with epilepsy treated with cannabis, as well as significant improvements in language, communication, motor skills, and sleeping order. However, only a few cases of adverse reactions, such as somnolence, fatigue, gastrointestinal disturbances, and irritability, have been reported. This resulted in discontinuation

of therapy in these five patients. Despite the contextual nature of these studies, which included different patients with dissimilar health issues of varying degrees of severity, there was agreement that CBD-rich cannabis used to treat seizures in children aged up to 18 years is significantly effective in providing them with a relieved life.

It is important to note that the current significant benefits of cannabis in the field of medicine do not come close to the actual potency of the plant, given that this is an emerging field, and research into the plant is still ongoing. The reason for this delay is that this plant has been illegal for a long time due to fabrication and outright propaganda by groups in the pharmaceutical, clothing, paper and pulp, and other industries that see cannabis as a threat to their bottomlines (Svrakic et al., 2012). Consequently, the war on cannabis is more political than scientific, with no established moral hegemony (Bottorff et al., 2013; Goode, 2009; Maier et al., 2017; Stringer & Maggard, 2016). Given that studies on cannabis and crime have found no association between them, it is reasonable to conclude that any policy prohibiting cannabis is not close to its implications (see Pedersen & Skardhamar, 2017; Pedersen & Skardhamar, 2010).

Severe recurrent headaches and migraines are major public health issues with debilitating effects on individuals and significant household and societal costs. While scientific research on phyto-physiology, headache, and migraine is still ongoing, cannabis has been identified as an important plant with significant health benefits and little or no psychoactive effects when administered at appropriate doses. This section examines the scientific literature regarding the role of cannabis in migraine treatment. Despite the anecdotal nature of the evidence, medical cannabis has played a significant role in the pain medical pharmacopoeia in treating chronic pain, including migraine in humans (Bachhuber et al., 2014; Russo, 2007). The endocannabinoid system is used to combat diseases and chronic pain by rebalancing the physical build-up and breakdown of cells (Bachhuber et al., 2014; Vandrey et al., 2015).

Theoretical and empirical studies have found that patients with migraine who receive cannabis treatment have a lower propensity, frequency, and intensity of migraine after treatment (Baron et al., 2018; Rajapakse & Davenport, 2019; Russo, 1998). As a result, the existing evidence serves as a useful starting point for more extensive research on cannabis and its medicinal value. Therefore, providing a better cure with fewer or no associated risks depends on extensive research.

3.3.2 Adverse effects of the use of cannabis

Addiction vulnerability (Chambers, Krystal, & Self, 2001) and self-medication (Khantzian, 1997) hypotheses were used as pillars to guide the analysis of whether cannabis has true therapeutic potential versus whether its effects are more harmful, which is essential for understanding the paradox of the societal and legal perspectives of cannabis. Two studies found a two-fold increased risk of anxiety symptoms with cannabis use, while another found no significant association between cannabis use and generalised anxiety disorder (GAD) (Degenhardt, Hall, & Lynskey, 2001; Van Laar, Van Dorsselaer, Monshouwer, & De Graaf, 2007). In addition to relieving acute withdrawal symptoms like anhedonia-like reports, anxiety, and headaches, the belief that cannabis can be used to medicate symptoms of mental illness primes reinforcement for further drug use (Agrawal, Pergadia, & Lynskey, 2008; Khantzian, 2012; Koob, & Le Moal, 2001).

Studies of cannabis' effects on mental illness are mostly observational and have been conducted with today's recreational strains, which have higher THC levels and lower CBD concentrations (ElSohly, Chandra, Radwan, Majumdar, & Church, 2021). Many people with mental illnesses believe that cannabis can help them cope with their symptoms. Cannabis use was associated with an increased risk of receiving an MDD diagnosis and earlier onset of cannabis use was associated with a shorter time to MDD presentation in a 40-year study that analysed a cohort of more than

400 individuals across multiple time points (Schoeler, Theobald, Pingault, Farrington, Coid, & Bhattacharyya, 2018). Consistent with the findings of other studies, chronic cannabis use is associated with an increased risk of developing depression (Horwood et al., 2012; Rasic, Weerasinghe, Asbridge, & Langille, 2013). Although the potential therapeutic effects and harmful effects of cannabis have been thoroughly evaluated, a recent report by the National Academies of Sciences (2017) concluded that many gaps remain in the scientific literature.

Increased dopamine release decreased glutamatergic synaptic transmission, the release of endogenous opioids, and inhibition of acetylcholine secretion were just some of the pharmacological changes triggered by a single exposure to cannabinoid agonists in the brain (Fantegrossi, Wilson, & Berquist, 2018). Both the right dorsolateral prefrontal cortex and bilateral hippocampus showed decreased activation in cannabis users during the encoding phase of the task but not during any of the other phases (Ramsey, 2007). These studies suggest that cannabis users, when compared to control participants, show a similar pattern of hyperneuronal brain activity accompanied by normal cognitive performance in functional neuroimaging studies. It has been hypothesised that this elevated state of activity is indicative of the increased neural effort required to sustain a level of performance that is deemed adequate for the task at hand (Weinstein, Livny, & Weizman, 2016). The lack of a correlation between chronic cannabis use and cognitive impairment and the lack of differences in cognitive performance between cannabis users and controls are not necessarily indicative of the same thing (Weinstein, Livny, & Weizman, 2016). Cannabis users have been shown to have structural and functional brain abnormalities in multiple recent studies (Weinstein, Livny, & Weizman, 2016; Lorenzetti, Solowij, & Yücel, 2016). According to a recent study (Duperrouzel, Granja, Pacheco-Colón, & Gonzalez, 2020), regular healthy cannabis users, regardless of age, exhibit poorer neurocognitive functioning than non-users with effect sizes ranging from small to medium.

Clinical studies have shown that, similar to the effects of tobacco, cannabis smoke increases airway inflammation. The negative effects of cannabis smoke on respiratory health have not been consistently demonstrated in population and cohort studies. Smoking cannabis has been linked in some epidemiological studies to an increased risk of developing cancers of the head and neck as well as cancers of the respiratory tract in humans, but this link is not definitive due to several confounding factors (Marselos & Karamanakos, 1999). Among people who don't regularly smoke cigarettes, cannabis use is linked to a higher risk of developing prostate cancer and a nearly significantly higher risk of developing cervical cancer (Sidney, Quesenberry, Friedman, & Tekawa, 1997). Based on these findings, more research into the link between cannabis and cancer, controlling for confounding factors such as tobacco use, is warranted.

According to a meta-analysis of preclinical and in vitro evidence, cannabinoids can influence T cell subset balance and cytokine expression and play a role in the equilibrium between neuroinflammation and neurodegeneration (Tanasescu & Constantinescu, 2010). Immune cells produce endocannabinoids and respond to cannabinoid analogues. Although the precise mechanisms by which cannabinoid ligands affect the immune system remain unclear, their immunomodulatory properties suggest that they may be useful for the treatment of inflammatory diseases (Tanasescu & Constantinescu, 2010). Since the people studied used cannabinoids at relatively high doses and may have developed tolerance to their effects, it is unclear how useful these data will be in clinical settings. Overall, studies on the effects of cannabis on the human immune system have yielded contradictory findings, suggesting the need for additional investigation on this topic.

Recent research has linked cannabis use to an increased risk of cardiovascular problems like heart attacks, strokes, and even cannabis arteritis (Thomas, Kloner, & Rezkalla, 2014). Synthetic cannabinoids (SCs) most commonly cause tachycardia, which typically resolves with

symptomatic care, including intravenous fluids, benzodiazepines, and antiemetics, and may not require inpatient care, according to a review of clinical studies on SCs. Myocardial infarction and fatal stroke were reported in 9.5% of 200 cannabis-related hospitalizations in a French study (Jouanjus, Leymarie, Tubery, & LapeyreMestre, 2011). The risk of developing myocardial infarction in regular cannabis users is 4.8 times higher than baseline in the hour after use (Mittleman, Lewis, Maclure, Sherwood, & Muller, 2001). Patients with heart conditions should stay away from cannabis (Thomas, Kloner, & Rezkalla, 2014).

Reproductive function is affected by long-term cannabis use. Cannabinoid agonist treatment disrupts the ovulatory cycle, decreases testosterone secretion, and affects sperm production and motility in animals (Fried 1993). Low birth weight, premature delivery, and placental abruption are not associated with cannabis use (Shiono et al., 1995). Changes in neural activity during response inhibition as measured by functional magnetic resonance imaging (fMRI) have been linked to prenatal cannabis exposure, even after accounting for current cannabis use and prenatal exposure to nicotine, alcohol, and caffeine (Smith, Fried, Hogan, & Cameron, 2004).

Dr. Alexandre Dumais (MD, PhD, FRCPC) of the Institut Philippe Pinel and Dr. Stéphane Potvin (PhD, professor at the Université de Montréal) studied 1,136 patients (aged 18–40 years) with mental illnesses who had been seen five times in the year following discharge. They accounted for substance use and the onset of violent behaviour. According to literature, cannabis dependence is linked to aggressive tendencies. New research published in Frontiers in Psychiatry found a correlation between persistent cannabis use and an elevated risk of violent behaviour, measuring +144 per cent (University of Montreal, 2017). These findings further support the idea that long-term cannabis use is harmful to individuals with mental illness. Alex Dumais (MD, PhD, FRCPC), the study's primary investigator, said, “an interesting feature of our results is that

the association between persistent cannabis use and violence is stronger than that associated with alcohol or cocaine" (University of Montreal, 2017).

3.3.3 Case Presentations: Cannabis Violence

Anthony Comello, a senior member of the Gambino family on Staten Island, New York, confessed to the murder of Frank Cali on 13 March 2019. He was subsequently charged with Cali's death. Comello's alleged romantic interest in a Cali relative is said to be the source of tension between the two men. "Comello had no prior run-ins with the law, but he may have drawn attention to himself by offering a citizen's arrest of New York City Mayor Bill De Blasio in a federal courthouse. Comello had previously contacted the U.S. Marshal to enquire about arresting citizens of House Speaker Nancy Pelosi. Comello admitted to being stoned at the time of Cali's murder and shooting him because he thought the senior leader had a gun and would shoot him amid their argument (Wilkinson, Stefanovics, & Rosenheck, 2015; ElSohly, Mehmedic, Foster, Gon, Chandra, & Church, 2016).

On 10 February 2019 a man in Rustavi, Georgia, stabbed his 13-year-old nephew to death. He was a known cannabis user. He complained of dizziness, headaches, general weakness, nausea, and insomnia on the days leading to the murder. Sometimes, he would get nervous, snap at people, and lose appetite. His wife claimed that he smoked cannabis while experiencing worsening of his condition. The patient attempted to visit a doctor on the day before the murder. However, the clinic turned down his request for help and recommended a mental health facility. However, he went home hours before killing his nephew (The Lowell Sun, 2019) and passed out of drug use.

Nikolas Cruz committed mass shooting at Marjory Stoneman Douglas High School in Parkland, Florida, on 1 February 2018 killing 17 people and injuring another 17. Cruz's behavioural problems in school began in middle school when he was already developmentally delayed. Early

in life, he developed severe cannabis. He says he regularly “heard demon voices,” and that he tried to drown them out by smoking huge amounts of cannabis. He even tried to kill himself. During an interview after the massacre, he admitted to using “a lot of cannabis” and the prescription tranquillizer Xanax (Arkansas Online, 2019; Dugré, Dellazizzo, Giguère, Potvin, & Dumais, 2017).

On 5 November 2017 Devin Patrick Kelley committed the deadliest mass shooting in Texas history by opening a fire on worshippers at the First Baptist Church in Sutherland Springs. Twenty-seven people were killed, and 20 were injured. Later, during a high-speed chase with law enforcement, bystanders shot and killed the Kelley. The toxicology results from Kelley's autopsy showed the presence of cannabis and anxiolytic medications. Multiple prior incidents, in which Kelley was also influenced by cannabis, were reported by the FBI. Kelley's first documented run-in with the law occurred when he was arrested for cannabis possession and kicked out of high school. The record shows that after this point, Kelley began regularly using cannabis, developed mental health issues that caused him problems at work with the United States Air Force, and repeatedly abused his stepson and wife (Brook, Lee, Finch, & Brook, 2014; Dharmawardene, & Menkes, 2017).

A teenager was killed and 22 others were injured when Richard Rojas deliberately drove a car through three blocks of Times Square in New York City on 18 May 2017. All indications point to Rojas status as a chronic cannabis smoker. He was admitted to smoking cannabis that had been treated with other drugs before the crime commenced. In addition, Rojas's history of paranoia and hallucinations is documented, explaining why he made strange statements and engaged in questionable behaviour at work and in social situations. Having suffered from paranoia and hallucinations, he “heard voices” convincing him to carry out the attack (Schoeler et al., 2018).

According to new research published online ahead of print in the journal Psychological Medicine, changes in brain function due to long-term cannabis use may contribute to aggressive behaviour. The relationship between cannabis use and aggressive behaviour has been the subject of many studies. In contrast to the intoxicating effects of alcohol and methamphetamine, the calming influence of cannabis seems poorly suited to encouraging violent behaviour. However, a large body of research has established a connection between cannabis use and aggressive behaviour. The difficulty in concluding these studies stems from numerous confounding factors. It is challenging to disentangle the effects of socioeconomic status, personality traits, and other factors related to the propensity to use cannabis based on the correlation between the two.

Moreover, the causal relationship between smoking cannabis and violent behaviour may be in the opposite direction. In other words, people who are more likely to engage in violent or criminal behaviour may also be more receptive to the benefits of cannabis use. Because cannabis is illegal in many areas, it stands to reason that those with lawless tendencies and antisocial personalities are the ones most drawn to trying it.

Neuroscientist Tabea Schoeler at Kings College London and her colleagues, concluded that "together, these results provide strong indication that cannabis use predicts subsequent violent offending, suggesting a possible causal effect, and provide empirical evidence that may have implications for public policy" (Schoeler et al., 2016, p. 1663). We now consider the proof provided in this study. The researchers in this new study followed the same people from childhood to adulthood, which gives their findings more weight than those of previous studies. This is precisely what one needs to solve the chicken-or-egg riddle concerning cannabis and violence: one can tell which one comes first by looking at them. The participants were 411 boys born in or around 1953 and raised in low-income areas of London for the Cambridge Study in Delinquent Development. All were Caucasian and raised by two parents; 97% were Caucasian.

Antisocial personality traits (measured by the Antisocial Personality Scale), cigarette smoking, alcohol consumption, drug use, mental illness, and family history were considered. They discovered that the vast majority of participants did not engage in cannabis use and exhibited no violent behaviour. As many as 38% of the participants in the study were admitted to having tried cannabis at some point in their lives. Most of them tried cannabis for the first time as teenagers but eventually gave up. Only 20% of boys who started using cannabis before the age of 18 years were in their thirties (32-48 years). Twenty-two percent of cannabis users reported an increase in violent behaviour after starting to use the drug, whereas only 0.3% reported an increase in violent behaviour before starting to use cannabis. When all other factors that contributed to violent behaviour were considered in the statistical analysis, continued cannabis use remained the strongest predictor of violent convictions over the course of the study.

In conclusion, the data indicate that persistent cannabis use is associated with seven times the risk of engaging in violent criminal behaviour in the future. Similar to the increased risk of developing lung cancer from smoking cigarettes for a prolonged period, the risk here was high enough to be considered statistically significant (40 years). According to the authors, the effects of cannabis on normal neural functioning in the ventrolateral prefrontal cortex may explain why some people exhibit impulsive and violent behaviours.

3.4 Husserl's Phenomenological Model

Transcendental phenomenology (TPh), largely developed by Husserl, is a philosophical approach to qualitative research methodology seeking to understand human experience (Moustakas, 1994) Transcendental constitutive phenomenology studies how objects are constituted in pure or transcendental consciousness, setting aside questions of any relation to the natural world around us. Husserl's transcendental phenomenology, therefore, can demonstrate how, in maintaining an indispensable role for mental states in permitting access to evidence,

internal states are a necessary condition for helping determine not only how valid beliefs are formed but also how knowledge about the world is established. Central to the phenomenological study was the description of the common meaning for several individuals of their lived experiences associated with a phenomenon or concept (Creswell, 2013).

Following Husserl's transcendental constitutive phenomenological framework, this study examined the lived experiences of people who used cannabis to improve health-related well-being. This method provides a vivid description without obscuring prior assumptions or hypothetical speculations (Husserl, 1970; Sanders, 1982; Dukes, 1984). Husserl's phenomenological framework allows the researcher's perceptions, subjective views, and personal biases regarding cannabis and its use to be separated from the actual experiences of those who use it. In effect, Husserl's eidetic reduction approach is used to deepen our understanding of the real experiences of cannabis and its use without preconception, which is a paradigm shift from societal facts about cannabis that are often gloomed with biases to the essence of using the plant from the user's perspective. In effect, this framework assists researchers and society in suspending all forms of belief systems regarding cannabis, its use, and its effects on the transcendental world. Overall, the phenomenological approach to understanding consciousness and alternate dimensions in human psychological makeup and cannabis use can draw a line between perceptions without understanding the meaning and essence of an individual's decision to use it due to insight gained from personal experiences with it. The tree. This is referred to as unimaginary variation in the framework (Husserl, 1970).

Given that cannabis consciousness and use are not random but intentional and can only be achieved through experience rather than perception, this framework best fits the study in explaining lived experiences of cannabis use for well-being. Doing so will provide the foundation for developing an edited synthesis written protocol to conduct a meaningful analysis to develop

a situated structure of cannabis users' lived experiences, which will integrate all forms of analyses to generate an overall general structure to assess the lived experiences of cannabis, its use, and its effects alongside perception.

The phenomenological approach to understanding the interaction between medical cannabis use and improved well-being provides an understanding of the essence of an individual's decision to use medical cannabis based on personal experience. This study used both thematic and case study approaches to present individuals' experiences with medical cannabis to assess the effect of medical cannabis on self-reported well-being.

3.5 Data and Methodology

This study used purely qualitative techniques to demonstrate individuals' self-reported cannabis experiences and how they affected their well-being in South Africa through unique cases of stress and anxiety management, migraines, chronic pain, and cancer. According to the phenomenological framework developed for this study, respondents aged 5–25 years are strongly advised to reach saturation. The study interviewed 21 people who said they used cannabis to treat medical conditions such as chronic pain, migraines, stress, and anxiety, among others. In terms of analysis, the study created case studies based on some of the most relevant but also fascinating and insightful narratives from individual respondents.

Given the study's purely qualitative nature, this chapter acknowledges the underlying methodological challenges in terms of validity and reliability to achieve methodological rigor. Regardless, this approach is deemed necessary because it provides a narrative report of individuals who use medical cannabis to improve their wellbeing. As a result, such findings cannot be quantified because the relationships expressed by the respondents do not represent any kind of causality.

The study also employs a positivist epistemology, with the understanding that this method of research challenges the traditional notion of absolute truth in knowledge by recognising that behavioural changes due to the use of cannabis for well-being improvement cannot be guaranteed (Comte, 1975; Creswell & Creswell, 2017; Muijs, 2010). The positivist paradigm is founded on key beliefs, such as the belief that empirical observations are the foundation of objective research, that the world follows permanent cause-and-effect laws, and that research is value-free, considering that the truth and reality of the study subject are independent of the researcher's cognitive thinking, and that it studies and tests hypotheses about human behaviour using the relationship between variables and experiments (Aliyu, Bello, Kasim, & Martin, 2014; Lee, 1991; Schrag, 1992). As a result, the study objectives were to uncover the contribution of medical cannabis to the improvement of individual well-being.

3.6 Findings

3.6.1 Cannabis and Pain Management

A better understanding of how cannabis interacts with the human body and brain to treat cancer and migraine headaches has been emphasised (Quarshie, 2020; Baron, 2015; Russo, 2001). Despite the scepticism of many medical and health professionals regarding the effects of medical cannabis use, some proponents assert that cannabis may have medicinal properties if the psychoactive substance, or 'high-inducing' component, is properly managed and controlled (Byars, Theisen, & Bolton, 2019; Abrams, 2016). Others contend, based on existing anecdotal evidence and a few scientific observations, that, given the positive effects of medical cannabis, there is a compelling case for considering its legal use in the medical profession (Case, 2021). Growing anecdotal and empirical evidence suggests that cannabis oil provides health benefits (Ebbert et al. 2018). One fascinating case involved a South African cancer patient who was given weeks to live. She asserted that the use of cannabis oil had saved her life. She began her

petition for the government to legalise cannabis with the hope that many other cancer patients would also benefit (QC, 2021).

Despite this, several African governments have maintained that cannabis has no therapeutic value because of the lack of scientific evidence (Kitchen, Kabba, & Fang, 2022). Surprisingly, one respondent stated that the only information she had was that her cancer had been nearly eradicated. According to her medical team, she was cancer-free, but was convinced that she had cured her with cannabis oil. She declared that she was speechless because she could not believe it. Before utilising medical cannabis, the patient underwent extensive chemotherapy for excruciating pain. During her illness, when everything seemed hopeless, a friend advised her to try cannabis oil but she refused. She highlighted that:

> *When my daughter brought oil, she checked with me whether I had taken it. I would always pretend I had, but I had not, because I just hated the taste, and I did not like the feeling of it as it makes me a bit drunk but funny; I just laughed at everything, but I did not like it.*

Another respondent recounted how medical cannabis served as an alternative pathway to his experience of a relatively better medical condition.

> *I used medical cannabis for back pain for two years. Before I discovered cannabis, I was on medications for high blood pressure and Attention Deficit Hyperactivity Disorder (ADHD). These medications depressed me, and, at one point, I started having suicidal thoughts. Once I started using cannabis, I stopped taking all my medications, started working out, and even lost weight. I even had a higher concentration of Sativa strain. My personality improved, and I started being open-minded instead of standing against it. I even made amends to my sister, whom I always ignored. Cannabis brought me out of a dark place and became a place to learn more about. In 2008, I would probably vote no*

for its legalisation, but now I am starting to understand the world from a different point of view. Being open-minded is the key.

Similarly, another respondent stated the following.

I have been using medical cannabis for Crohn's disease since I was much younger. I first acquired Crohn's disease when I was a ten-year-old child. Seven years later, after a small gulp from the mainstream medical community, I found something that seemed to demonstrate actual evidence, such as an improvement in my medical condition. While I have not recovered from Crohn's disease, I can see significant improvement as my pain has ceased, similar to nausea, fatigue, and being homebound and virtually married to the bathroom. While I still have diarrhoea, it has reduced significantly from an average of seven to eight times a day to approximately three to four times a day. I can even sleep better.

3.6.1.1 How Medical Cannabis Changes the State of High Blood Pressure

Medical cannabis may cause the sympathetic nervous system to release the stress hormones adrenaline and cortisol, increasing heart rate and blood pressure. A study published in 2016 in the Journal of Hypertension found that recent cannabis use was associated with higher systolic blood pressure levels (Alshaarawy & Elbaz, 2016). Systolic blood pressure measures the blood pressure in the arteries when the heart beats. Diastolic blood pressure measures the force when the heart is at rest between beats. In a study of people aged 20 to 59 years, approximately 1500 people who had used cannabis in the past 30 days were compared to roughly 5,000 never-users and 5,000 people who had used cannabis in the past, but not in the last 30 days. Based on these results, the researchers estimated that using cannabis daily for 30 days would result in a systolic blood pressure about 3 points higher than that of people who never used it or used it in the past.

This ‘modest association’ jibes with other studies that have found cannabis can cause a short-term rise in blood pressure but the long-term impact is less clear, they concluded.

Another study based on similar national survey data was published in 2019 in The American Journal of Health Behavior (Vidot, Powers, Gonzalez, Jayaweera, Roy, Dong, & Messiah, 2019). The study found that current heavy cannabis users were 1.8 times more likely to have higher blood pressure than their counterparts who never used cannabis. Of those who had used cannabis one or more times in the last 30 days, 19.4 per cent had elevated blood pressure, 22.7 per cent had stage 1 hypertension, and 12.9 per cent had stage 2 hypertension, compared with 16.1 per cent, 21.4 per cent, and 11.9 per cent, respectively. People at risk for high blood pressure should be cautious when it comes to heavy cannabis use.

3.6.1.2 How Medical Cannabis Changes the State of Attention Deficit Hyperactivity Disorder (ADHD)

Attention deficit hyperactivity disorder (ADHD) is a chronic neurobehavioural disorder highly prevalent in both children and adults. Despite the lack of evidence regarding its efficacy and safety, an increasing number of patients with ADHD are self-medicating with cannabis. ADHD is a neurodevelopmental disorder that affects around 6-9% of children and younger adults and about 5% of adults globally (Zulauf, Sprich, Safren, & Wilens, 2014). A person with ADHD might find it difficult to focus on tasks, frequently fidget, show signs of restless behaviour, or be unable to stay still or quiet at appropriate times.

ADHD medications can help correct the levels of dopamine, a neurotransmitter, in the brain. However, medications may also have unpleasant side effects. To avoid these adverse effects, some individuals with ADHD use cannabis as a treatment option. Many unanswered questions remain about its usefulness and safety, especially for children and younger people. Supporters of cannabis often claim that it is a safe drug, with no risk of addiction. However, some opponents

call it a ‘gateway drug,’ potentially leading to the use of other drugs, and claim that it is more dangerous than others. Many people smoke or eat plants to produce a ‘high’. In recent years, cannabis has been used as an alternative treatment for various health conditions including pain and mental health problems.

- **Benefits**

A 2016 study of 268 separate online discussion threads reported that 25% of people said they believed that cannabis had a positive role to play in ADHD symptom management (Mitchell, Sweitzer, Tunno, Kollins, & McClernon, 2016). This study indicates that research proving a connection between cannabis and the management of ADHD is limited. Some schools of thought suggest that ADHD may stem from a lack of dopamine in the prefrontal cortex region of the brain. As a neurotransmitter, dopamine transmits signals between the nerve cells in the brain. Dopamine may affect thought processes including memory and attention. Substances in recreational drugs, such as cannabis, can lead to the production of more dopamine in the reward centre of the brain. The reward centre of the brain provides individuals with a pleasant sensation when they use cannabis and other drugs. However, recreational drug use and increased dopamine levels can lead to the development of dependence.

A 2017 study discusses the dopamine-releasing action of tetrahydrocannabinol (THC), an active chemical component in cannabis, and the source of its pleasure sensation (Bloomfield, Ashok, Volkow, & Howes, 2016). The researchers advised that THC boosts short-term dopamine levels, but may dull the system that releases dopamine in the long term. This varying effect suggests that even if cannabis provides short-term symptom relief, better focus, or sedation for people with ADHD, its long-term use may result in more harm.

One trial in 2017 tested cannabinoid medication in ADHD patients. While the participant number was small and the findings were not statistically significant, the results did show small

improvements in ADHD symptoms (Cooper, Williams, Seegobin, Tye, Kuntsi, & Asherson, 2017). The results also suggest that adults who take cannabinoids for ADHD experience more side effects than children. A further review of available clinical evidence on cannabis cited a case that, although not involving ADHD, showed that a child with autistic spectrum disorder had improved hyperactivity levels after receiving cannabidiol (CBD) treatment.

- **CBD and ADHD**

CBD is a natural compound found in Cannabis Sativa. Unlike THC, CBD did not produce a psychoactive effect. The CBD is legal in most of the United States and is sold online. Researchers have studied CBD and found that it may help with mental and physical health issues, such as depression, anxiety, and pain management. Several studies on CBD and ADHD have been conducted. A 2019 study compared a THC and CBD combination pharmaceutical with a placebo and found no significant effects on ADHD symptoms (Black et al., 2019).

According to 2020 research by Hergenrather, Aviram, Vysotski, Campisi-Pinto, Lewitus, and Meiri (2020), 59 adults with ADHD and access to medical cannabis self-reported higher doses of cannabis and its cannabinoids such as CBD, CBN, and terpenes helped with ADHD symptoms. Further studies are needed to understand how cannabis and CBD can help to manage ADHD symptoms.

3.6.1.3 How Medical Cannabis Changes the State of Crohn’s Disease

Inflammatory bowel diseases (IBD), such as Crohn’s disease, are serious medical conditions. Inflammation of the digestive tract is one symptom of this condition. Crohn's disease is thought to be the result of immune system malfunction, but its exact cause is unknown. Crohn's disease symptoms can range from mild to severe, but they typically include diarrhoea, abdominal pain, cramping, fatigue, nausea, loss of appetite, and weight loss. In most cases, Crohn's disease progresses during relapsing-remitting cycles. A person with this condition may go through ‘flare-

ups' or periods of significantly worsened symptoms, as well as 'remission', or periods of milder or absent symptoms. Treatment for Crohn's disease focuses on symptom management and maintenance of remission because there is currently no cure.

According to a review published in the March 2019 issue of Inflammatory Bowel Diseases, cannabis contains nearly 500 chemicals, the most well-known of which are cannabidiol (CBD) and delta-9tetrahydrocannabinol (THC) (Swaminath et al., 2016). Cannabinoids are one of the many components of cannabis that contribute to its effects. Cannabinoids exert their effects by interacting with the endocannabinoid system, which is hypothesised to play a role in regulating various bodily functions.

Cannabis has been studied in recent years in people with Crohn's disease. However, because different studies have examined different doses of different plant chemicals, it is difficult to draw firm conclusions about how this drug may or may not help with Crohn's management. The authors of one review of three different studies published in November 2018 in the Cochrane Database of Systematic Reviews (Kafil, Nguyen, MacDonald, & Chande, 2018) discovered that the effects of cannabis on Crohn's were either unclear or mixed. Individual studies found some beneficial effects, such as a higher likelihood of reduced Crohn's disease activity in people who smoked cannabis-containing THC versus those who smoked a version with the THC removed. However, three studies found that cannabis users were more likely to experience sleepiness, nausea, and difficulty in concentrating.

Other studies have simply examined people with Crohn's who use or do not use cannabis, rather than randomly assigning participants to one of the two groups. One such study, published in the journal Digestive Diseases and Sciences in October 2019 (Mbachi et al., 2019), compared hundreds of otherwise similar Crohn's disease users and non-users between 2012 and 2014.

Cannabis users were less likely to have active fistulizing disease or an intra-abdominal abscess and to require a blood product transfusion, parenteral nutrition, or colectomy.

A larger study with a similar design, published in the Annals of Translational Medicine in June 2019 (Desai et al., 2019), had more mixed results. While cannabis users with Crohn's had lower risks of colorectal cancer, anaemia, and the need for parenteral nutrition, the rates of active fistulizing disease or intra-abdominal abscess formation were higher in this group.

3.6.1.4 The effect of medical cannabis on wellbeing (household income)

Medical cannabis can be prohibitively expensive for patients who rely on drugs to alleviate chronic pain, nausea, and other conditions. As medical cannabis usage continues to grow, the coverage options under federal and private health insurance schemes have wilted. Despite the expanding list of qualifying conditions for medical cannabis, patients seeking coverage under Medicare, Medicaid, or other government health insurance programs have consistently been denied funding under these plans. Instead, patients are forced to either rely on 'traditional pharmaceuticals' or incur out-of-pocket expenses for medical cannabis (Ecker, 2022). This suggests that the relative prices of medical cannabis affect the household budget significantly. In a study by Goulet-Stock et al. (2017), household income was significantly associated with medical cannabis use. In a low-income household, it can be said that spending on medical cannabis affects the well-being of the user as the high cost puts a strain on other needs of the user.

Using data from the Current Population Survey, it was found that while medical cannabis laws (MMLs) have little effect on labour market outcomes for most demographic groups, they are associated with a 2–3 per cent decline in hourly earnings for younger males aged 20- to-29 (Sabia & Nguyen, 2018). Increased cannabis use, particularly heavier cannabis, has been linked to amotivational syndromes (Volkow et al., 2016) and increased lethargy (Irons et al. 2014; Pesta

et al. 2013), diminished cognition (Hanson et al., 2010), and poorer psychological health (van Ours & Williams, 2015, 2012, 2011), each of which could decrease attachment to the labour force and reduce earnings. Cannabis use may also be negatively related to earnings if cannabis use acts as a gateway to harder drugs (DeSimone, 2002; Hall, 2009), diminishes human capital acquisition (Chatterji, 2006; Chu & Gershenson, 2016; Hall, 2009; van Ours & Williams, 2015), or leads to discrimination by employers. In addition, there is recent evidence that cannabis use may lead to greater impatience in labour market choices, which could result in cannabis users being more likely to accept lower-wage offers than non-users (van Ours & William, 2016).

On the other hand, if increased cannabis use allows individuals with physical or mental health ailments to effectively treat their conditions (Blake et al., 2005; Doblin & Kleinman, 1991; Fiz et al., 2011; Bonn-Miller et al., 2007) or induces substitution away from traditional medications with side effects that may impede work, such as opioids and antidepressants (Bradford & Bradford, 2016), employment and earnings could increase.

Case study 1: Cannabis use and Migraine, the story of a new user

Growing up from a typical Christian home, the perceived negative effects of so many things had been projected to us by our guardians. Key among them are; 'smoking will make you go mad, marijuana will make you grow mad or become an irresponsible person in society' among other beliefs. As kids, we had to accept without questioning how that happens and who actually is a victim of such claims. This has been permanently registered and cemented in the finest part of our mental faculty, irrespective of the amount of education, knowledge and exposure we have had as individuals. We have lived with these perceptions and stigmatize people for no reason. Till late last year, my entire perception about cannabis had been lop-sided, biased and negative which is deep-rooted in the thoughts I had been fed with when I was in my formative years.

One day in South Africa, I accidentally found myself in an unplanned seminar where a professor was presenting on cannabis. Being curious given the already existing perception I hold about the plant, I threw a series of questions to hear both responses and to observe reaction. I came out of the seminar room with a full conviction, hope and smiles that I was finally divorcing with my migraine I experienced persistently. For a few seconds, I reflected and pondered over my life only to remind myself that, 'my friend, you don't even drink alcohol and you are here thinking about using marijuana'. There and then, I realized how stigma and

perception can mentally paralyze the minority group and relegate them into some smaller unhappy brackets of life. This has led me into serious research and readings just to advance my knowledge on the history of cannabis, its medical and industrial uses as well as how the political and legal landscape has evolved over time. I began to ask myself", 'why would a plant that can clothe, fuel, shelter, feed and medicate be made illegal'. The rest of it has been an amazing and enriching encounter I experienced personally. It took a bold, unshakable out of the blue decision for me to give cannabis product a try to observe and experiment how it will react with my migraine, sinus and eye pressure.

When I first took two mouth-full sips of a bottle of juice made of cannabis and fruits, that night, 45 minutes after I took the juice, I could feel a burden lifted off my skull, a movement through my spine deep down to the tips of my toes. In fact, that feeling is yet to be described with the right words. There is just no human language to capture these feelings properly. My night was sound, smooth and peaceful than any of my nights. I woke up in the morning extremely excited, filled with laughter and fully energized. The entire day was a memorable one full of life. My entire system reconfigured back to normal with my level of productivity on another degree without the feel of any stress. This lasted for a week before returning to another sip. What I realized was that, cannabis did not only cure my migraine, but also, it reset my entire body and mental faculty to a relatively normal state while increasing my happiness and pleasure levels. It is important to note that, given the relatively higher THC strain in the juice, I felt a bit 'high' but this is manageable as I was able to go about my usual activities.

- **The mechanism through which cannabis aids in migraine**

It is imperative to understand the patterns of cannabis use and its associated relief compared to non-cannabis products in migraineurs. Several migraine patients are refractory to conventional treatments (e.g. NSAIDs, tricyclic antidepressants, and triptans); as such, individuals with more severe treatment-resistant migraines may be more likely to turn to alternative or complementary treatment strategies such as cannabis use. Emerging evidence from preclinical studies suggests that endocannabinoids modulate migraine-associated pain pathways and endocannabinoid deficiency contributes to the pathophysiology of migraine. The CB1 receptor is predominantly located in the central nervous system (CNS) but has also been detected on the terminals of peripheral nerves, the gastrointestinal system, and the reproductive system. Localised to the terminals of nerve fibres, the CB1 receptor has been implicated in inhibiting retrograde

signalling, resulting in the inhibition of neurotransmitter release and synaptic transmission.

Cannabinoids are a promising class of compounds for acute and prophylactic migraine pain treatment owing to their anticonvulsive, analgesic, antiemetic, and anti-inflammatory effects. From the aforementioned case study, the individual felt better after ingesting cannabis juice because the abundance of CB1 receptors in the brain makes them an attractive target for the treatment of migraine by blocking peripheral and central nociceptive traffic and reducing the pathologically enhanced cortical excitability predisposing them to Cortical SD (CSD). CB2 receptors in immune cells can be targeted to reduce inflammatory components associated with severe forms of migraine. Exogenous compounds lacking unwanted peripheral pro-nociceptive components or eCBs generated via inhibited degradation pathways combined with other supportive agents are most desirable for this purpose.

3.6.2 Past experience with migraine

This section provides the narrative of a single respondent who had previously experienced migraine. This emphasises the historical perspective on migraine disorders. He explained this by stating that:

> *I have personally heard about migraine; however, I have not had any family members experienced it, aside from my mother, who consistently dealt with flu among other sinus allergies. When I first discovered that my headache was migraine, it began with a severe recurring headache that lasted for days. This has been with me for over a decade, and has later expanded to affect my eyes. I started experiencing pressure on my eyes; however, my thoughts convinced me that it was actually because I had smaller eyeballs that needed less sunlight than normal.*
>
> *Over the years, I have struggled with this pain. Part of me believed that it was due to the*

hours I spent on computer screens and phone devices. I had no option but to come to terms with this situation, although it was a thorn in my flesh. It affected my eyes to the extent that I had to resort to medical eyeglasses to restore and correct damage. It made me feel that I was born under underlying health conditions. This migraine situation has persisted and has been persistently excruciating despite numerous pharmaceutical remedies prescribed by physicians, friends, and family relatives. While my case may sound idiosyncratic, I have met people who share similar, if not different, stories with me, and understand my plight as a migraine patient.

3.6.3 Pharmaceutical Drugs and Migraine Treatment

The individual narrated her personal experience with pharmaceutical drugs. He acknowledges that:

Resorting pharmaceutical drugs for any health-related issue has remained a culture of modern civilisation. I am not excluded from this assertion as I am an individual who remains the 'doctor's friend'. This was because I had visited the hospital several times. At one point, I found an optometrist asking both of my hands for a word of prayer, as all my laboratory tests appeared normal, but my system functioned abnormally. It remains a puzzle to know which part of me needs a natural factory reset, or better, must still undergo reconstruction. I even feel guilty that they may feel that I have been faking my unhealthy condition. However, in reality, I have not fit into a healthy sense. In effect, I found myself consuming pharmaceutical drugs frequently. My system was used for such remedies and has become a lifestyle. I saw myself moving from headache to migraine, flu to sinus, and eye itches to eye problems. The pharmacy became my second most frequent place of visit aside from my lecture halls.

I must say that pharmaceutical drugs have been good to me and have remained in a great

alliance. Notwithstanding, I have moved from a lower schedule of prescriptions to relatively higher schedules for the same treatment. This means that my body and system became acclimatised to these medicines and therefore had little effect on alleviating my health issues. Despite this relief, I have always been worried about the negative side effects of these drugs, as I am mindful of the skyrocketing nature of opioid-related deaths. It became a mixed feeling, as I could not do without these drugs. Later, I developed a physical dependence on these drugs, and my nasal spray, which serves a dual purpose, became a useful tool, similar to my toothbrush, daily.

I could vividly recall the words of my doctor, "put your nasal spray close to your toothbrush… even if you do not have any migraine or sinus, use it consistently". These words from my doctor helped me understand that I could not undo my health condition. Instead, I must officially and unhappily come to terms and live my remaining life I have left peacefully. I must say that it became frustrating as I continued to climb the academic ladder, and I needed good health and a peaceful mindset to focus. What I know about pharmaceutical drugs in my life is that they provide me with temporary relief without curing my migraine, eye pressure, and sinuses. This means that I must constantly take these drugs to feel better. At one point, the drugs no longer function as my body is used to them. I had to rebook appointments with my doctor to get an upgrade, and perhaps try new potent drugs that my system is not used to. Trust me; it has remained a constant and daily battle, knowing I am going to bed only to wake up with migraine, even when I take pharmaceutical drugs.

3.6.4 Comparative Views of Cannabis and Pharmaceutical Drugs

This section provides a comparative narrative of pharmaceutical drugs and medical cannabis for migraine treatment. In the words of the respondents,

My migraine journey has been dreadful and has affected my health for a long period. Both pharmaceutical drugs and medical cannabis have played significant roles in providing relief. Medical cannabis provided me with a cure, while pharmaceutical drugs provided me with temporal relief: unlocked other parts of my mental faculty while reconfiguring my entire body system. In terms of dosage, pharmaceutical drugs have sufficient information to guide me during my periods of medication, while this is not the case for medical cannabis. In effect, the tendency toward abuse (un) is known to be high. In terms of side effects, I realised that I developed a physical dependence on pharmaceutical drugs for migraines, as it does not provide permanent solutions. Therefore, my chances of experiencing opioid-related side effects were high, as I depended on them daily for relief. Unlike pharmaceutical drugs, medical cannabis does not have such side effects, especially CBD-rich cannabis which is not intoxicated because no dopamine release may lead to euphoria, psychosis, or schizophrenia.

In terms of cost comparisons, I may not be able to recall the exact amount I invested in pharmaceutical drugs. However, given the consistency of the purchase, I can provide a rough estimate. My nasal spray costs US$20, which I need twice a month. For the past 10 years, I would say I spent on average, US$4000 on just the nasal spray without accounting for hospital consultation fees, and my eyeglasses among other pharmaceutical drugs, which also cost me a lot. In contrast, the once-off purchase of a bottle of medical cannabis juice that cured my migraine was estimated at US$20. It is therefore clear to me that pharmaceutical drugs not only pose a health threat to me, but they also slapped a severe and prolonged monetary cost which could have been reprogrammed into other viable businesses for better returns.

Another area of interest is the time required to access both pharmaceutical drugs and cannabis. Every typical African knows the structural vulnerabilities and institutional bottlenecks in various sectors, in which the health sector is inclusive. The waiting queue, delays in laboratory tests, and the headache of waiting on pending results before seeing a physician have remained leading causes of exacerbated health conditions and, at worst, deaths among unfortunate patients. Among the precursors are infrastructural deficits and low doctor-patient ratios, whereas medical cannabis requires relatively less time to learn about the plant, understand the strains, and align their health conditions for better treatment. It can be made available in any quantity, anywhere, and under any strain to match any underlying health condition, with minimal time and ease of delivery. It only took a brief conversation about my migraine with a colleague to know that medical cannabis can cure me, while it took me a decade to understand that pharmaceutical drugs can only provide me with temporal relief.

Anecdotal evidence indicates that most people use cannabis as a coping strategy for managing stress and anxiety. The innocuous question is, “How exactly do stress and anxiety responses change in the presence of cannabis?” Does cannabis alleviate stress and anxiety? This section discusses the stress-relieving effects of cannabis as it interacts with the bodies of individual users. As scientific studies continue to unpack the true effects of cannabis use, this study draws insights from respondents' self-reported views.

It is imperative to set the caveat that while there may be interesting views about cannabis use and stress management, the relationship between cannabis and stress is complex and much more remains unknown, as it is difficult to disentangle or control for the plausible effect of other factors. This study summarises some of the findings reported by individuals with an emphasis on the interactions between cannabis and how people react to it.

3.6.4.1 Background on Cannabis Use and Anxiety

Anxiety disorders, such as chronic worry, social anxiety, agoraphobia, and separation anxiety, are common mental health issues. “Furthermore, generalised anxiety disorder (GAD), a more generic form of anxiety, is the sixth leading cause of disability worldwide in terms of the number of years lost due to illness (Baxter, Vos, Scott, Ferrari, & Whiteford, 2014). Researchers have estimated a 7.3% worldwide prevalence of generalized anxiety disorder (Baxter, Scott, Vos, & Whiteford, 2013), with studies showing that women are more likely to experience GAD than men and that GAD is more prevalent in older adults (Wittchen, 2002). Overall, GAD was associated with adverse health consequences. For instance, research has shown that individuals who suffer from anxiety are more likely to disclose their acts of suicide (Bolton et al., 2008; Sareen et al., 2005). Substance abuse may serve as a coping mechanism for people with GAD (Frojd, Ranta, Kaltiala-Heino, & Marttunen, 2011; Kushner, Abrams, & Borchardt, 2000; Stein & Sareen, 2015); there is strong evidence that GAD overlaps with other mental health problems such as major depressive disorders.

According to the South African Stress and Health (SASH) study, which was designed to be nationally representative, generalised anxiety disorder (GAD) was the most commonly reported mental health issue in South Africa, with an estimated 8.1% national prevalence (Herman et al., 2009). Although generalised anxiety disorder (GAD) is the most prevalent mental health problem in South Africa, surprisingly little research has been conducted on this topic. Several clinical studies using self-selected samples have examined the frequency of anxiety. Using the Mini-International Neuropsychiatric Interview, a study of pregnant women from one clinic in Cape Town (n = 376) found a GAD prevalence of 18%. (van Heyningen et al., 2017). About one-third of the people who voluntarily participated in the study and visited one of 12 HIV-clinics in the Free State reported clinically significant symptoms of anxiety using the Hospital Anxiety and Depression Scale (Pappin, Wouters, & Booysen, 2012). Finally, among young men in a rural

area of KwaZulu-Natal (aged 14-24), 40.2% reported clinically significant anxiety symptoms when evaluated using the Brief Symptom Inventory (Mngoma, Ayonrinde, Fergus, Jeeves, & Jolly, 2020). The second case study in the textbox below describes the experiences of a person who uses medical cannabis to relieve stress and anxiety.

Case study 2: Cannabis use and Anxiety

I am a third-year geomatics engineering student with a double minor in indigenous studies and business entrepreneurship which was a much more intensive program that was from 12 months to six days a week. At a time, I could not handle the extra stress and that's when I started to experience panic attacks for the very first time. At first, it started with a train of thought whether it be negative or even just a very anxious thought that just takes a life of its own and takes control. Sometimes it is even as simple as worrying about having a panic attack could trigger a panic attack, so I couldn't fight it. There is nothing to fight as it is all in my head, so my only option is to irrationally run away. There were times when I would be driving my car where I stop the car on the side of the road and get out and almost run down the side of the road just to get out of whatever irrational situation I was in inside of that vehicle.

After my initial meeting with a psychiatrist, he prescribed several medications. I was on three of them at one point even though it was successful as a sedative to keep me from feeling the negative aspects of the negative thoughts and emotions that would take me down a path of anxiety, but also all the positive experiences were gone. I was sedated, and I couldn't experience the negative things, yet, I couldn't experience the positive things which are a very special part of my personality. It took away my spark, my energy, my humour, my love for all the things that make me who I am. A lot of it was gone and I wasn't myself anymore. I was just simply existing as a person. I couldn't chase my goals; I couldn't chase my aspirations. If I was to describe myself from an outside perspective, I would say that's a zombie. I mean that says that's somebody who's not existing or somebody who was only existing and not living.

At that point, I started to learn more about traditional medicines, and I came across medical cannabis which I had experimented with. However, it wasn't effective as I wasn't employing the right dosage and I didn't have the right knowledge to do so. I later reached out to a doctor who specifically dealt with those who were interested in medical cannabis and together we had a discussion and we decided that it was a worthwhile shot for me to try medical cannabis as a possible treatment for my anxiety and my panic attack disorders. I went through the process and started to try it again, but this time, under the strict guidance of a doctor with much experience than I do. I must say that it turned my life around, especially knowing that this is a prominent recreational drug that a lot of people sometimes don't take seriously as a form of actual treatment and actual medicine.

I know it took my family a little bit of time to get their heads around the idea of using cannabis as a medical form of treatment, they don't quite see it yet as the same medication that my father takes for his diabetes even though I take it for the very same reason to keep myself healthy, which is one of the biggest challenges I faced. Currently, I am starting my third year and I'm looking at getting my 4.0 this semester or if not the next semester and I'm very proud of myself.

However, it is important to note that the potency of medical cannabis is positively and strongly correlated with its proclivity to abuse its use. This is because most people naturally believe that if something makes them happy, it makes them happier. Despite the respondent's positive response, the study was unable to separate the placebo effect from the true potency of the plant, as well as issues of causality and correlation. As this is an anecdotal observation, it is likely to have influenced the conclusions. In effect, there is legitimate concern about having well-informed research-driven knowledge and awareness before using medical cannabis for any health purpose.

Additionally, it is imperative to mention that the potency of cannabis crucially depends on the strain (Freeman & Winstock, 2015; Baron et al., 2018; Hines et al., 2020), the person using it (Stuyt, 2018), the condition being treated (Schlag, Hindocha, Zafar, Nutt, & Curran, 2021; Kvamme, Pedersen, Thomsen, & Thylstrup, 2021; Freeman et al., 2018), the mindset, and a host of other factors. The basic principle for dosing medical cannabis is to start with a low dose and increase it slowly to achieve the desired effect. The benefits of cannabis are not always immediately felt.

Starting low and going slow allows patients to become familiar with the beneficial effects of the medication and simultaneously minimises any potential side effects. Starting low and going up slowly is important, as the dosage varies greatly among patients, even when treating the same condition. The usual dose of THC for a patient new to medical cannabis is 2-5 mg per dose. Although the number of patients varied widely, this is a good starting point. As any recreational

or medical cannabis user can tell you, not all cannabis are equally created. Different strains of cannabis produce different effects and can thus be used for different reasons (some strains are better for certain conditions than others) (Fergusson, 2018; Caporuscio, 2020).

3.6.4.2 Overview of Cancer Cases in South Africa

In South Africa, accurate data collection on cancer incidence and mortality is improving; however, this remains challenging. Several cancer surveillance systems exist for collecting cancer data, but underreporting remains an issue (Cairncross, Parkes, Craig, & Are, 2021). South Africa's largest cancer registry is a pathology-based cancer surveillance system that has been in place since 1986 as part of the National Health Laboratory Service. This agency has collected, analysed, and reported all cancer cases diagnosed in South Africa using cytology, histology, and bone marrow aspirate or trephine (Cairncross, Parkes, Craig, & Are, 2021).

In 2003, the National Health Act of South Africa declared cancer a reportable disease. However, it was only in 2011 that a legalised entity, the National Cancer Registry (NCR), was created under the National Department of Health. Under this act, the NCR was charged with establishing population-based registries. The first small urban population-based registries were created in the Ekurhuleni metropolitan municipality in Gauteng Province and Frere Hospital in the Eastern Cape Province. These registries include data on all cancers, whether diagnosed clinically, radiologically, or pathologically

With the available data, it is estimated that in 2020, almost 110,000 new cases of cancer were diagnosed in South Africa, with more than 56,000 cancer-related deaths, representing a quarter of premature non-communicable disease-related mortality. This significant cancer burden is predicted to increase in the coming decades, with the incidence of new cancer cases expected to rise to 138,000 and 175,000 by 2030 and 2040, respectively (International Agency for Research on Cancer 2020) (Figure 4). Cancer-related mortality is predicted to rise to 73,000 and 94,000

deaths during the same period, respectively (Figure 5).

The five most common cancers in South Africa, in order of incidence, are breast, prostate, cervical, lung, and colorectal (Figure 6). However, lung cancer was the leading cause of cancer-related mortality among the five cancers (Figure 7). Although breast cancer has a 25% higher incidence among women, cervical carcinoma is the leading cause of mortality. In South Africa, deaths due to cancer represent approximately 9% of all-cause mortality in adults (Central Intelligence Agency, 2022), whereas in children and adolescents, these data are unavailable.

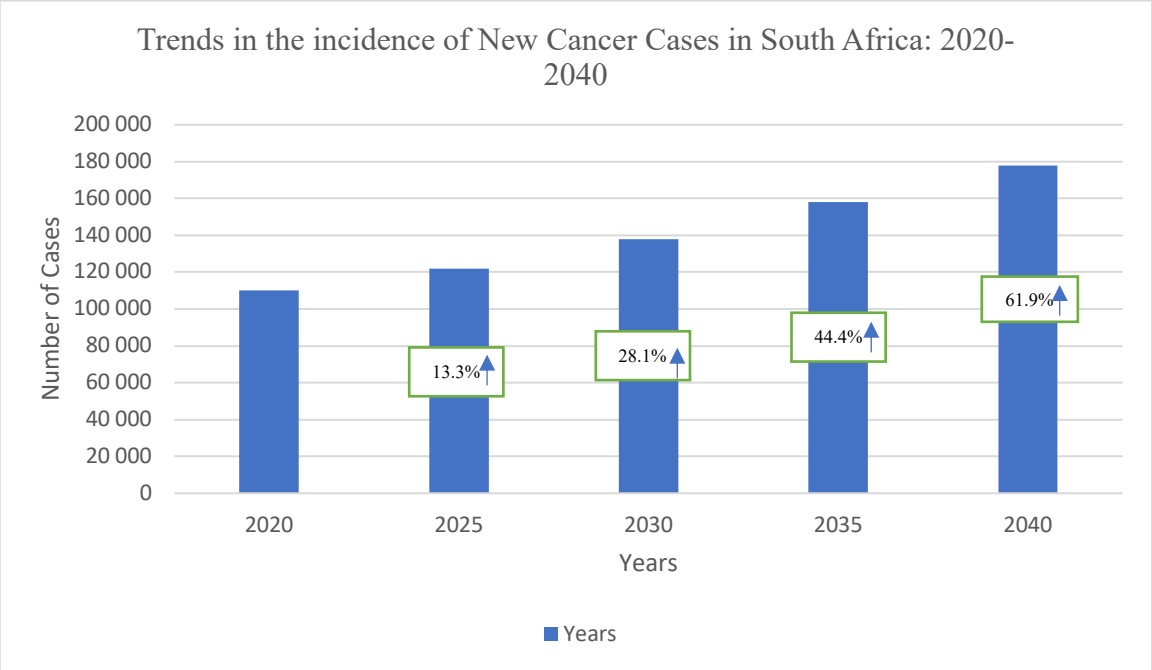
Epidemiologists have predicted a major increase in cancer incidence in the developing world, with 60% of all new cases coming from Africa, Asia, and South/Central America (Hoen, 2015). The projected increase in SA is even greater, and a recent article in The Lancet (Stefan et al., 2013) projected a 78% increase by 2030. Rapidly changing lifestyles, uncontrolled urbanisation, pollution, population ageing, endemic viral infection (HBV/HIV/HPV) and an epidemic of obesity provide a lethal cocktail of infectious and lifestyle cancer risk factors in SA (Wild, 2014; Gopal, Achenbach, Yanik, Dittmer, Eron & Engels, 2014).

In terms of the cost of treatment, the American Institute of Cancer Research[24] estimated an annual figure of US$895 billion as the money spent on cancer treatment. means that while advancements in cancer treatments are increasing, so are costs. Similarly, UK Cancer Research projected that the cost of cancer drugs would increase by 10% per annum[25]. In addition, the costs of diagnosis, radiation, chemotherapy, imaging, pathology, surgery, and end-of-life care are also increasing at an exponential rate.[26] Within the context of South Africa, local treatment can cost anything

[24] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4462533/
[25] http://www.cancerresearchuk.org/funding-for-researchers/research-features/2016-08-10-health-economics-the-cancer-drugs-cost-conundrum
[26] http://www.huffingtonpost.co.za/2017/05/16/the-challenges-of-suffering-from-cancer-in-south-africa_a_22093419/

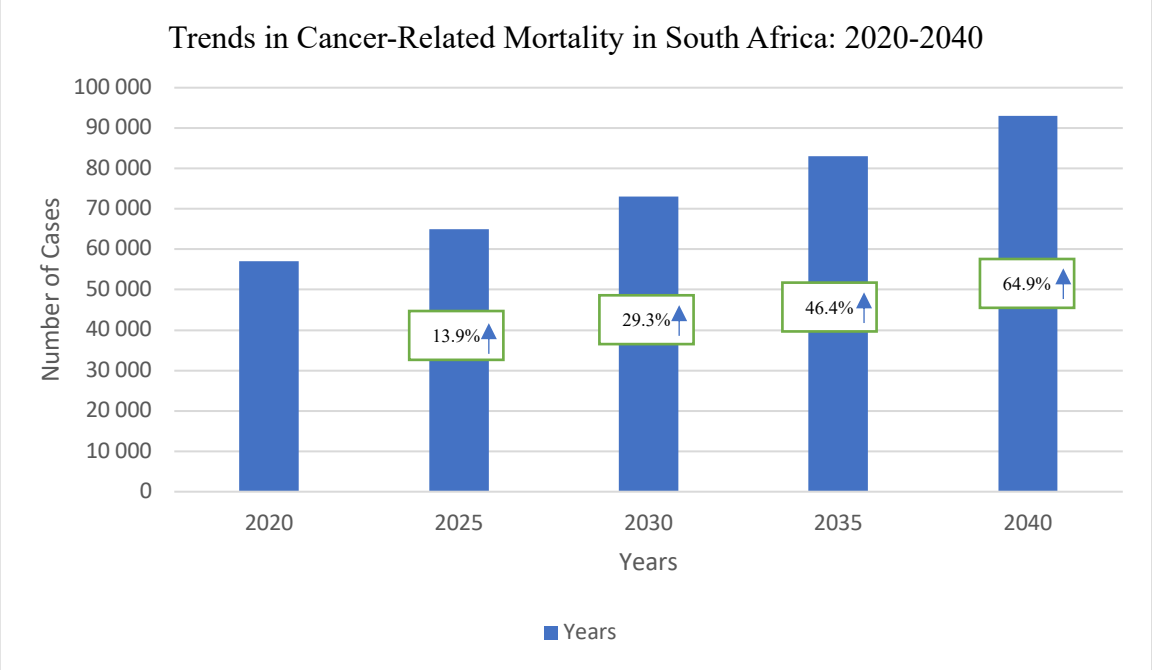
between R10 000 and R1 million per patient per year, depending on the cancer type (Independent Clinical Oncology Network, 2021).

Figure 4: Trends in the incidence of New Cancer Cases in South Africa: 2020-2040



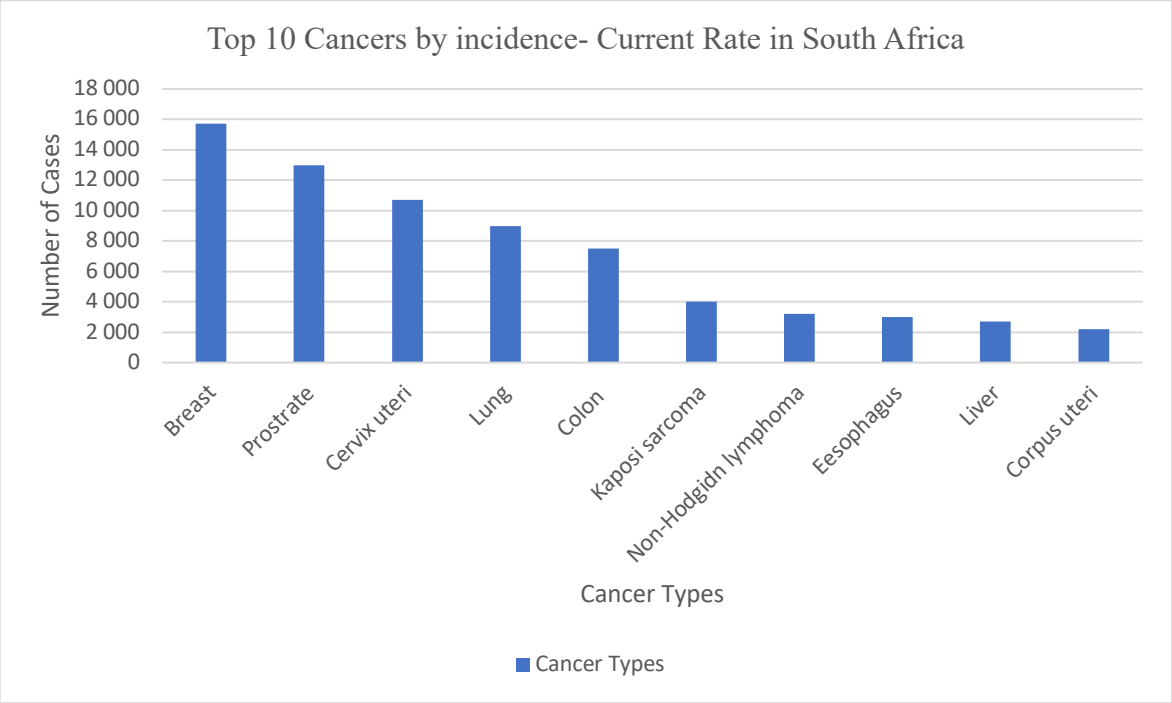
Source: GLOBOCAN Cancer Today and Tomorrow (2022)

Figure 5: Trends in Cancer-Related Mortality in South Africa: 2020-2040



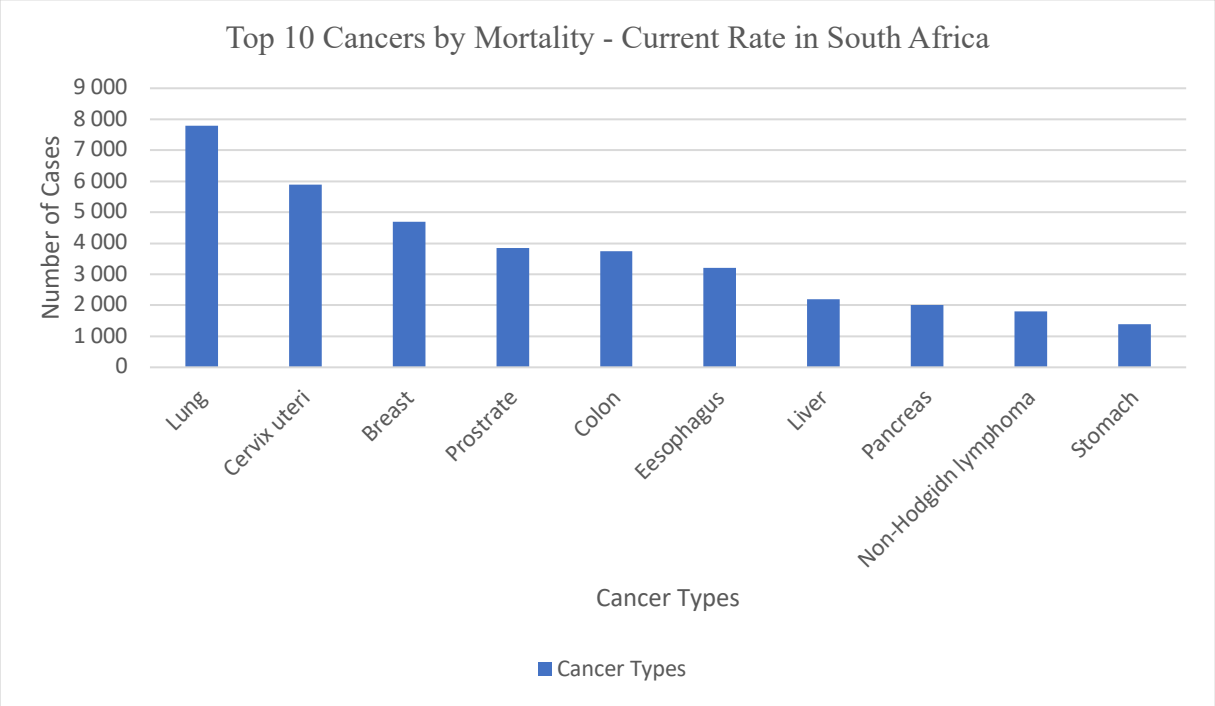
Source: GLOBOCAN Cancer Today and Tomorrow (2022)

Figure 6: Top 10 Cancers by incidence- Current Rate in South Africa



Source: GLOBOCAN Cancer Today and Tomorrow (2022)

Figure 7: Top 10 Cancers by Mortality – Current Rates in South Africa



Source: GLOBOCAN Cancer Today and Tomorrow (2022)

3.6.4.3 The Effect of Cancer on the Population and the Healthcare System

Cancer is a growing national health and socioeconomic concern in South Africa. It has been recognized that the rising cancer incidence, high death rate, and significant morbidity experienced by cancer survivors are urgent issues that must be addressed. Globally, many cancer-related deaths are reported to be preventable through immunisation, lifestyle changes, early detection, and timely treatment, thereby alleviating unnecessary suffering. Although numerous initiatives have been implemented over the last two decades to reduce the risk of certain cancers, the beneficial effects will take time to manifest and will first impact the incidence and mortality rates.

The overarching goal of the Cancer Strategic Framework is to reduce the burden placed on the South African population by cancer-related deaths, disabilities, and financial strain. Furthermore, it seeks to preserve the dignity of cancer patients and their communities by reducing suffering and distress. Health systems need to be improved to provide effective and efficient cancer prevention and management services, including operational, quality care, and staffing improvements. South Africa's National Development Plan 2030 (NDP) recognises that health is more than just a medical issue, and that a healthy population is critical to the development agenda's success (National Planning Commission, 2013).

Health systems must be strengthened to deliver interventions for cancer prevention and control successfully. Development of such interventions varies across provinces and countries. Cancer is a tragedy that affects both the family and community. The financial costs of a cancer diagnosis do not only affect the patient, but also the family, community, and country as a whole (Sartorius, Sartorius, Govender, Sharma, & Sheriff, 2016). Treatment costs are frequently unacceptably high, rendering many standard-of-care treatments unaffordable for partially or fully insured patients (Sartorius, Sartorius, Govender, Sharma, & Sheriff, 2016). Furthermore, they jeopardise

the state's ability to obtain treatment for approximately 85 per cent of the population that relies on the public health sector.

South Africa recognises the negative impact of cancer on its health and development. The country readily supported the UN Resolution A/RES/70/1 entitled: Transforming our world: The 2030 Agenda for Sustainable Development, adopted during the United Nations Sustainable Development Summit held on 25 September 2015 at the United Nations Headquarters in New York. The 17 development goals commit parties to a vision of a world free of poverty, hunger, disease, and want, where all life can thrive by meeting comprehensive, far-reaching, and people-centred targets by 2030.

3.6.4.4 Brief Overview of Cannabis Use and Cancer Treatment

Cancer cells, like normal cells, express cannabinoid receptors (Moreno, Cavic, Krivokuca, & Canela, 2020). Cancer and its treatment-related signs and symptoms, such as anxiety, depression, and poor sleep (O'Brien & Blair, 2021), have all been linked to ECS dysfunction. Stimulation of cannabinoid receptors has both beneficial and detrimental effects on various tumour subtypes (Moreno et al., 2020). Overexpression or underexpression of cannabinoid and other receptors of the extended ECS has been observed in a variety of tumour types (Mangal et al., 2021; Moreno et al., 2020). Overexpression of CB2 receptors has been observed in HR+ breast cancer and gliomas (Dumitru et al., 2018; Pérez-Gómez, 2015), whereas TRPV1 expression has been observed in glioblastoma multiforme (GBM). Poor prognosis in stage 4 colorectal has been linked to the overexpression of CB1 and CB2 receptors (Jung et al., 2012; Martnez-Martnez et al., 2015).

Cannabinoids (including endocannabinoids AEA, 2-AG, phytocannabinoids THC, CBD, and synthetic cannabinoid receptor agonists) have anti-cancer activity, addressing many of the ‘hallmarks of cancer’ (Velasco, Sánchez, & Guzmán, 2012), as shown in several preclinical

studies. Cannabinoids have been shown to have pro-apoptotic and anti-proliferative effects in a wide variety of cancers (Seltzer et al., 2020; Moreno et al., 2020; Scheau et al., 2020). Cannabinoids inhibit cancer cell migration, adhesion, angiogenesis, invasion, and metastasis, as well as the cell cycle and induce apoptosis (Seltzer et al., 2020; Alexander, Smith, & Rosengren, 2002; Shrivastava, Kuzontkoski, Groopman, & Prasad, 2011). However, cannabinoid stimulation of receptors appears to activate different signalling mechanisms in transformed and normal cells (Velasco, Sánchez, & Guzmán, 2012), therefore the viability of normal (non-transformed) cells appears to be unaffected or even favoured under certain conditions.

Pergam 's (2017) survey results suggest that cancer patients use cannabis for medical purposes. Sixty-six percent of respondents to a cross-sectional survey of 926 patients at the Fred Hutchinson Cancer Research Center (Seattle) reported using cannabis at some point in their lives, with 24 per cent using it within the past year and 21 per cent using it within the past month. Nearly three-quarters (n = 222) of the respondents who used cannabis did so to alleviate physical symptoms (pain, nausea, appetite), 63% did so to alleviate neuropsychiatric symptoms (stress, coping with illness, depression/improve mood, sleep), and 26% said they believed cannabis helped to treat their cancer. Good news:51% of people reported a 'major benefit' from cannabis and 39% reported a 'moderate benefit' (Pergam, 2017) regardless of their symptoms.

Six hundred and twelve US-based members of the Breastcancer.org and Healthline.com communities with a self-reported diagnosis of breast cancer within 5 years were surveyed anonymously online; 42% of respondents reported using cannabis for relief of symptoms (including pain (78%), insomnia (70%), anxiety (57%), stress (51%), and nausea/vomiting (46%). Seventy-nine percent of cannabis users report using the drug while undergoing treatment (Weiss et al., 2021). Cannabidiol (CBD) is an important phytocannabinoid that is one of the hundreds of secondary metabolites found in Cannabis Sativa L.

- **The Relative Cost of Treating Cancer Versus Using Cannabis**

The exponential rise in cancer costs in South Africa (SA) was illustrated in a recent article titled 'The cost of cancer can be a debt sentence' (Laganparsad, 2016). Health care costs are a growing international concern. The cost of cancer management has 'skyrocketed', as illustrated by the European Union, which recorded a cost (in SA terms) of more than ZAR2 500 billion in 2009 that including direct healthcare costs, lost productivity and loss of family savings (Luengo-Fernandez, Leal, Gray, & Sullivan, 2013). The doctrine of justum pretium (a fair price) has been ignored by the pharmaceutical sector. Of the 12 drugs approved by the US Food and Drug Administration for various cancer indications in 2012, 11 were priced above ZAR1.5 million per patient per year (Experts in Chronic Myeloid Leukaemia, 2013).

Cancer care is a major financial burden on patients. Copayments for pharmaceutical agents, limited coverage for care, and yearly deductibles can lead to financial challenges (Bonar, Cranford, Arterberry, Walton, Bohnert, & Ilgen, 2019). Even in the setting of health insurance, cancer therapy exposes patients and families to statistically significant out-of-pocket healthcare costs, and unfortunately, cancer and bankruptcy are often linked (Hastert et al., 2018; Altice et al., 2017). Currently, cannabis products are not covered by insurance regardless of whether they are acquired through formal medicinal cannabis programs or other means. Therefore, all costs are additional out-of-pocket expenses for patients using cannabis. The cost of cannabis varies widely, depending on its availability. For instance, in a study conducted in Michigan-USA, patients were found to obtain cannabis more frequently from illegal community sources due to the high cost of medicinal cannabis distributors (Macari, Gbadamosi, Jaiyesimi, & Gaikazian, 2020).

When it comes to cannabis and cancer, some studies have found that the plant may lessen the symptoms of nausea and vomiting from chemotherapy and may help treat neuropathic pain

caused by nerve damage. According to the American Cancer Society (ACS) (2022), patients with cancer who use cannabis often require less medication. The third case (Case 3) discussed the use of cannabis in cancer treatment, as depicted by the user.

Case study 3: Cannabis Use and Cancer treatment

I think medical cannabis helped me become a better person; overall, a better individual. It changed my life. When I first thought I was sick, I lost all my energy. I would cough up blood, and I would bleed out of my sinus, my nose, constantly. It wouldn't stop. And they just--they couldn't figure out what was wrong with me. One day, I went into the emergency room, and a doctor told me that I had a form of sinus cancer with a brain tumour. I was in a lot of pain, so my wife would have to do everything for me. She would get my coffee ready for me because I needed that to wake up. She would help me to get out of bed.

I weighed 210 pounds in high school, and I went down to nothing. I went down to nothing but skin and bones. My pain is in the back of my neck because the tumour has eaten through my bone marrow. I don't wish it on anybody. It's something that you just pray that it'll go away. I've tried liquid Morphine to Vicodin to Lortab. I had to take pills around the clock, every four hours, and they didn't always help. The medication they have been prescribed didn't work, and now they are taking medical cannabis and, finally, for the first time in their lives some of that pain is relieved and they're able to actually enjoy fuller, happier, healthier lives.

I heard that in the USA, there are between 750,000 and 1,000,000 people using medical cannabis to treat serious illnesses such as cancer, AIDS, among other diseases, who are in great pain and are suffering every day. I and my oncologist talked about it, and he felt that medical cannabis would help me. Which it has! I felt less pain for sure. The pain went immediately, just disintegrated. I had his appetite back. I was able to interact more with my wife and my children. Now they love to play with me. We play board games and things like that. I love it. Where I didn't have that relationship with them before.

Most countries in Africa have prohibited cannabis, even for medical use, despite its medicinal and health potentials. I believe this is a threat to people’s health and wellbeing, especially among those of us who rely on this as our medicine, and it is not right to take sick people's medicine away from them. I would therefore like to plead to the drug enforcement agency to reclassify medical cannabis as a less serious drug. Currently, most African countries adapted the USA classification which is Schedule I drug. This means that cannabis is considered more dangerous than cocaine, which impedes the types of research that people can do to prove its medicinal effects. Secondly, I would like the government to respect medical cannabis users that recognize the therapeutic value of cannabis and allow sick people to get the treatment that they need. I would ask the government to please have some compassion and respect for the sick individuals who are using this as a medication.

The respondents' consensus led to three major conclusions. Cannabis has several advantages. These advantages may not be as large or spectacular as some of the most ardent supporters of medical cannabis would believe, but they are real. Second, there are risks associated with the use of medical cannabis. Those risks may not be as significant or frightening as some opponents of medical cannabis would have us believe, but they are nonetheless real. Finally, most people who use cannabis for medical purposes do so because it gives them control over their illness, allowing them to manage their health productively, efficiently, effectively, and comfortably.

3.7 Conclusion

Medical cannabis has numerous health benefits in various underlying health conditions in humans. Regardless, the ongoing debate over the growing use of medical cannabis has centred on public health, psychiatry, and social welfare research, with little focus on economic implications. This study, which follows a qualitative study, provides insight into the role of medical cannabis in improving well-being through cancer treatment, anxiety and stress management, chronic pain and migraine treatment. Although pharmaceutical drugs provide relief from the medical conditions listed above, they do not guarantee a cure and are frequently associated with negative side effects. More importantly, opioid-related deaths are on the rise, with adverse effects on people suffering from chronic pain. In addition, the cost of treating the aforementioned illnesses with pharmaceuticals can be prohibitively high for both individuals and society.

In contrast, the use of CBD-rich medical cannabis provides a cure, relief from stress and anxiety, and increased productivity. However, this study was unable to separate the causality and correlation issues. In effect, there is legitimate concern about having well-informed research-driven knowledge and awareness before using medical cannabis for any health purpose. The current study recognises the underlying methodological challenges in terms of validity and

reliability in achieving methodological rigor due to the sample size and adherence to existing methodological protocols. However, this study is only a subset of a larger study that examined the dynamics of responses from people with various underlying health conditions. Future research that expands the sample to include different racial profiles, sex, and environmental factors could aid in determining the causality and feedback effects of medical cannabis and its effect on pain management in general, and migraine treatment in particular.

CHAPTER FOUR

PERCEPTION ABOUT CANNABIS USE: EVIDENCE FROM GHANA AND SOUTH AFRICA

4.1 Introduction

Cannabis use is one of the few topics that has the potential to elicit sentimental and intense emotional debate, particularly among various groups of people such as health practitioners, scientists, researchers, policymakers, and the general public. While there are legitimate concerns and excellent questions about this subject, including its safety, legal status, medical effectiveness, usefulness in human well-being, addiction, and abuse among youth, the discourse is largely clouded by misconceptions, myths, and subjective views, which lack empirical support. Context and legal status are the two major factors that explain the significant scientific role of cannabis. Cannabis is either legally regulated, decriminalised, or prohibited, depending on the geographical location within the global political economy.

Regardless of the policy environment or plant's legal status, the cannabis narrative is mostly covered by myths (Bottorff et al., 2013). While some schools of thought consider cannabis a miraculous plant that improves people's well-being (Bonn-Miller et al., 2016; Bonn-Miller et al., 2014; Russo, 2017), others have concluded that cannabis is a gateway to other harmful substances (Barry et al., 2016; Desimone, 1998; Yzer et al., 2003). These fragmented, complex, and perplexing research conclusions have had a significant impact on our understanding of cannabis. Most importantly, it influences how people perceive cannabis, its medical applications, industrial potential, and recreational benefits, while emphasising the negative consequences of improper use or abuse.

Cannabis is mostly demonised by some people in society, and those who use it for medicinal purposes are labelled as abnormal (Bottorff et al., 2013). Although amplified views of opponents of cannabis use may appear thought-provoking and concerning, evidence supporting this claim remains elusive, particularly in African countries. Moreover, while much of the focus on cannabis is on its negative aspects, it is worth noting that its unknown benefits cannot be overstated. Society has moved past the scientific debate over cannabis to reintroduce the plant as dangerous, a gateway drug to other harmful substances with the potential to make users angry. Interestingly, the above claims are largely fuelled by skewed dissemination and misinformation, with no scientific light shedding on any of the myths and misconceptions about the relationship between cannabis use and human well-being.

While some studies have found a link between cannabis use and other drug use, it is critical to remember that the correlation does not equal causation. Rather than serving as a gateway for the use of other drugs, cannabis is much more likely to be used by people who use harder drugs. To support this claim, the Institute of Medicine of the National Academy of Sciences (IMNAS, 1999) conducted a study of the United States Congress and concluded that there is no evidence that cannabis's drug effects are causally linked to the subsequent abuse of other illicit drugs. In effect, gateway theory, which underpins the long-held belief that cannabis is a gateway drug, lacks scientific and empirical support.

Regardless, one of the most dangerous aspects of any drug is the risk of an overdose. Although it is technically possible to overdose tetrahydrocannabinol (THC), the psychoactive substance in cannabis that causes intoxication, it is not possible to consume sufficient THC to achieve this level. This is because there has never been a single confirmed death from cannabis overdose worldwide. However, some studies have found that frequent cannabis use can result in lower levels of dopamine in the brain, leading to lower levels of motivation (Sami et al., 2015; Volkow

et al., 2014; Kuepper et al., 2010; Sinha, 2008). Other studies, rather than generalising their findings, have focused on subjective, individual-specific encounters and experiences with cannabis. Following this approach, it was concluded that there is no generally accepted relationship between frequent cannabis use and dopamine levels in the brain, because it is more dependent on the individual using the plant. Most societies believe that cannabis causes violent tendencies and crimes because of the dangerous world surrounding drug trafficking.

Ghana, a significant drug transit hub, has recently addressed the question of cannabis legalisation. The Ghanaian state is secular but socially conservative. Substance misuse is underreported because of stigma. Nonetheless, based on scant statistics, Ghana's cannabis usage per capita may be among the top 10% globally (Curley & Attwood, 2019) In Ghana, over 4.5 tonnes of cannabis were seized in 2017 (Fedotov, 2019). The estimated user reports ranged from 8 to 21.5 percent, which is higher than the global average of 3.8 percent (Fedotov, 2019; World Drug Report, 2011). The reasons for the popularity of cannabis in Ghana are unknown. Cannabis trading serves as a means of 'capital formation' as well as a safety blanket during cocoa price slumps (Bernstein, 1999; Akyeampong, 2005). Cannabis is relatively inexpensive in Ghana compared with other substances of abuse, and low cannabis pricing corresponds strongly with abuse (WHO, 2019). Furthermore, the Ghanaian boarding senior high school system provides excellent breeding grounds for peer influence on cannabis use. Furthermore, there is an obvious empirical gap between Christianity (the largest religion in Ghana) and the Rastafarian religion, where cannabis has ceremonial applications (Davenport & Pardo, 2016).

On 21 March 2020 Ghana’s Parliament, through the Narcotics Control Commission Bill, decriminalised cannabis for health and industrial purposes. The law empowers the Ministry of Interior to grant licences for the cultivation of cannabis of not more than 0.3% tetrahydrocannabinol (THC), the active compound that gives the feeling of ‘being stoned’ or

‘high’. Ghana joins Uganda, Rwanda, Lesotho, Zimbabwe, Malawi, South Africa, and Zambia as the few African countries that have legalised cannabis. The race to legalise is strong and unstoppable. However, knowledge balancing the benefits and potential downsides, as well as appropriate conditions for a successful cannabis industry, is in short supply (Quarshie & Alagidede, 2020).

Despite an increase in our understanding of cannabis usage in South Africa, little is known about cannabis users' attitudes toward the drug, particularly in economically important places. Manu and Ntsaba (2016) found that cannabis smokers in the studied communities believe cannabis is not dangerous. The main negative consequence they identify with cannabis use is social. After consuming a substance, they are viewed as disrespectful and sluggish by others. It was also shown that most cannabis users smoke it because of the perceived spiritual and medicinal benefits that they associate with cannabis use. Female cannabis use was universally frowned upon by all study participants, who saw such users as social outsiders.

This chapter assessed the public perception of cannabis users in Ghana and South Africa. Perceptions of cannabis usage among people living in cannabis-growing areas in both Ghana and South Africa require careful consideration if the prevalence of cannabis use in such communities is to be reduced. This chapter establishes the groundwork for addressing misconceptions, guiding academic discourse, and reconfiguring the cannabis narrative to better understand how society perceives cannabis and the myths held against the plant, in comparison to scientific knowledge. As a result, further research into myth, perception, and scientific evidence is a good place to begin when trying to understand the cannabis knowledge gap and its implications for human well-being.

Studying the public perception of cannabis users in Ghana and South Africa can provide valuable insights into social and cultural attitudes towards cannabis use in these countries. This

information can be used to inform policies and programs aimed at reducing stigma and discrimination against cannabis users, as well as to guide public health and education efforts related to cannabis use.

In Ghana, where cannabis is illegal but widely used, research on the public perception of cannabis users could help shed light on the social and cultural factors that influence attitudes towards cannabis use. This information could be used to develop strategies for reducing stigma and discrimination against cannabis users, as well as to educate the public about the potential risks and benefits of cannabis use.

In South Africa, where the use of medical cannabis has been legal since 2018, research on the public perception of cannabis users could help identify any potential barriers to accessing medical cannabis for those who may benefit from its use. This information could be used to develop programs and policies aimed at increasing access to medical cannabis for patients in need as well as to educate the public about the potential benefits of medical cannabis for certain medical conditions.

Overall, studying the public perception of cannabis users in Ghana and South Africa can provide valuable insights into the social and cultural attitudes towards cannabis use in these countries. This information can be used to inform policies and programs aimed at reducing stigma and discrimination against cannabis users, as well as to guide public health and education efforts related to cannabis use.

This research is timely, relevant, necessary, and sufficient to dispel public misunderstandings and provide answers to benefits, while ignoring side effects when used incorrectly or abused. This study assessed a multidimensional view of individuals' perceptions of cannabis based on demographic, social, and economic factors to reach a consensus on how society should view cannabis. This chapter is divided into five sections, the first of which provides context before

delving into a specific gap. The second section collects and evaluates existing research, as well as theoretical underpinnings. The methodology section discusses the empirical strategy, model specifications, and nature of the data. Section four presents and discusses the findings of this study based on a purely quantitative cross-country dataset. Based on the findings, the study concludes and makes a series of recommendations to improve institutional responses to the general public's knowledge and understanding of cannabis, its benefits, and associated side effects, as well as users in both Ghana and South Africa.

4.2 Theoretical Perspective - Social Information Perception (SIP) Model

In recent decades, cannabis research and policy have significantly contributed to society's knowledge, understanding, and perception to dispel existing myths and misconceptions regarding the plant. However, this has a spatiotemporal dimension, as it is more common in the Global North among developed countries, with little research done in developing countries. Anecdotal observations of cannabis use and its users in Africa are largely clouded by subjective views influenced by societal history, religion, and cultural beliefs, with few or no empirical studies that are theoretically grounded. Popular rhetoric, populist narratives, and myths that are more subjective, sentimental, and emotionally driven have largely obscured a better understanding of the scientific truth regarding cannabis, which is supported by data-driven evidence-based research.

Policy diffusion studies frequently infer that learning occurs, but statistical analyses cannot prove this (Mallinson & Hannah, 2020). Literature shows that the lived experience of a post-prohibition society is not the same as that in which cannabis is normalised. Individuals working with cannabis users should not assume that stigmas have vanished, especially because cannabis stigmas frequently intersect with other sources of social inequality (Reid, 2020). Although medical patients and recreational users have different reasons for using cannabis and may have

different experiences, their identities are devalued because they are associated with the same plant. A good example of cannabis-related social stigma is the belief that it is incompatible with social role expectations, such that those who use cannabis in the roles of parents, students, and/or workers are perceived as less capable in these roles than their non-using peers (Hathaway et al., 2011). Parents who use cannabis may be shunned by other parents, students who use cannabis may be forced to complete a rehabilitation program, and cannabis users may be fired. Even if no action is taken, sentiment frequently leads to increased scrutiny of cannabis users, with any minor mistake directly attributed to cannabis intoxication (Newhart & Dolphin, 2019).

Therefore, it is crucial to employ the social dimension to resolve research and policy flaws in cannabis use. This is necessary because any cannabis discourse involves groups and individuals on the periphery of society who hold extreme and opposing views and understanding of what is deemed true about a topical issue such as cannabis, its use, and its users in Ghana and South Africa (Stahl, 2006).

Following Karlova and Fisher (2013) and Karlova and Lee (2013), this study introduces two concepts: perceived misinformation and normative misinformation about cannabis use in an attempt to better understand what society considers true and/or normative about cannabis use in a marginalised society. Thus, the perception of cannabis and its use are regarded as perceived knowledge information that is likely to be inaccurate, incomplete, vague, or ambiguous. Although little is known about the plant, cannabis and its users have been viewed negatively in terms of public opinion and discourse. According to some studies, is widely stigmatized (Skliamis, Benschop, & Korf, 2020). However, cannabis studies have not focused on myths, perceptions, or misinformation regarding cannabis and its users. Similarly, no attention has been paid to the impact of myths, perceptions, or misinformation on the cannabis policy landscape in Ghana and South Africa.

To underpin general myths, society's perceptions, and existing misinformation about cannabis, its use, and users in Ghana and South Africa, this study used the social information perception (SIP) framework (Ruokolainen & Widén, 2020). The framework is predicated on the assumption that all information includes both objective evidence-based research views and subjective views that are likely to be accurate, misinformative, or disinformative. The framework also recognises that perceptions of cannabis, its use, and users can be social, religious, or cultural and that these perceptions can be used to construct social reality.

According to the SIP framework, individuals or groups of individuals with access to social information lack a better understanding of how truthful or trustworthy they are. Individuals may have different experiences and perspectives on cannabis and its users, depending on their sociocultural orientation and religious background. In light of the above, there is little to no guarantee that society as a whole will never encounter cannabis myths, false perceptions, or misinformation, particularly in Ghana and South Africa. While this is an important research and policy issue, it is frequently observed that societal knowledge and information behaviour models ignore misinformation and disinformation and treat all information as accurate (Karlova & Fisher, 2013). The neglect of societal views, perceptions, and information about cannabis, its use, and users has played a significant role in the respective policy options adopted by countries (either regulated legalisation, prohibition, or decriminalisation). However, it has had a significant impact on the policy landscape in most African countries, particularly in Ghana and South Africa.

Based on the following, the SIP model stands out as the best way to articulate and dispel society's perceptions, myths, and misconceptions about cannabis in Ghana and South Africa. The key tenets establish two necessary conditions for validating or refuting cannabis-related information. To begin, the model asserts that, to be considered valid and acceptable, any societal view or information about cannabis and its users must be accurate. As a result, any claim about cannabis

and its users should have scientific backing, be evidence-based and data-driven, and be free of subjective views clouded by religion, cultural sentiment, and social orientation. The second condition states that societal information regarding cannabis must be considered. This is based on the belief that a complete piece of information (including misinformation and disinformation) about cannabis and its users serves as a useful starting point for a more objective scientific enquiry that allows for the repeated testing of claims and hypotheses to arrive at the truth about cannabis and its users. This approach is motivated by the belief that all information about cannabis is critical and requires a thorough and scientific research investigation.

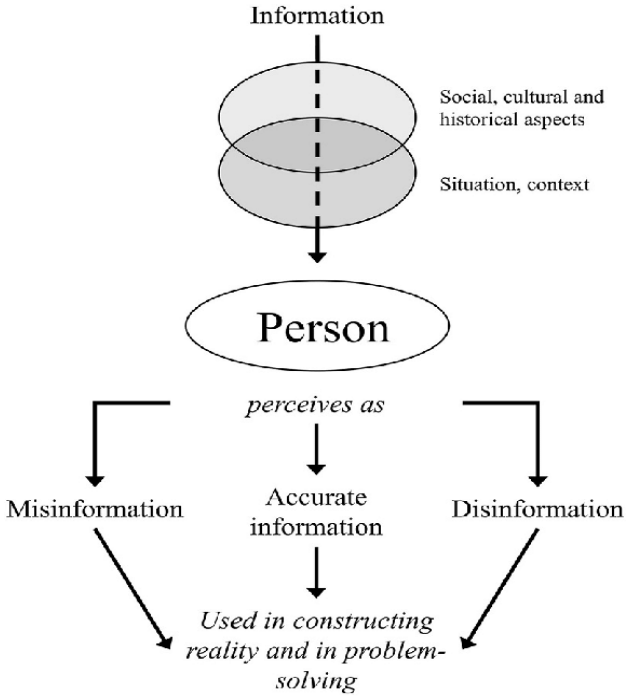
The SIP model emphasises various categories of how an individual or society perceives cannabis, its use, and its users (Figure 8). While there has been limited scientific investigation into the current perception of plants, it is widely accepted as accurate information. However, any objective scientific research on cannabis perception can only be accurate because perceptions are not always as true as depicted in the model. The SIP model reiterates that the accuracy of any information about cannabis, its use, and its users can be perceived differently by different people in Ghana and South Africa. The model also indicated that social history, culture, religion, and level of education all impact one's attitude toward cannabis, its use, and its users. More specifically, the model emphasised that the observed factors influence not only an individual's knowledge of cannabis, but also how the individual perceives cannabis use and users.

The advantage of the SIP framework is that it offers a comprehensive model for understanding the processes involved when an individual makes sense of, and acts in, social situations. It acknowledges that individuals enter social situations with a set of predetermined influences, both biological and environmental. However, there is a gap between the theoretical foundation of the SIP model and its typical assessment methods, interviews and self-reports. In particular, the model discusses automated social-cognitive processes that evaluate, categorise, and impute the

meaning of social information and then feed conscious and controlled judgment and decision processes associated with the production of behaviour. Such automated processes are likely to remain unattended when interviews and self-reports are employed. Additionally, self-report methods are not built to separate low-level encoding mechanisms from higher-level behaviourally relevant ones, confounding critical aspects of encoding and interpretation, such as response criteria and biases, with later response decision stages.

Given the wealth of evidence for individuals of all ages, unconscious of the knowledge conveyed in their implicit responses, methods that tap all processing levels are crucial. SIP measurement is typically limited to conscious, explicit, and subjectively reported responses. Current SIP research may not capture the subtlety of this internal process, and critical components may remain obscure. This method may be a potential shortcoming of the model for Sub-Saharan African countries. It is important to use methods that can tap into all processing levels to obtain a complete picture of people's knowledge and behaviour.

Figure *8*: Social Information Perception framework



Source: Ruokolainen and Widén (2020)

The researcher believes that the SIP model has the potential to assist in resolving the issues currently being discussed because the model maintains that any societal view or information about cannabis and its users must be accurate for that view or information to be considered valid and acceptable. As a consequence, any claim made regarding cannabis and the people who use it ought to be supported by scientific evidence, evidence-based and data-driven, and devoid of the subjective views clouded by religion, cultural sentiments, and social orientation.

4.3. Empirical understanding of Cannabis, its use and users

4.3.1 The role of perception on the legal status of cannabis

The core question of why cannabis must be legal, decriminalised, or prohibited remains the single significant pivot that sustains the narrative within the research and policy arena (Maier et al., 2017). The policy option preferred by economies is contingent on, and somewhat deeply rooted in, the level of information and the degree of knowledge possessed by policymakers and practitioners. Kilmer and Pacula (2017) identified four thematic areas addressed by the cannabis law. These are as follows: a) purpose – medical and recreational purposes; b) producer – who is legally protected for large-scale production; c) purchase – who can purchase cannabis and related products; and d) products – what types of cannabis-related products are permitted. One of the main arguments for legalising recreational cannabis use is that it allows the government to profit from cannabis use while reducing the burden on drug enforcement agencies (Lynn 2016).

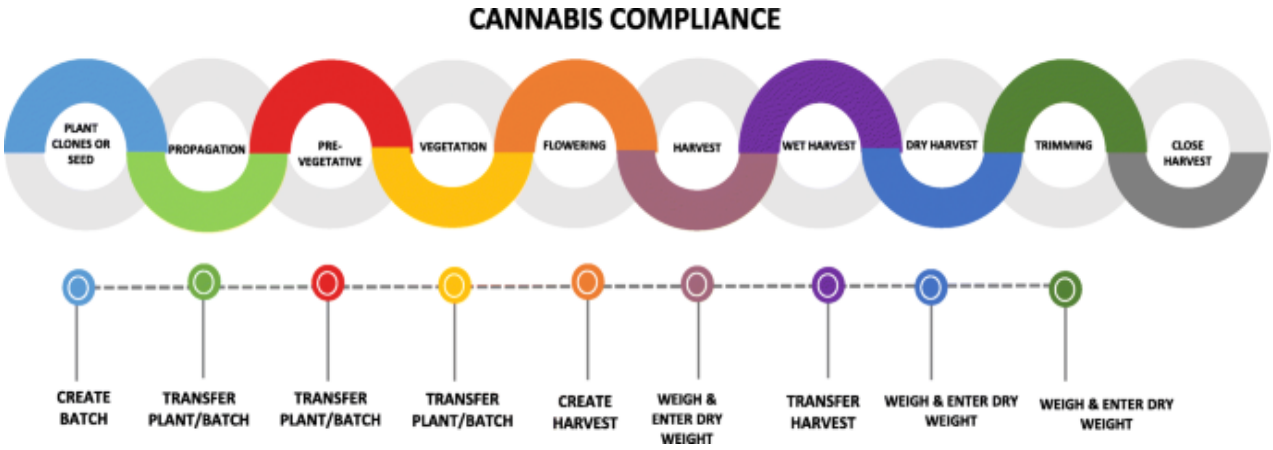
4.3.1.1 The role of perception on the legal status of cannabis in South Africa

Cannabis cultivation and production in South Africa is limited to specific areas. According to the United Nations Office on Drugs and Crime (2002), illegal commercial cannabis production in South Africa is concentrated along the coasts of the KwaZulu Natal and Eastern Cape Provinces. This plant has long been cultivated in the Pondoland region of the wild coast of the Eastern Cape (Kepe, 2003). Traditionally, cannabis use in cannabis-growing communities has

been governed by strict rules enacted by traditional leaders. The leaders' hold on their communities has weakened because of modernisation, resulting in widespread and uncontrolled cannabis smoking in such communities (Peltzer & Ramlagan, 2007).

South African citizens can grow in specific amounts for personal and nonmedical purposes. Other countries have approached cannabis legislation through legalisation and commercialisation. This enables commercial and research production under licence. In this approach, *Cannabis sativa L* can be grown as an industrial hem-p, and its related products are extracted by a licenced company. The licencing authority closely monitors production and supply chains. Figure 9 depicts the compliance regime in Lesotho, which governs the medikingdom's cannabis production.

Figure 9: Cannabis compliance in Lesotho.



Source: Medikingdom "Production" (2014)

- **Specific perception instances in South Africa**

(a) Denial of Negative Health Consequences of Cannabis Use

According to the findings of Manu and Ntsaba (2016), most cannabis smokers believe that cannabis does not harm the user. They claimed to have known people who had smoked cannabis

for many years and had suffered no ill effects; thus, cannabis could not be said to cause harm to smokers. According to a Khanya community focus group member,

"No, there is no disease that can be caused by it [cannabis] because there are many old people who are smoking it ever since I was born and I have never heard that they are sick because of it or someone has died from smoking it" (Manu & Ntsaba, 2016, p. 77).

According to their findings, cannabis-related illnesses or deaths were not reported in the community, even though certain illnesses or deaths may have occurred in these communities as a result of cannabis use. Cannabis smokers believe that cannabis is harmless. The myth that cannabis poses no health risk is widespread. The perception that cannabis is harmless may stem from the fact that most African and South African youths are uninformed about the effects of cannabis on the human brain and body. According to Mafubelu (2013), drug awareness programs in rural South Africa are not as intense as they should be. The lack of drug awareness programs in most rural communities, including those where cannabis is growing, has perpetuated the myth that cannabis smoking poses no health risks. People of all ages share this perception: the cannabis-smoking key informants in each community were much older and shared similar perceptions (Manu & Ntsaba, 2016).

According to Rakhi et al. (2011), cultural norm transmission is a top-down process. They are passed on from one generation to another. As a result, older cannabis smokers in rural communities who believe the drug is harmless have been told that it is harmless, and no awareness campaigns have changed their minds. To dispel this myth, there is a need to raise public health awareness in rural communities, where cannabis has grown. This would increase their understanding of the effects of cannabis and possibly prevent a new generation from blindly following their elders' footsteps.

(b) Perceived Social Problems Associated with Cannabis Use

Cannabis users believe that issues associated with cannabis use are solely social in nature (Manu & Ntsaba, 2016). Smokers explained that smoking made them lazy and disrespectful, harming their social relationships. Participants were fully aware of the consequences of their actions. They were unable to perform any household tasks after smoking cannabis because of their laziness and disrespect, leading them to refuse requests and orders from their parents or older siblings. This lack of positive response to older persons' orders is frowned upon in traditional African communities (Manu & Ntsaba, 2016). It deviates completely from social norms and is especially disruptive in rural communities that rely on harmony and cooperation for normal functioning. According to one smoker:

> *"It makes me disrespectful; I don't care whether the person is old enough to be my mother or my father, I just talk any way I like. I do not feel shy about anything. If someone older than me sends me to do something, I will say aloud that I am not going to do that. It also makes me lazy. After smoking it, I do not want to do anything" (*Manu & Ntsaba, 2016, p. 77).

Adolescents are shy and unable to do certain things when they turn to cannabis to gain the courage they require and to overcome their shyness. Cannabis removes usual social inhibitions and liberates them from social conventions, allowing them to act in ways that they would never sober. While cannabis use is frequently linked to crime and violence, Morris et al. (2004) found that drug users in Khanya and Ilanga communities were only lazy and disrespectful and never violent. However, laziness and disrespect are unacceptable behaviours in most African cultures. According to Wallace (2015), the way we treat and interact with others in a relationship is a true carrier of our values; they are traits we learn in our homes or communities. According to Wallace (2015), being respectful is a prerequisite for successful interaction with others. Being

disrespectful and refusing to help with household tasks makes interaction with others more difficult and has long-term consequences for social relationships. Being lazy and disrespectful marks one as socially deviant in a traditional African community, where conformity with the social values of respect, courtesy, and obedience to the elderly is highly valued. It also stigmatises the entire family and possibly the entire community. Cannabis users in these communities are also less likely to be considered for job openings because they are perceived as high-risk (Manu & Ntsaba, 2016).

(c) Perceived Health Benefits Associated with Cannabis Use

It was also discovered that cannabis smokers had deeply held beliefs about the health benefits of cannabis. People in the studied communities used the plant in a variety of ways, including women and children, who used it to treat various illnesses. They saw cannabis as a medicinal plant, and had no fear of being judged for therapeutic use. Pimples, coughs, asthma, diabetes, high blood pressure, and toothache are among the conditions that are thought to benefit from cannabis use. A key informant from Manu and Ntsaba (2016, p. 78) stated:

> *"People with severe cough cook it and drink the 'amatyatya' [the boiled water] to relieve themselves of the cough".*

The plant was boiled, and water was extracted and consumed as tea. People with pimples wrapped their heads on their faces in a towel and bent over a bowl of leaves steeped in boiling water; steam is thought to be beneficial for the skin, possibly by killing the bacteria that cause the condition. The patients with cough symptoms underwent the same procedure. Although cannabis has been used to treat chronic pain (Zvolensky et al. 2015), its use in the treatment of cough and high blood pressure is supported by literature. If a person with high blood pressure boils the plant and drinks water in the form of cannabis tea over a long period, the high blood pressure is significantly reduced.

In contrast, Greydanus et al. (2015) explained that cannabis increases both heart rate and blood pressure. As a result, cannabis arthritis, cardiomyopathy, myocardial infarction, sudden cardiac death, transient ischaemic attack (TIA), cerebrovascular accident (stroke), and cardiac arrhythmias occur. As a result, participants were misinformed about the negative effects of smoking cannabis and its effects on specific conditions when used medicinally, without scientific proof. While some used it to try to lower their blood pressure, they increased their chances of having cardiac arrest.

(d) Perceived Spiritual Attributes of Cannabis Smoke

Some cannabis smokers believe that cannabis smoke could ward off evil spirits. According to the findings of the study by Manu and Ntsaba (2016), a smoker explained that cannabis smoke chased away spirits that caused nightmares; as a result, they smoked or burned cannabis in their rooms to keep bad spirits away". One respondent claimed:

> *"I smoke dagga [cannabis] because I used to have nightmares a lot, so my uncle advised me to smoke when I was about to sleep or burn it in the room. It chases bad spirits away and I no longer have nightmares since I started smoking and burning dagga in my room"* (Manu & Ntsaba, 2016, p. 79).

Cannabis is smoked or burned in bedrooms at night to prevent nightmares. As a result, cannabis smoke is believed to have spiritual properties. According to Kasilo et al. (2010), traditional or spiritual healing is based on beliefs and experiences indigenous to different cultures. In a traditional African community, such as Pondoland, where cannabis cultivation is a cultural norm, the plant is likely to be imbued with qualities other than recreational ones. Cannabis's perceived spiritual properties are passed down from generation to generation, so that even before an individual considers smoking it, he or she has formed a favourable impression of it based on the spiritual beliefs of the community. According to Asamoah-Gyadu (2015), Africans strongly

believe in supernatural forces and witchcrafts. Depending on faith, various media and practices are consulted or performed in an attempt to ward off evil spirits. As a result, the Pondoland region's belief in the spiritual properties of cannabis is unsurprising. In South Africa, nearly 80% of the population seeks traditional or spiritual healers for physical and spiritual ailments (Media Club South Africa, 2012). Thus, traditional and spiritual healing has a special place in South African healthcare delivery.

- **Present Situation**

Cannabis is currently decriminalised in South Africa for recreational purposes. However, there have been several calls for its fully regulated legalisation to include industrial and medicinal uses, in addition to recreational use. Amid this quest, two major schools of thought examined their impact on the market (Riley et al., 2020). These two conclusions are based on the degree of responsiveness to cannabis price changes, which are highly dependent on quantity and quality, as well as spatiotemporal variation in terms of growth, accessibility, and availability.

While some supporters argued that regulated cannabis legalisation necessitates the imposition of an excise tax to generate revenue for the government, their argument implies that the imposition of a tax on cannabis when legalised would exacerbate existing black-market operations, which are complemented by criminal activities. However, the opposing school of thought argued that regulated cannabis legalisation would lead to mass cultivation of cannabis, resulting in a decrease in market prices due to excess supply. This will address criminal activities related primarily to cannabis trading in the black market. While these two schools of thought offered opposing perspectives on the potential effects of regulated cannabis legalisation, it is important to emphasise the importance of prince elasticity, existing policy infrastructure, state machinery, and other state and non-state actors who play important roles in the drug control policy landscape.

Similar to the rest of the world, the failure of the war on cannabis and its use has resulted in a policy review and rethinking, with decriminalisation and possible legalisation remaining the best options for the South African government (van Niekerk, 2014). This policy revolution in South Africa is visible and reflects the National Drug Master Plan (NDMP) for the 2013–2017-year periods captured, as it aspires to a drug-free society rather than an earlier plan that aimed for an unrealistic drug-free society.

4.3.1.2 The role of perception on the legal status of cannabis in Ghana

Existing research suggests that cannabis was introduced in Ghana by ex-servicemen who fought World War II (Bernstein, 1999; Mensah & Adu-Gyamfi, 2019). This usage was common among ex-servicemen and certain strenuous and dangerous jobs, such as stevedores, fishers, prostitutes, criminals, farmers, and night-soil men (Akyeampong, 2005). These groups are often regarded as low class. However, cannabis use has evolved in Ghana. This substance has become common among all classes, including students in tertiary (Adu-Gyamfi & Brenya, 2015) and secondary schools (Adu-Mireku, 2003). Records of the existence and use of cannabis date back to over 6000 years (Sawler et al., 2015). The plant was a very legal one, and early colonists in North America were required to grow it (Deitch, 2003; Segal, 2014).

OGD (1995), as cited in Bernstein (1999), reported Ghana as a significant producer of high-quality cannabis, second only to Nigeria in West Africa. Ghana, Nigeria, and Eswatini were identified as the primary sources and trafficking points of cannabis in Africa (World Drug Report 2018 (Sales No. E.18.XI.9) n.d.). The report also noted that most of the cannabis produced in Ghana is exported. These reports suggest that Ghana has the potential to create a legal cannabis market. Ghana has recently passed the Narcotics Control Commission Act of 2020 (Act 1019) (2020). This act was to repeal the Narcotic Drugs (Control, Enforcement, and Sanction) Act, 1990, PNDC Law 236, which criminalized possession or importation of narcotic substances

(cannabis inclusive). A violation of the law was punishable by up to 10 years of imprisonment. In addition, Act 1019 decriminalises the use of cannabis for commercial and health purposes.

In Ghana, before the enactment of Act 1019, all cannabis species were classified as narcotic substances, and unlawful possession sections 1, 2, and 5 of PDNC Law 236 stipulated that anyone who wanted to import or possess any narcotic substance had to obtain a licence, which had to be granted by the Minister for Health. In addition, anyone who imports a narcotic drug is supposed to submit details to the pharmacy council. The possession and use of narcotic substances, including cannabis, even for medical purposes without following due process, is unlawful and punishable by up to 10 years of imprisonment. The Ministry of Health (MoH) was supposed to set up a licencing regime, but it never did so until PNDC Law 236 was repealed. The lack of a regulatory framework has encouraged the illegal possession of cannabis and its related products in Ghana.

Ghana shares a common cannabis legislation history with Zambia. In Zambia, the status of medical cannabis is contradictory. Cannabis production was technically legalised under the Narcotic Drugs and Psychotropic Substances Act Cap. 96. However, cultivation was only allowed with a licence from the Health Minister, and none had been granted thus far. In 2019, the Zambian government decided to legalize cannabis cultivation when the government decided to export cannabis to boost the economy (Mfula, 2019).

Act 1019 provides a new status for cannabis and allows for the production of industrial hemp (THC > 0.3%). Section 43 of Act 1019, titled Special provision relating to cannabis of reads:

(1) … The Minister, on the recommendation of the Commission, may grant a licence for the cultivation of cannabis, which has no more than 0.3% THC content on a dry weight basis for industrial purposes for obtaining fibre, seed, or medicinal purposes.

(2) To avoid doubt, a licence granted under subsection (1) should not be used for the cultivation of cannabis for recreational purposes.

Prohibition Partners (2019)[27] estimates Ghana's medicinal cannabis market value at 0.38 (US$m) and recreational market value of 326 (US$m) by 2023. The legalisation and commercialisation of industrial hemp creates new foreign direct investments (FDI) for the country. Owusu et al. (2021) suggested that new legislation can have a positive impact on the Ghanaian economy. This conclusion differs from Mensah and Adu-Gyamfi's (2019) and Osei's (2016) primary arguments against the legalisation of cannabis.

Historically, Ghana's drug control legal and policy landscape has been harsh with almost no proportionality. Current laws to control, enforce, and punish individuals who commit drug offences are not progressive. For example, the 1990 PNDCL 236 sentences drug possession or production to ten years in prison, while drug use and supply can result in at least five years in prison (Ane, 2018; UNODC, 2017, 2019). Despite these strict measures, Ghana continues to be among the top African countries in terms of drug traffic. Given the failure of the preceding policies to control drug use, possession, and trafficking, Ghana's government proposed the Narcotics Control Commission Bill of 2017 (NCC) to replace the current Narcotic Drug Act (Control, Enforcement, and Sanctions). More specifically, the bill called for increased sentence proportionality as well as the decriminalisation of drug use. More importantly, the current bill calls for cannabis to be reviewed and reclassified based on its industrial and medicinal potential.

[27] https://jcannabisresearch.biomedcentral.com/articles/10.1186/s42238-021-00066-0#ref-CR30

4.3.1.3 Comparison of the role of perception in the legal status of cannabis in South Africa and Ghana

Although cannabis is illegal in most African countries, current data suggest extensive usage in the region. According to the cannabis use perception index, cannabis use increased between 2010 and 2016 (Owusu, Arthur & Aboagye, 2021). The continent has one of the highest consumption rates in the world, with an annual prevalence of 13.2 % (Partners, 2019). In 2016, Africa recorded 17% of the total cannabis seized worldwide (World Drug Report 2018 (Sales No.18.XI.9) n.d.). However, countries such as Lesotho, South Africa, Zimbabwe, Zambia, and Malawi have taken the lead in legalising cannabis to reap their medical and economic benefits.

Table 2: Overview of cannabis policy in Ghana and South Africa

	Ghana	**South Africa**
Main Recreational Cannabis Legislation	Narcotics Control Commission Act, 2020 (Act 1019) (2020),	Cannabis for Private Purposes Bill, 2020
Main Medicinal Cannabis Legislation	Narcotics Control Commission Act, 2020 (Act 1019) (2020),	Medicines and Related Substances Act (Act 101 of 1965)
Regulatory body	Narcotics Control Commission (NACOC)	South African Health Products Authority (SAHPRA)
Recreational Cannabis Legal status	Decriminalized for the use of cannabis for health and industrial purposes.	Decriminalized (Confined to private settings to which the public does not have access as of right)
Medicinal Cannabis Legal Status	Decriminalized (use and cultivation)	Legal for all purposes
Penalties for cannabis possession for personal use	Civil penalties i.e. fines of 200-500 penalty units (Ane, 2020) or treatment referrals. Failure to pay fines, translates into a 15 months jail sentence.	Public consumption is liable to a fine or between two and fifteen years of imprisonment.

Source: Authors Construct (2022)

South Africa is at the liberal end of the spectrum, running from liberal to punitive. Cannabis was approved for medical use in South Africa in 2017, following a 2018 constitutional court ruling that ruled that cannabis criminalisation violated the right to privacy (Tharoor, 2018), and private consumption and cultivation were decriminalised (AFRICA, 2020; Veldman, 2020b). The Narcotics Control Commission Act of 2020 (Act 1019) has been passed in Ghana. This act effectively decriminalises cannabis use for commercial and medical purposes (Owusu et al., 2021), exemplifying a country that is systematically pursuing liberalisation (Table 2).

Legislative trends in Ghana and South Africa are not uniformly reflected in public attitudes towards cannabis. Responses to user stereotypes, cannabis as a problem, comparisons with tobacco and alcohol use, preferred legislation, and strategies for addressing users differ (Kitchen, Kabba, Ssekamatte, Nelson, Adu-Gyamfi, Mametja & Fang, 2022). Countries with more liberal policies are associated with more positive sentiments, thus supporting their hypotheses. Ghana and South Africa are at the liberal end of the spectrum, depending on the focus (Kitchen et al., 2022). There is a link between cannabis tolerance and consumption, as well as awareness of current users: more liberal countries have higher rates of ever cannabis use (above 35 per cent), whereas less liberal countries have higher rates of knowing a current user (above 56 per cent). These findings suggest that differences in cannabis use experiences and encounters with users across countries reflect collective attitudes (Kitchen et al. 2022).

Perceptions of risk (social, health, and substance abuse) were similar in Ghana and South Africa. In contrast, participants from more liberal countries had more positive attitudes toward the social and health benefits of cannabis use (Kitchen et al., 2022). Cannabis is typically introduced to adolescents in social settings such as parties (Mehanovi, Virk, Akanidomo, Pwajok, Prichard, van der Kreeft, & Vigna-Taglianti, 2020); moderate use is associated with positive social attributes, and abstinence is associated with negative social attributes (Robertson & Tustin,

2020). Because most of the survey participants were young, this may explain their support for social benefits. However, peer pressure to conform to socialising norms and engage in risky behaviours (Mametja & Ross, 2020) explains why nearly identical proportions of people thought cannabis posed a social risk.

The belief that the benefits of cannabis outweigh the risks is consistent with previous research, indicating a reduction in the associated risk perception in European and American settings (Piontek et al., 2013; Steigerwald et al., 2020; Tamson et al., 2021). A possible explanation for perceived health benefits has been defined as a legitimacy-conferring process in which medicinal cannabis is legitimised through expert backing from established health institutions, such as the Medicines and Control Authority of Zimbabwe (MCAZ) or the South African Health Products Regulatory Authority (SAHPRA), regardless of personal beliefs (Sznitman & Bretteville-Jensen, 2015).

Similar to previous studies that found increased tolerance for cannabis when used for medical purposes (Mikos & Kam, 2019), the majority of people in all countries through the sale and use of cannabis with doctor approval were acceptable, safe, and effective. This supports the notion that public opinion toward cannabis is influenced by medical considerations rather than by current policies and concerns about negative public health effects (Sznitman & Bretteville-Jensen, 2015). Evidence suggests that while exclusive cannabis smokers are exposed to fewer harmful constituents than exclusive tobacco smokers and co-users, they are still exposed to higher toxicant levels than non-smokers (Meier et al., 2022). Blood tetrahydrocannabinol (THC) levels and impaired performance with cannabis intoxication have been linked to a significantly increased risk of vehicular accidents (Turna et al., 2020). As policies evolve, the perception that cannabis use is safe and low-risk may become a more prominent public health issue, necessitating targeted campaigns to dispel myths.

Both Ghana and South Africa have seen a wave of contradictory cannabis policies in which the plant is decriminalised but illegal for medicinal and industrial use. This is a common practice in other countries. However, previous and recent research and policy designs have demonstrated that, if regulated and properly managed, cannabis legalisation can significantly contribute to socio-economic transformation in South Africa and Ghana because the plant is not a threat to competing industries, but rather a timely solution to human, household, community, and national problems such as health, wellbeing, livelihood strategies, and industries. Ghana adopts a legal and commercialisation approach to cannabis regulation. This is evident in the cannabis strain, which can be cultivated under a licence. Legislation allows for industrial and medical purposes only. However, South Africa adopts legislation that not only allows for commercialisation but also for recreational purposes.

4.3.2 Determinants of knowledge and perception about Cannabis

While the general public possesses little valid and accurate knowledge and information about cannabis and its use, the myth, misconception, perception, and social stigma surrounding cannabis use inform various spheres that play a significant role in public discourse and policy dialogue. Countries prohibit, decriminalise, or legalise cannabis with regulations in place, based on their knowledge of the effects of cannabis on the individual, its associated benefits, and costs. Cannabis has remained a global plant with competing viewpoints and debates regarding its legal status.

Even though this ongoing debate has gained sufficient traction in the research, theory, and policy space, no single individual, government, or nation can afford to downplay the plant's socioeconomic benefits with its substantial medical potential that tends to heal the sick, calm the afflicted, and most importantly, contribute to the growth and development of nations (Baron, 2015; Kalant, 2016; Kaplan et al., 2017). Myths of cannabis use and legalisation persisted. Some

are stubborn remnants of the long-running drug war, whereas others reflect the influence of a growing industry that seeks new customers. Despite significant progress in transitioning from prohibited and illegal status to decriminalised or legal status, society's perceptions are heavily clouded by myths and misconceptions (Bottorff et al., 2013; Kevin Sabet, 2013; Gyasi et al., 2011; Pandey, 2016).

While there is a popular maxim indicating that the plant is abusive with no medicinal benefits due to lop-sided claims without any empirical evidence and its eventual classification as a schedule one[28] drug, there has been a paradigm shift in its bedevilment to arguing for its legalisation. Schedule I substances are considered to have a 'high potential for abuse', with no currently accepted medical use for treatment in the United States. CSA prohibits the manufacture, distribution, dispensation, and possession of Schedule I substances, except in federal government-approved research studies. Cannabis is listed as a Schedule I controlled substance under the CSA and has been on Schedule I since the CSA was enacted in 1970 (P.L. 91-513)[29]. Schedule I status of cannabis means that the substance is strictly regulated by federal authorities. However, over the last several decades, most states and territories have deviated from the across-the-board prohibition of cannabis, and now have laws and policies allowing for some cultivation, sale, distribution, and possession of cannabis.

While the CSA definition of cannabis changed in 2018, which resulted in the removal of hemp from the definition of cannabis, the status of cannabis as a Schedule I substance has remained unchanged for over 50 years[30]. However, over the last several decades, many states have established a range of laws and policies that allow for medical and recreational use of cannabis. Most of these states have deviated from an across-the-board prohibition of cannabis, and it is

[28] Schedule I drugs are defined as drugs, substances, or chemicals with no accepted medical use and a high potential for abuse, such as ecstasy or LSD (source: www.dea.gov)
[29] https://crsreports.congress.gov/product/pdf/IN/IN11204
[30] https://crsreports.congress.gov/product/pdf/IN/IN11204

now more the rule than the exception that states have laws and policies allowing for some cultivation, sale, distribution, and possession of cannabis or low-THC cannabis - many of which are contrary to the CSA[31].

As of 1 April 2022 37 states, as well as Puerto Rico, Guam, and the U.S. The Virgin Islands and District of Columbia allow for the comprehensive medical use of cannabis, while 11 additional states allow for the medical use of low-THC cannabis. In addition, 18 states, including the District of Columbia, Guam, and the Northern Mariana Islands, allow for the recreational use of cannabis. These developments have spurred several questions regarding the potential implications of the federal and state cannabis policy gap for federal law enforcement activities, for individuals who comply with state cannabis law but violate federal cannabis law, and for the nation's drug policies as a whole[32].

Although regulated cannabis legalisation has remained a complicated nuance, particularly in Ghana and South Africa, the potential medicinal use of the plant cannot be overstated (Adams et al., 2021). In the scientific world, where cannabis's medicinal potential has played a significant role in its legalisation, timely investment in medical cannabis research, specialist training, and re-orienting of the curricular of medical pharmacopoeia is necessary and sufficient to help achieve growth and development while sustainably managing the pressure in the health sector (Fike, 2016; Shanahan & Ritter, 2014).

Despite the Schedule 1 classification of cannabis, several studies over the years have shown accepted medical use in the treatment of many medical problems (Hill, 2015; Kramer, 2015; Karst, 2018; Greenwell, 2012; Gupta & Gupta, 2018; Birdsall, S. M., Birdsall, & Tims, 2016; Wilkie, Sakr, & Rizack, 2016; Gerich, Isfort, Brimhall, & Siegel, 2015; Koppel, Brust, Fife,

[31] https://crsreports.congress.gov/product/pdf/R/R44782#_Toc477191639
[32] https://crsreports.congress.gov/product/pdf/R/R44782#_Toc477191639

Bronstein, Youssof, Gronseth, & Gloss, 2014; Jensen, Chen, Furnish & Wallace, 2015). To characterise evidence regarding the health benefits of cannabis use, the National Academies of Sciences, Engineering, and Medicine published a comprehensive in-depth review of 10,000 studies (2017). The report found strong evidence from randomised controlled trials to support the conclusion that cannabis or its constituents (i.e., cannabinoids) are effective for treating chronic pain, as antiemetics in the treatment of chemotherapy-induced nausea and vomiting, and for improving patient-reported multiple sclerosis spasticity symptoms.

With regards to mental health, other research has found an anxiolytic-like effect of cannabidiol (CBD) in patients with a social anxiety disorder (Schier, Ribeiro, Silva, Hallak, Crippa, Nardi, & Zuardi, 2012). There is also moderate evidence that cannabinoids, mainly nabiximols, improve short-term sleep outcomes in patients with chronic medical conditions (e.g., fibromyalgia) (Whiting et al., 2015). Few studies have examined cannabis's effects on well-being, a construct related to the quality of life, and findings have been mixed (Schmid, Schönlebe, Drexler, & Mueck-Weymann, 2010).

Furthermore, de-scheduling cannabis at the national and provincial levels will serve as a useful starting point for deeper investigation into the full medical benefits of cannabis (Crépault, 2014; Miron, 2005; UNODC, 2018). Cannabis has several medical uses and is not inherently more toxic than several medicines in current clinical practice (Mensah & Adu-Gyamfi, 2019). Although only 6% of the research on cannabis's medical benefits has been conducted globally, scientific discoveries in terms of providing relief for patients suffering from brain seizures, epilepsy, advanced Parkinson's disease, multiple sclerosis, and other issues such as chronic pain and chemotherapy pain cannot be overlooked (Baron, 2015; Hill, 2015). Several other cannabis myths exist, and only a few of the most persistent myths are discussed.

- **Myth No. 1**

Do most people who use other drugs start cannabis? Most definitely, reads a fact sheet[33] on the website of Smart Approaches to Cannabis (SAM), a prominent anti-pot organisation. Research demonstrates that 99% of those addicted to other drugs started with alcohol and cannabis," the group claims. Potsqueamish politicians including the 2019 - 2021 New York Gov. Andrew Cuomo[34] (D), President Biden[35] and Rep. Andy Harris[36] (R-Md.) cited this "gateway theory" as a reason to keep restrictions in place.

In reality, there is no credible evidence that cannabis makes people more inclined to use other drugs. That, at least, was the conclusion of an exhaustive 96-page inquiry by the Justice Department and the Library of Congress in 2018 (Nöel & Wang, 2018). 'No causal link between cannabis use and the use of other illicit drugs can be claimed at this time,' the authors wrote. The reasoning undergirding gateway theory is fully displayed in SAM's statements. For instance, it is true that most people who use opiates and other dangerous drugs also use cannabis at some point in their lives. However, you can make the same claim regarding alcohol, cigarettes, caffeine, or any other common substance. 'Ninety-nine per cent of those addicted to other drugs started with milk' is a true statement and perfectly meaningless.

- **Myth No. 2**

This myth has gained some steam because of the 2019 publication of 'Tell Your Children: The Truth About Cannabis, Mental Illness, and Violence[37],' a polemic by Alex Berenson, a former New York Times reporter. In the book and elsewhere, Berenson attempts to tie cannabis

[33] https://learnaboutsam.org/faq/#sam14
[34] https://www.politico.com/states/new-york/albany/story/2017/02/cuomo-says-he-remains-opposed-to-recreational-cannabis-109436
[35] https://edition.cnn.com/2019/11/18/politics/joe-biden-cannabis-gateway-drug/index.html
[36] https://www.enterprisenews.com/story/news/politics/government/2020/09/04/house-will-vote-on-federal-cannabis-legalisation-for-first-time-bills-future-in-senate-uncertain/42908463/
[37] https://www.amazon.com/gp/product/1982103671?ie=UTF8&tag=thewaspos09-20&camp=1789&linkCode=xm2&creativeASIN=1982103671

legalisation to increases in murders and assaults: 'Cannabis causes psychosis. Psychosis can also lead to violence. An obvious implication is that cannabis causes violence (Berenson, 2019). Other prohibitionists have attempted to show a link between cannabis use and mass shooting (Devine 2019).

Indeed, there are well-documented ties between heavy cannabis use and psychosis, particularly in young individuals (Chatterjee, 2019). However, teasing out causality is difficult (Hamilton & Monaghan, 2019). Does cannabis use cause psychosis? Are people who develop psychosis already predisposed to cannabis use? Researchers say Berenson and others overstate their claims[38] and ignore evidence that cannabis may help some people with psychotic disorders. Beyond that, scholars have conducted rigorous work directly examining the relationship between cannabis use and crime, and for all intents and purposes, they have not found one. In 2013, a sweeping review of the evidence conducted by the Rand Corp. on behalf of the White House concluded that 'cannabis use does not induce violent crime' (Pacula, Lundberg, Caulkins, Kilmer, Greathouse, Fain, & Steinberg, 2013).

A more recent Justice Department-funded study of the effects of legalisation in Washington the state found that 'neither cannabis-related crime nor more serious offences seemed to be affected by legalisation' (Stohr, Willits, Makin, Hemmens, Lovrich, Stanton Sr, & Meize, 2020). Numerous other papers have turned up evidence that cannabis use and legalisation may lead to less violent crime (Dragone, Prarolo, Vanin, & Zanella, 2019; Brinkman & Mok-Lamme, 2019; Morris, TenEyck, Barnes, & Kovandzic, 2014). Given that the drug's most common effects[39] include 'a pleasant euphoria and sense of relaxation,' it isn't hard to understand why.

[38] https://twitter.com/zivacooper/status/1083061126219259904?s=20
[39] https://nida.nih.gov/publications/research-reports/cannabis/what-are-cannabis-effects

- **Myth No. 3**

No topic in cannabis produced a greater noise-to-signal ratio than potency or the concentration of THC, the plant's main psychoactive compound in a given product. Legalisation sceptics claim that today's cannabis is stronger than ever before 'not your father's cannabis, as they say. Pot advocates, meanwhile, often say that stronger marijuana is better because one can theoretically consume less of it to achieve the same high (Sullum, 2021). However, drug warriors have been issuing dire proclamations regarding cannabis potency since the 1940s. Canadian cannabis advocates that Dana Larsen dug up decades' worth of potency warnings and did the math to determine that, if they were all true, today's marijuana would be roughly 12,600 times stronger than it was in the 1960s. Because the THC concentration cannot exceed 100 per cent, we know that is not true. That said, cannabis is becoming stronger, although it is difficult to say exactly how much. Most of our longitudinal knowledge of cannabis potency comes from a government-run monitoring program that has been marred by flawed data-collection practices for much of its existence. There is no question, however, that under both prohibition and legalisation, cannabis growers have been obsessively selecting for higher THC potency in their plants.

However, this is not necessarily acceptable. The research on potency, summed up in a 2020 report[40] from the Colorado Department of Public Health and Environment, shows a good deal of evidence that people who routinely use stronger cannabis put themselves at a higher risk for mental health disorders than people who use weaker stuff. Do high-potency product users consume less? This is a good idea in theory; however, real-world data are mixed. A recent review found, for instance, that 'users of more potent cannabis products incompletely adjust their THC doses,' which resulted in those users reporting 'more negative consequences than users of less potent products' (Leung, Stjepanović, Dawson, & Hall, 2021). Other recent studies have shown

[40] https://www.thenmi.org/wp-content/uploads/2020/08/THC-Concentration-in-Colorado-Cannabis-_CDPHE-8.3.2020.pdf

that high-potency cannabis products do not necessarily increase the number of users (Aldin 2020). Recent investigations have revealed that the potency testing industry is rife with fraud, quality assurance problems, and general incompetence. The THC labels on products in the dispensary may not necessarily mean that much in the end (Black, 2021).

- **Myth No. 4**

Speaking of labels at dispensaries, cannabis connoisseurs often rhapsodize about their favourite strains[41] the way wine snobs discuss their favourite chardonnays. Product descriptions promise effects from locking you to couch[42] to motivating you to clean the house[43]. However, scientists who have studied the genetics of cannabis strains have claimed that these alleged distinctions have little grounding in reality. For instance, a 2015 report found only minor differences in the genetic makeup of cannabis strains (Sawler et al., 2015). However, the cannabis strain name does not necessarily represent a genetically unique variety. In about one-third of the plants studied, individual samples were more genetically similar to samples with different (strain) names than to samples with identical names. A 2019 study failed to find meaningful genetic differences even between the two major varieties, indica and Sativa[44], often said to produce very different types of intoxication (Schwabe & McGlaughlin, 2019). An analysis in 2018 concluded that the concept of 'strain' does not reflect crop domestication, breeding programs, or plant chemistry (Mudge, Murch, & Brown, 2018). Cannabis contains hundreds of chemical compounds, most of which are poorly understood. Different combinations can produce different toxicity effects. However, research strongly suggests that there is little correlation between how a strain is labelled and what it does.

[41] https://weedmaps.com/news/2020/10/the-best-strains-of-all-time-according-to-experts/
[42] https://www.leafly.com/products/details/homegrown-cannabis-co-original-glue
[43] https://www.leafly.com/products/details/six-labs-tropicana-cookies
[44] https://www.leafly.com/news/cannabis-101/sativa-indica-and-hybrid-differences-between-cannabis-types

- **Myth No. 5**

Opponents of legalisation often make their cases apocalyptic. Groups like Parents Opposed to cannabis[45], for instance, claim that legalisation is 'an anti-science Public Health disaster' and an 'assault on public safety' that 'increases the black market for all drugs, and overdose deaths,' and that 'on EVERY measure, cannabis legalisation is failed policy.' Medical groups have argued that legalisation will lead to increases in teen drug use[46]. Police groups have warned that traffic fatalities will rise[47]. However, one of the most striking facts about states that have been legalised is how little has changed. For instance, this spring, two economists from the University of Colorado at Denver and Montana State University, performed a comprehensive review of the public health consequences of cannabis legalisation, encompassing dozens of previously published studies (Anderson & Rees, 2021). They found little evidence suggesting that recreational cannabis laws result in greater teen drug use, but strong evidence that teens who do use cannabis are less likely to use alcohol - a net public health win, given what we know about the relative dangers[48] of the two substances. There are also some provisional signs[49] that legal marijuana is taking a bite out of opioid mortality, directly contradicting prohibitionists' dire warnings.

On the traffic front, the researchers found that road safety improves when medical cannabis is legalised, but that jury is still out of the effect of recreational cannabis. In the workplace, multiple studies[50] have shown that legalisation reduces sick day use and absenteeism. The net post-

[45] https://poppot.org/cannabis-legalisation-is-an-anti-science-policy/
[46] https://www.lohud.com/story/news/investigations/2019/02/14/new-york-recreational-cannabis-under-attack-cops-educators-doctors-cannabis/2815260002/
[47] https://www.stargazette.com/story/news/public-safety/2019/02/08/southern-tier-law-enforcement-officials-oppose-legal-cannabis-ny/2814107002/
[48] https://www.washingtonpost.com/news/wonk/wp/2015/02/23/cannabis-may-be-even-safer-than-previously-thought-researchers-say/?itid=lk_inline_manual_43
[49] https://www.bmj.com/company/newsroom/legal-cannabis-stores-linked-to-fewer-opioid-deaths-in-the-united-states/
[50] https://www.washingtonpost.com/news/wonk/wp/2016/08/29/study-medical-cannabis-changes-how-employees-use-sick-time/?itid=lk_inline_manual_44

legalisation changes are modest and trending slightly toward a positive[51]. This is not surprising: human societies are massive and complex systems with thousands of interconnected parts interacting in unpredictable ways. It is naïve to think that altering a single variable, such as the legal status of marijuana, could bring the whole edifice crashing down.

4.3.2.1 Factors and their role in the potential legalisation of Cannabis

Anecdotal evidence suggests that factors such as culture, religion, education, and the role of the media have played a significant role in skewing public opinion regarding cannabis use and its potential legalisation in Ghana and South Africa, an issue that has attracted the attention of policymakers. Despite this, the literature on the inextricable connection between culture, religion, education, media exposure, and public opinion regarding the legalisation of cannabis with regulations is somewhat limited. The existing research is primarily Eurocentric and lacks contextual dynamics, regional realities, and country-specific concerns. (Stringer & Maggard, 2016).

Some studies have observed gender dynamics regarding public attitudes towards cannabis use, its users, and views on legalisation. Psychometricians may refer to this effect as differential criteria/item functioning (DCF) (Birnbaum, 1968; Bolt et al, 2004), which, as the name suggests, implies that under the assumption that there is an underlying latent construct with item indicators (e.g., cannabis abuse/dependence), some criteria/items function differently in certain sub-populations (e.g., men versus women). Agrawal and Lynskey's (2007)'s findings suggest that there may be differences in the rates at which men and women endorse criteria for cannabis abuse/dependence and that certain criteria may be more potent markers of cannabis problems in one gender versus another. Women are more likely to use cannabis to cope with tension and

[51] https://www.cato.org/policy-analysis/effect-state-cannabis-legalisations-2021-update#conclusion

chronic stressors, whereas men often report mood enhancement as a motive for drug use (Chabrol et al., 2005).

Lack of gender invariance was identified for two dependence (quit and problems) and two abuse (legal and hazard) criteria with a greater likelihood that women would endorse dependence criteria while men would endorse abuse criteria even after controlling for gender differences in the latent construct. Grant et al. (2006) noted similar gender differences in their latent class analyses with National Longitudinal Alcohol Epidemiologic Survey (NLAES) data with an elevated probability for endorsement of the hazard criteria in NLAES men, and an increased probability of problems and quitting in NLAES women. Furthermore, when factor analysis was performed separately in men and women, Agrawal and Lynskey (2007) observed that the gender heterogeneity due to these criteria was driven by threshold differences alone

Further, from a substantive standpoint, factors associated with the maturational effects of ageing such as increasing responsibilities or declining health, shared influences of 'coming of age in a particular birth cohort such as lifetime exposure to and attitudes towards cannabis and other drugs, and shared period influences such as economic conditions or media focus on drug issues can be generally identified as age, period or cohort effects, guiding future studies into the mechanisms behind these effects Results for demographic variables also support previous findings indicating that marriage and employment are associated with reduced cannabis and other drug participation (French et al., 2004).

Some researchers have also found that reading newspapers and watching television are associated with increasingly liberal drug-related views (Nielsen & Bonn, 2008; Stringer & Maggard, 2016). Considerable attention has also been given to research within individual states, some of which focus on how cannabis-related legislative changes have affected attitudes and use (Khatapoush & Hallfors, 2004; Friese & Grube, 2013; Schuermeyer et al., 2014). But these

studies cannot address why laws and attitudes changed initially or what factors may have contributed to changing views across the nation because they focus largely on legislative changes within a single state.

Over the past four decades, researchers have consistently found that men are more likely to support cannabis legalisation than women (Meares, 1997; Saieva, 2008; Toch & Maguire, 2014). Nevertheless, Felson, Adamczyk, and Thomas (2019) suspect that changes between men and women and differences across various racial, political, and religious groups are not key to understanding the relatively recent liberalization of attitudes. People who are more engaged in their religion are also likely to be more disapprove of cannabis use (Adamczyk & Palmer, 2008). Nielsen and Bonn (2008) and Stringer and Maggard (2016) found that support for legalisation was positively correlated with exposure to media that framed cannabis. Although there has been some increase in tolerant attitudes toward other illegal drugs since the mid-1990s this change has not been as dramatic as the increase in tolerance for cannabis (Nielsen, 2010; Trevino & Richard, 2002).

Political ideology and/or political party affiliation are also strongly related to attitudes toward cannabis legalisation (Boaz, 2011; Brown, Glaser, Waxer, & Geis, 1974; Caulkins et al, 2012; Danigelis & Cutler, 1991, Danigelis, Hardy, & Cutler, 2007; Davis, 1997; Rarey, 2002 cited in Stringer & Maggard, 2016). In addition, gender differences have been noted by various studies regarding both the use of cannabis as well as attitudes toward cannabis legalisation (Agrawal & Lynskey., 2007; Kerr, Greenfield, Bond, Ye, & Rehm., 2007; Nielsen, 2010; Reinzi et al., 1996). Terry-McElrath, O'Malley, and Johnston (2008) showed that while there are a variety of reasons for stopping or abstaining from cannabis use, there are significant variations by gender and race.

In addition, gender differences have been noted in various studies regarding both cannabis use and attitudes toward cannabis legalisation (Agrawal & Lynskey, 2007; Jacobs, 2006; Kerr et al.,

2007; Nielsen, 2010; Reinzi et al., 1996). Terry-McElrath et al. (2008) showed that while there are a variety of reasons for stopping or abstaining from cannabis use, there are significant variations by gender and race. Race or ethnicity has also been shown to be a significant predictor of attitudes toward legalisation; however, the results and relationships have varied (Caulkins et al., 2012; Chen & Killeya-Jones, 2006; Lambert, Ventura, Baker, & Jenkins, 2006; Terry-McElrath, O'Malley, & Johnston, 2008; Thornhill, 2011).

In South Africa, race and ethnicity are significant predictors in pre-determining whether cannabis should be legalized, decriminalized, or prohibited (Caulkins et al., 2012; Thornhill, 2011). Additionally, education has also played a role in people's perception and level of understanding of the implication of legalisation. For instance, while cannabis use is more likely to be associated with lower educational levels, individuals advocating for its legalisation are likely to have higher levels of education (Goode, 1970; Nielsen, 2010). Marital status or the number of children individuals is likelihood influence people's perception of cannabis, its use, and its legal status (Caulkins et al., 2012; Cubbins & Klepinger, 2007). Religion plays a significant role in influencing people's perception, knowledge, and position about cannabis use and legal status (Caulkins et al., 2012; Nielsen, 2010).

National politics have also played a significant role in policy options - regulated legalisation, decriminalization, or prohibition of cannabis for its medicinal value, industrial purposes, or recreational use. In Ghana, political opposition parties tend to support the legalisation while the incumbent government proposes otherwise, given the existing nature of infrastructure, monitoring mechanisms, institutional bottlenecks, and structural vulnerabilities that are likely to fail full implementation of regulations (Boaz, 2011; Brown, Glaser, Caulkins et al., 2012, Danigelis, Hardy, & Cutler, 2007).

This comparative study explored public perception and society's knowledge of cannabis use and users. In doing so, this study examines the underlying factors that influence their perception and how they affect their position on the legalisation of cannabis in the context of Ghana and South Africa. In the literature, key variables such as country of residence, race, gender, education, political ideology, marital status, religion, and birth cohort play a significant role in determining how individuals perceive cannabis and users. This study contributes to the existing body of literature by dispelling public perceptions at the individual level using a comparative study between Ghana and South Africa.

4.4 Data and Methodology

Using primary quantitative datasets, the study assessed attitudes toward and knowledge of cannabis and its users (Table 3). To highlight the differences in the cannabis landscape between the two countries, 1548 people were randomly selected from the populations of Ghana, specifically Accra among university workers and students and South Africa, specifically Gauteng Province among university workers and students. This study not only provided empirical insight and theoretical underpinning to the pressing need to understand how cannabis and its users are perceived in Ghana and South Africa, but also contributes to rigorous methodological inputs in the understanding level of knowledge, sociodemographic factors, and how this influences perception. This study provides several methodological insights. For starters, it is the first cross-country study to attempt to quantify perception through quantitative data and analysis. Second, it determines the relationship between relevant socioeconomic and demographic factors and how they affect individuals' perceptions of cannabis, with a particular emphasis on the individual's level of knowledge about cannabis, strains, and types. Third, this is one of the few studies that examine the relationship between cannabis and four (4) contentious conditions that have significantly influenced public opinion on the relationship between cannabis and crime, violence, suicide, and rape. These findings make the study seminal and provide a

solid foundation for future research that will be subject to focus within the African context, given that the debate over cannabis legalisation, medicinal benefits, and industrial use has become a hot topic.

Despite the theoretical intuitiveness of this study, which is supported by a more grounded and relevant framework, it is important to note that empirical investigations face challenges. It is difficult to distinguish individuals' subjective views from sociodemographic factors, and how this influences their objective views about cannabis and its true implications among users. However, theoretical literature supports this effect. Another issue is whether the observed factors of individual respondents are significantly correlated with unobserved factors that influence their perceptions of cannabis, its use, and users. To overcome these obstacles, the study made use of country of residence dummy. The main source of concern is the classic problem of self-selection due to the population sampled for this study. In effect, it becomes difficult to delineate the effect of respondent's own biases on the outcome of their response which is likely to be clouded by subjective views.

Another problem relates to whether the observed determinants correlate significantly with unobserved factors that influence on how respondents perceive cannabis use and users. Given that this is an inaugural work within the context of South Africa and Ghana, which sets the stage for a deeper inquiry, future studies must use a robust panel dataset that is nationally representative, as this will provide a unique opportunity to investigate the dynamic effects of people's perceptions of cannabis and its users.

Due to the observed disadvantages of the Linear Probability Model (LPM), data where the dependent variable is a binary dummy (0 and 1 values) are analyzed using non-linear models. By using the cumulative distribution function (CDF) the values are confined between zero and one. What makes it unique and less of a problem is the fact that the study basically measures

perception which includes respondents' personal views less void of scientific underpinning about cannabis use.

This study assumed that the dichotomous dependent variable, cannabis use, leads to withering crime, violence, rape, suicide, or not, coded as 0/1 to reflect the probability. The reduced-form model is estimated as

$$\Pr(\vec{x}) = \Pr(Y = 1|\vec{x}) = \begin{cases} 1 & if\ marijuana\ use\ leads\ to\ crime \\ 0 & if\ otherwise \end{cases} \quad (4.1)$$

more formally, the study estimate

$$\Pr(Y_i \neq 0|X_i) = \mathrm{P}(X_i\beta + \upsilon_i + u_i) \quad (4.2)$$

$$\Pr(\vec{x}) = \Pr(Y = 1|\vec{x}) = \begin{cases} 1 & if\ marijuana\ use\ leads\ to\ violence \\ 0 & if\ otherwise \end{cases} \quad (4.3)$$

more formally, the study estimate

$$\Pr(Y_i \neq 0|X_i) = \mathrm{P}(X_i\beta + \upsilon_i + u_i) \quad (4.4)$$

$$\Pr(\vec{x}) = \Pr(Y = 1|\vec{x}) = \begin{cases} 1 & if\ marijuana\ use\ leads\ to\ rape \\ 0 & if\ otherwise \end{cases} \quad (4.5)$$

more formally, the study estimate

$$\Pr(Y_i \neq 0|X_i) = \mathrm{P}(X_i\beta + \upsilon_i + u_i) \quad (4.6)$$

$$\Pr(\vec{x}) = \Pr(Y = 1|\vec{x}) = \begin{cases} 1 & if\ marijuana\ use\ leads\ to\ suicide \\ 0 & if\ otherwise \end{cases} \quad (4.7)$$

more formally, the study estimate

$$\Pr(Y_i \neq 0|X_i) = \mathrm{P}(X_i\beta + \upsilon_i + u_i) \quad (4.8)$$

where equations (4.2), (4.4), (4.6), and (4.8), represent the likelihood that cannabis leads to crime, violence, rape, suicide respectively or not, given the covariates $\mathbf{x}_i$, which consists of a vector of predictor values such as socio-demographic and economic indicators for individual i. These sociodemographic factors included age, sex, marital status, religious affiliation, race, education, employment status, income level, country of residence, and knowledge about cannabis. Thus, b captures the intensive margin estimates of the extent to which the aforementioned factors explain the likelihood that cannabis use will lead to rape, crime, violence,

crime, or suicide. That is, the logistic regression model estimates the likelihood that an individual who uses cannabis is likely to commit suicide, crime, violence, or rape given the independent variables. The composite error term $u_i = n_i + e_i$ captures other unobserved characteristics, which are both time-fixed.

Therefore, this model was analytically estimated using the maximum likelihood estimation (MLE) technique. Given that the study assumed a normal distribution N(0, s_n), the likelihood is then given as

$$l_i = \int_{-\infty}^{\infty} \frac{e^{-V_i^2/2\partial_v^2}}{\sqrt{2\pi_v}} \left\{ \prod_{i=1}^{n_i} \mathrm{F}(Y_{i,} X_i + \upsilon_i) \right\} dv_i \tag{4.9}$$

Where

$$F(y,x) = \begin{cases} \dfrac{1\exp(-z)}{1+\exp(-z)} \; if \; \neq 0 \\ \end{cases} \tag{4.10}$$

The maximum likelihood estimator (MLE) is a consistent asymptotically normal estimator of the coefficient vector *b* (Woodridge, 2010, 473–481). However, by assuming a random effect, we invoke strong assumptions regarding the error term u_i. This study assumed unit homogeneity of the individuals. That is, there is no unobserved heterogeneity that affects individuals' perception of cannabis, its use, users, or how it affects the listed behavioural patterns given the covariates. This study also assumes that the errors are statistically orthogonal to the regressors. These assumptions are likely to fail when there is self-selection, and the errors are not completely random. Although the assumptions seem untenable, the study argues that the logit model is still efficient and consistent.

4.4.1 Marginal effects

Given that the logit model does not measure the accurate effect of each covariate, the marginal effects have been estimated for each model run by country. In effect, the study estimates the marginal effects for each observation and reports the average marginal effect. Calculation of the marginal effects for binary variables is somewhat different, given that a change in x_i for a dummy variable will mean changing from zero to one. In the case the *ith* explanatory variable is a binary dummy variable a useful way to analyze the marginal effect is by taking sample means of the other variables that are continuous and the mode for other variables that are dummies and then comparing the situations for $x_i = 0$ and $x_i = 1$. By subtracting these two different mean marginal effects from each other we obtain the marginal effect in equation (4.11) below:

$$F(\beta_0 + \beta_1 x_1 + \cdots + \beta_{i-1} x_{i-1} + \beta_i) - F(\beta_0 + \beta_1 x_1 + \cdots + \beta_{i-1} x_{i-1}) \quad (4.11)$$

4.5 Key Findings and Discussion

4.5.1 Descriptive analysis of respondents

Of the 1548 respondents, 49.6% were identified as male, 49.4% as female, and 0.9% as someone who did not identify with either of the binary genders. It is reasonable to assume a representative sample size to learn more about the differences between men and women in terms of cannabis legal status, social acceptance, and the attitudes and beliefs of those who use it in Ghana and South Africa.

The vast majority of respondents (86.4%) were young adults (between the ages of 15 and 34), which is especially telling given that this demographic is heavily represented among the students. As the research was conducted in academic institutions in both Ghana and South Africa, these results corroborate the initial definition of the target population for this study. A growing body

of evidence indicates that people of this age range benefit from regular cannabis use, further demonstrating the relevance of studying this demographic. Only 0.26 percent of the population are 65 and above, but 13.4 percent are between the ages of 35 and 64 and are part of the working class (above 65years). The mean respondent age was approximately 13 years, suggesting a relatively young demographic group.

The majority of the people in the sample were from South Africa (55.1%), while nearly half came from Ghana (44.9%). Because cannabis use for recreation has been decriminalised in South Africa, while it remains illegal to possess the drug in Ghana, this distribution is consistent with the anecdotal observation that the policy landscape favouring cannabis usage is far more advanced in South Africa than in Ghana. For South Africa, a larger sample size is both necessary and sufficient to collect data from a wide range of people's perspectives on cannabis to mitigate the influence of selection bias. The vast majority of respondents (79.7%) are black Africans; 9.6% are white; 6.7% identify as ‘other;’ and 4.7% are members of the coloured population. Seventy-nine percent of respondents considered themselves Christians, 11.4% claimed no religious affiliation, 5.4% were Muslim, 1.5% were traditionalists, 1.2% were Hinduist, 0.9% were Jewish, and 0.3% were Buddhist. When asked about their marital status, 80.4% of respondents said they were single, 18.2% said they were married, 9.0% said they were divorced, 4.5% said they were separated, and 0.32 said they were widowed.

The vast majority of the people surveyed had some level of education, with 39% enrolled in post-secondary programs, 33% in undergraduate programs, and 19.6% in elementary school. Of the remaining respondents, 8.7% had a bachelor's degree or higher, and this number dropped to less than 1 per cent when accounting for those with no college degrees. The literacy rates among the respondents were high across the board in both Ghana and South Africa. More than half of the study population were unemployed (50.58%), which is consistent with the respondents' levels of

education, while the other 49.4% had jobs of some kind. The incomes of the people in the sample are often correlated with their levels of education because education defines (un)employment. More than half of the respondents (59.63%) had monthly incomes of less than $500, and fewer than 5% have monthly incomes of $5,000 or more. About 15.9% of the respondents had incomes in the $500-$1,000 range, while the remaining 20% had incomes in the following ranges: $2,000-$2,500, $2,500-$3,000, $3,500-$4,000, $4,500-$5,000, and $5,000 and above.

Knowledge of cannabis, its types and compounds, and respondents' opinions on the policy options in both Ghana and South Africa were used to gain a more concrete understanding of the topic and its related issues. Eighty-five percent said that they knew something about cannabis, whereas 15.5 per cent said they knew nothing. Another 51% of the respondents claimed that they were completely unaware of various strains of cannabis. Only 13.5% were aware of the difference between the Sativa and Indica strains of cannabis, whereas 6.8% were aware of this difference. With the goal of learning more about the compounds in cannabis with which people are familiar, we found that 51% of the respondents were clueless about any of the compounds in cannabis. Of the sample, 11.9% were aware of CBD, 13.8% were aware of THC, and 24.4% were aware of both the major compounds in cannabis. When asked about their preference for a policy stance on cannabis, 68.1% of respondents said legalisation should be the default, followed by 23.6% who preferred prohibition, and 8.3% who wanted decriminalisation.

Table 3 Summary statistics

Variable	Obs	Mean	Percent	Min	Max
Sex	1548			**1**	**3**
Male	768		49.61		
Female	765		49.42		
Non-binary	15		0.97		
Age group	1548	12.943		**1**	**3**
Youth (15-34)	1337		86.37		
Adult (35-64)	207		13.37		
Elderly (65+)	4		0.26		

Country	1548		**1**	**2**
South Africa	853	55.10		
Ghana	695	44.90		
Race	1548		**1**	**4**
Black	1,233	79.65		
Colored	62	4.01		
White	149	9.63		
Other	104	6.72		
Education	1548		**1**	**6**
Tertiary	587	37.92		
Postgraduate	520	33.59		
Secondary	303	19.57		
Graduate	135	8.72		
Non-formal	2	0.13		
No education	1	0.06		
Employment	1548		1	3
Unemployed	783	50.58		
Employed	765	49.42		
Income	1548		**1**	**9**
$1,000 - $1,500	73	4.72		
$1,500 - $2,000	71	4.59		
$2,000 - $2,500	64	4.13		
$2,500 - $3,000	50	3.23		
$3,500 - $4,000	28	1.81		
$4,500 - $5,000	22	1.42		
$500 - $1,000	246	15.89		
above $5,000	71	4.59		
less than $500	923	59.63		
Religion status	1548		**1**	**7**
Buddhism	6	0.39		
Christianity	1223	79.01		
Hinduism	20	1.29		
Jewish	14	0.90		
Islamic	85	5.49		
No religion	177	11.43		
Traditionalist	23	1.49		
Marriage	1548		**1**	**5**
Divorced	14	0.90		
Married	278	17.96		
Separated	7	0.45		
Single	1244	80.36		
Widow	4	0.32		
Knowledge	1548		**1**	**2**
Yes	1309	84.56		
No	239	15.44		
Cannabis type	1309		**1**	**4**
Sativa		13.52		
Indica		6.80		
Both		23.661		
None		56.07		

Compound	1309		**1**	**4**
CBD	142	10.85		
THC	180	13.75		
Both	319	24.37		
None	668	51.03		
Policy option	1548		1	3
Prohibit	365	23.58		
Decriminalize	129	8.33		
Legalize	1054	68.09		

Source: Field Survey (2021)

4.5.2 Relationship between Cannabis, Crime, Rape, Violence and Suicide

Cross-referencing was used to draw out some relationships to present a better understanding of how individuals' level of knowledge affects their viewpoint about general public opinions on cannabis. Respondents' knowledge was paired with four key opinions: the relationship between cannabis knowledge and crime, violence, rape, and suicide.

In general, people with no knowledge of cannabis believed that it was linked to crime, rape, violence, and suicide. More specifically, 72 percent of those with no knowledge of cannabis believed that cannabis led to crime compared to 28 percent of those with some knowledge of the plant. Among those who indicated no relationship with crime, 51.7% had knowledge of cannabis, whereas the remaining 48.3 percent did not. Furthermore, 60.2 percent of those who indicated that there was some link between cannabis and crime were aware of it, while the remaining 30.8 percent were unaware of it (Figure 10).

Similarly, 76.9 percent of those with no knowledge of cannabis believed that cannabis users were more likely to commit rape than the remaining 23.1%, who had some knowledge of the plant. Of these, 55.7% said they had no relationship with rape and had no knowledge of cannabis, while the remaining 44.3 percent had some knowledge. Of those who indicated a relationship between cannabis and rape, 57.5% were aware, whereas the remaining 42.5 percent were unaware (Figure 11).

Concerning the relationship between cannabis knowledge and violence (Figure 12), 72.5 percent of those who had no knowledge of the plant believed that it had a significant link with violence, while the remaining 27.5 percent who had some knowledge of the plant agreed. Sixty-two percent of those who stated that there was no link between cannabis use and violence had knowledge of cannabis, whereas the remaining 37.7 percent did not. Furthermore, of those who indicated a link between cannabis use and violence, 58.4 percent were aware of it, and the remaining 41.6% were unaware.

As shown in Figure 13, approximately 72 percent of people who said they had no knowledge of cannabis believed that it was linked to suicide, whereas the remaining 28 percent said they had some knowledge of the plant. Of those who believed otherwise (no link between cannabis and suicide), 49 percent had no knowledge of cannabis, whereas the remaining 51 percent had some knowledge. Sixty-three percent of those who believed that there was a relationship between cannabis and suicide had some knowledge of cannabis, while the remaining 39.7% had no knowledge of cannabis.

4.5.3 Perception about Cannabis

This study attempts to determine how individuals' sociodemographic factors influence their perception of cannabis, as well as the key thematic areas in this study relating to cannabis's degree of addiction, cosmetic use (body or hair products), industrial potential, recreational benefits, spiritual purpose, medical efficacy, and its impact on well-being in terms of stress management, as well as perceived negative associations with its use.

In general, more males than females reported using cannabis for medicinal purposes. When individuals were asked to report their views on how addictive (or not) cannabis can be, females outnumbered males, with more females believing that the plant was addictive. Interestingly, most males reported that cannabis was harmful, whereas most females reported that it relieved

depression and caused no harm to the body. Regardless of the fragmented nature of this viewpoint, it is critical to recognise that such views are likely to be influenced by the individual using cannabis, the strain and dosage used, and the conditions under which cannabis is used. Compared to males, most females reported recreational significance, industrial benefits, and spiritual usefulness of cannabis, which is reflected in their high ranking of the plant for cosmetic use.

Similar to the above-fragmented views, the majority of Christians believe that cannabis is addictive and very harmful, but they also believe that the plant has cosmetic uses, industrial potential, medicinal benefits, resolves depression, causes no harm to the body, and can even be used for spiritual purposes. The views expressed above are also valid for people who claim to know cannabis. While people claim to know about cannabis, a follow-up question about the types, strains, or compounds they are aware of reveals that there is a lot of cannabis ignorance, as a better understanding of the type and strains will objectively inform people's views on the likely impact and/or relationship between cannabis and the above-mentioned indicators. In effect, the motives and plausible reasons for the above position by individuals affiliated with the Christian religion as well as those with some level of cannabis knowledge require further scientific investigation to disentangle other factors such as culture, subjective views, and others that are likely to influence their views.

A comparison of the same indicators based on residence country (Ghana or South Africa) revealed somewhat contradictory, yet predictable results. When compared to their South African counterparts, most Ghanaians believed that cannabis is addictive (51.6 percent versus 48.4 percent) and very harmful (70.8 percent versus 29.2 percent), but the majority of Ghanaians also believed that the plant has cosmetic benefits (62 percent versus 38 percent), medicinal benefits (50.7 percent versus 49.3 percent), and a fair view (50 percent of individuals residing in Ghana)

that cannabis has industrial potential. In contrast, most South Africans (as opposed to Ghanaians) believed that cannabis has significant recreational benefits (88.8 percent vs. 11.2 percent), causes no harm to the body (62.6 percent vs. 37.4 percent), relieves depression (74.2 percent vs. 25.8 percent), and has a spiritual purpose (78 percent vs. 22 percent).

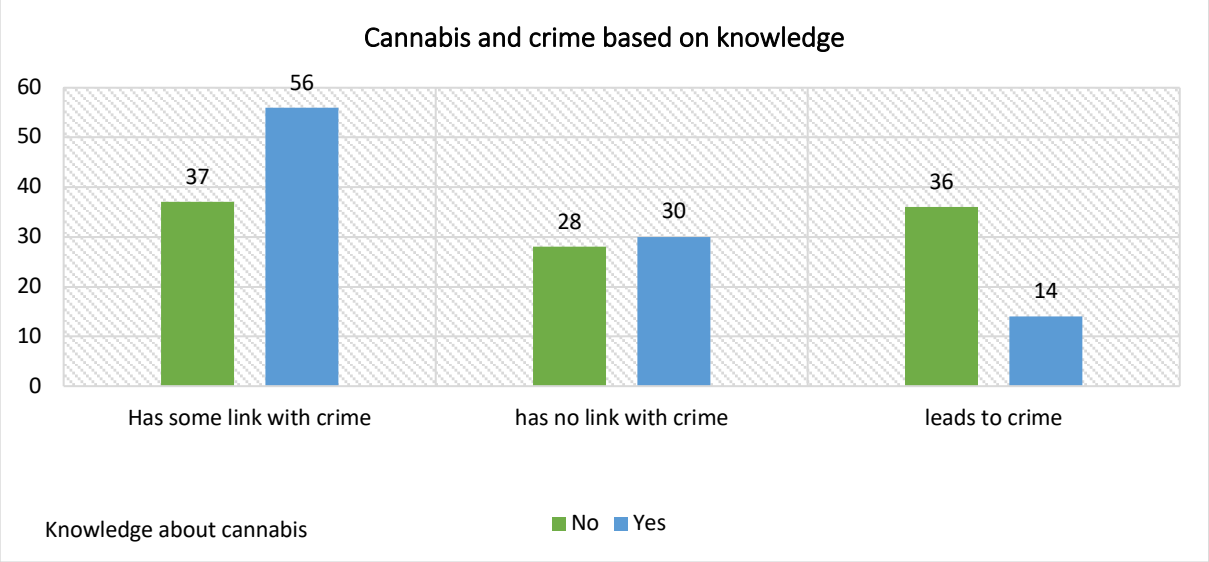
To determine whether respondents believe cannabis is addictive, the study matched the addiction variable with existing sociodemographic variables such as age, gender, religious affiliation, level of education, country of residence, and other key variables. In terms of gender, 51.7 percent of females believe cannabis is highly addictive, while 48.3 percent of males do so. In comparison to the other cohorts, adults (13.3 percent) and the remaining 0.5% of the elderly population, the majority (86.2 percent) of individuals in the younger age group believed cannabis to be addictive. In terms of country-specific realities, 51.6 percent of Ghanaians believed cannabis to be addictive, while 48.4 percent of South Africans believed the same. Similarly, the race structure in relation to cannabis's perceived addictive role shows that most blacks (86.2 percent) believe it is addictive, compared to 6.5 percent whites, 2.3 percent coloured, and the remaining 5.2 percent belonging to the 'other' race group.

In terms of religious affiliation, 90.9 percent of Christians believed cannabis is addictive, with the remaining 9.1 percent divided among Muslims, people with no religious affiliation, people with traditional belief systems, Jews, and Hindus. The majority of participants (79.7 percent) were single and 17.7% were married. The remaining widows, separated, and divorced people who said cannabis was addictive made up less than 3% of the sampled population. Education, employment status, income level, and level of knowledge about the plant are used to determine its relationship with the perceived degree of addiction, with a strong emphasis on socioeconomic indicators, as well as the level of knowledge on cannabis paired with how it is perceived. For the education variable, 37 percent of people enrolled in tertiary education said that cannabis is

addictive, with the second highest (33.1 percent) coming from those enrolled in postgraduate programs. The remaining 18.2 percent were enrolled in secondary school, and 11.7% were enrolled in graduate school. Furthermore, 50.8 percent of employed people believed cannabis to be addictive, compared to 49.2 percent of unemployed people. Among those who demonstrated some level of knowledge about cannabis, 81% believed it was addictive, and the remaining 19% represented those who had no knowledge at all.

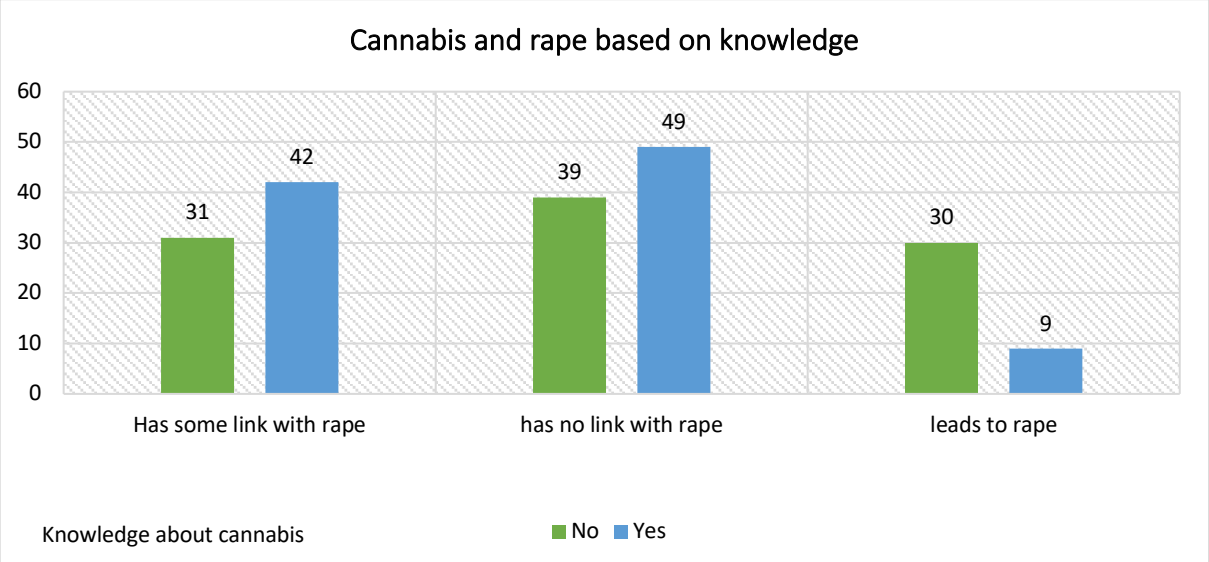
In summary, the preceding descriptive analysis is based on Table 4, which provides insights into the relationship between cannabis use and relevant sociodemographic and demographic indicators. However, it is critical to emphasise that this analysis does not imply causation. In effect, this analysis serves as a useful starting point for a more rigorous scientific analysis, for which this study provides a hint following the logistic regression model described in the following section.

Figure 10: Relationship between Cannabis and Crime based on knowledge



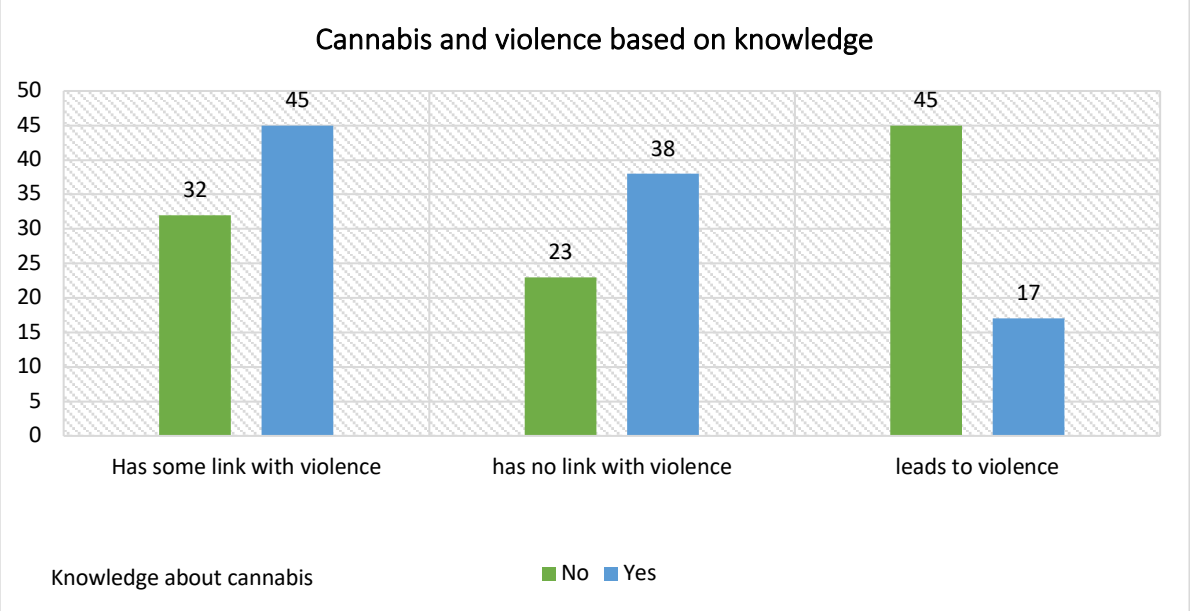
Source: by Author based on survey (2021)

Figure 11: Relationship between Cannabis and Rape based on knowledge



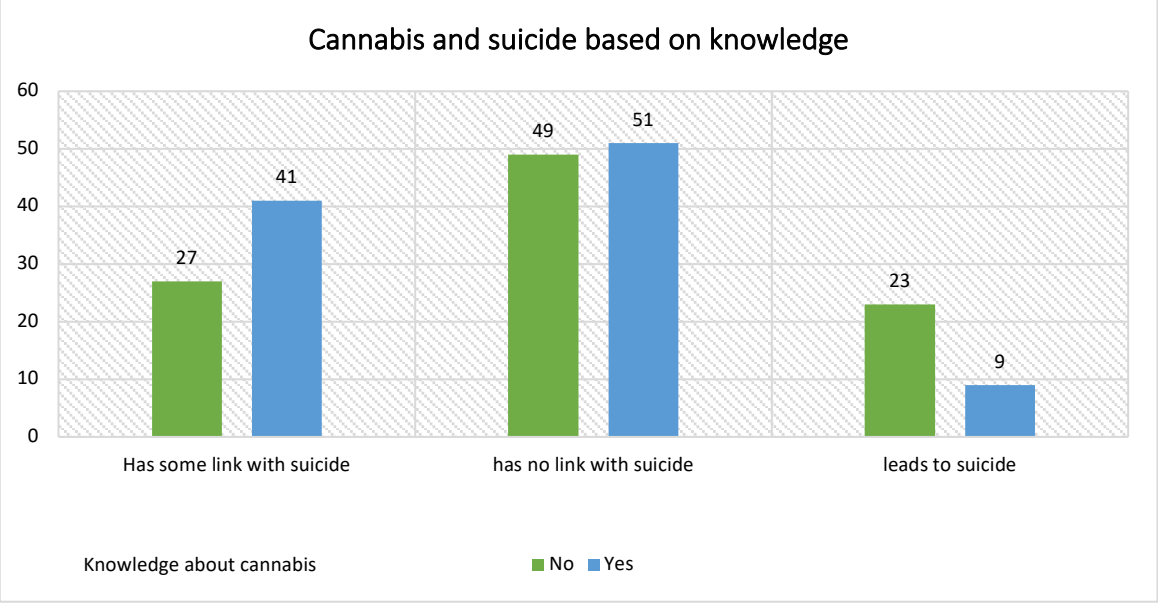
Source: by Author based on survey (2021)

Figure 12: Relationship between Cannabis and Violence based on Knowledge



Source: by Author based on survey (2021)

Figure 13: Relationship between Cannabis and Suicide based on available Knowledge



Source: by Author based on survey (2021)

Table 4 Perception about Cannabis based on Sociodemographic and Economic Factors

Variables	what is your perception about cannabis plant in general?											
	Addictive	All the above	Cosmetic use (Body or hair products)	I don't know	Industrial benefits	Recreational benefits	Causes no harm to the body	Spiritual purpose	Medicinal purpose	resolves stress and depression	very harmful	Total
Sex												
Female	198	1	26	2	11	98	46	27	238	55	63	765
	51.70	100.00	52.00	33.33	55.00	56.65	51.69	55.10	48.28	45.08	42.86	49.90
Male	185	0	24	4	9	75	43	22	255	67	84	768
	48.30	0.00	48.00	66.67	45.00	43.35	48.31	44.90	51.72	54.92	57.14	50.10
Age												
Youth	331	1	43	5	19	157	82	41	431	108	119	1337
	86.20	100.00	86.00	83.33	95.00	88.20	90.11	82.00	86.72	87.10	80.95	86.37
Adult	51	0	7	1	1	21	9	9	65	16	27	207
	13.28	0.00	14.00	16.67	5.00	11.80	9.89	18.00	13.08	12.90	18.37	13.37
Elderly	2	0	0	0	0	0	0	0	1	0	1	4
	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.68	0.26
Country												
Ghana	198	0	31	3	10	20	34	11	252	32	104	695
	51.56	0.00	62.00	50.00	50.00	11.24	37.36	22.00	50.70	25.81	70.75	44.90
South Africa	186	1	19	3	10	158	57	39	245	92	43	853
	48.44	100.00	38.00	50.00	50.00	88.76	62.64	78.00	49.30	74.19	29.25	55.10
Race												
Black	331	1	45	4	16	121	71	35	385	94	130	1233

	86.20	100.00	90.00	66.67	80.00	67.98	78.02	70.00	77.46	75.81	88.44	79.65
Colored	9	0	1	0	1	7	3	5	24	7	5	62
	2.34	0.00	2.00	0.00	5.00	3.93	3.30	10.00	4.83	5.65	3.40	4.01
Other	20	0	4	0	1	19	7	7	32	7	7	104
	5.21	0.00	8.00	0.00	5.00	10.67	7.69	14.00	6.44	5.65	4.76	6.72
White	24	0	0	2	2	31	10	3	56	16	5	149
	6.25	0.00	0.00	33.33	10.00	17.42	10.99	6.00	11.27	12.90	3.40	9.63
Education												
Graduate	45	0	0	0	0	1	8	4	49	10	18	135
	11.72	0.00	0.00	0.00	0.00	0.56	8.79	8.00	9.86	8.06	12.24	8.72
No education	0	0	0	1	0	0	0	0	0	0	0	1
	0.00	0.00	0.00	16.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Non formal education	0	0	0	0	0	0	0	0	2	0	0	2
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.13
Postgraduate	127	1	16	2	7	59	27	17	166	47	51	520
	33.07	100.00	32.00	33.33	35.00	33.15	29.67	34.00	33.40	37.90	34.69	33.59
Secondary education	70	0	9	1	5	49	24	16	87	20	22	303
	18.23	0.00	18.00	16.67	25.00	27.53	26.37	32.00	17.51	16.13	14.97	19.57
Tertiary	142	0	25	2	8	69	32	13	193	47	56	587
	36.98	0.00	50.00	33.33	40.00	38.76	35.16	26.00	38.83	37.90	38.10	37.92
Employment												
Employed	195	1	28	3	8	68	45	23	255	56	83	765
	50.78	100.00	56.00	50.00	40.00	38.20	49.45	46.00	51.31	45.16	56.46	49.42
Unemployed	189	0	22	3	12	110	46	27	242	68	64	783
	49.22	0.00	44.00	50.00	60.00	61.80	50.55	54.00	48.69	54.84	43.54	50.58
Monthly income												

$1,000 - $1,500	24	0	2	1	2	7	6	1	21	4	5	73
	6.25	0.00	4.00	16.67	10.00	3.93	6.59	2.00	4.23	3.23	3.40	4.72
$1,500 - $2,000	17	0	0	0	1	11	6	3	27	4	2	71
	4.43	0.00	0.00	0.00	5.00	6.18	6.59	6.00	5.43	3.23	1.36	4.59
$2,000 - $2500	14	0	5	0	0	8	2	4	23	6	2	64
	3.65	0.00	10.00	0.00	0.00	4.49	2.20	8.00	4.63	4.84	1.36	4.13
$2500 - $3,000	16	0	0	0	0	5	2	2	16	5	4	50
	4.17	0.00	0.00	0.00	0.00	2.81	2.20	4.00	3.22	4.03	2.72	3.23
$3,500 - $4,000	6	0	0	1	0	7	1	1	8	3	1	28
	1.56	0.00	0.00	16.67	0.00	3.93	1.10	2.00	1.61	2.42	0.68	1.81
$4,500 - $5,000	2	0	0	0	0	5	0	1	9	1	4	22
	0.52	0.00	0.00	0.00	0.00	2.81	0.00	2.00	1.81	0.81	2.72	1.42
$500 - $1,000	65	0	9	1	3	19	13	7	83	19	27	246
	16.93	0.00	18.00	16.67	15.00	10.67	14.29	14.00	16.70	15.32	18.37	15.89
above $5,000	16	0	2	1	2	8	7	3	14	13	5	71
	4.17	0.00	4.00	16.67	10.00	4.49	7.69	6.00	2.82	10.48	3.40	4.59
less than $500	224	1	32	2	12	108	54	28	296	69	97	923
	58.33	100.00	64.00	33.33	60.00	60.67	59.34	56.00	59.56	55.65	65.99	59.63
Religious affiliation												
Buddhism	1	0	0	0	0	0	0	2	3	0	0	6
	0.26	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.60	0.00	0.00	0.39
Christian	349	0	44	4	14	110	67	28	394	83	130	1223
	90.89	0.00	88.00	66.67	70.00	61.80	73.63	56.00	79.28	66.94	88.44	79.01
Hinduism	2	0	1	0	1	2	1	0	10	3	0	20
	0.52	0.00	2.00	0.00	5.00	1.12	1.10	0.00	2.01	2.42	0.00	1.29
Jewish	2	0	0	0	0	3	1	0	6	1	1	14

	0.52	0.00	0.00	0.00	0.00	1.69	1.10	0.00	1.21	0.81	0.68	0.90
Muslim	16	0	2	0	3	3	7	5	28	9	12	85
	4.17	0.00	4.00	0.00	15.00	1.69	7.69	10.00	5.63	7.26	8.16	5.49
No religion	13	1	2	2	2	58	12	13	50	22	2	177
	3.39	100.00	4.00	33.33	10.00	32.58	13.19	26.00	10.06	17.74	1.36	11.43
Traditionalist	1	0	1	0	0	2	3	2	6	6	2	23
	0.26	0.00	2.00	0.00	0.00	1.12	3.30	4.00	1.21	4.84	1.36	1.49
Marital status												
Divorced	4	0	0	0	0	2	0	0	5	1	2	14
	1.04	0.00	0.00	0.00	0.00	1.12	0.00	0.00	1.01	0.81	1.36	0.90
Married	68	0	10	1	2	23	15	8	87	19	45	278
	17.71	0.00	20.00	16.67	10.00	12.92	16.48	16.00	17.51	15.32	30.61	17.96
Separated	3	0	1	1	0	0	0	1	1	0	0	7
	0.78	0.00	2.00	16.67	0.00	0.00	0.00	2.00	0.20	0.00	0.00	0.45
Single	306	1	39	4	18	153	76	41	403	104	99	1244
	79.69	100.00	78.00	66.67	90.00	85.96	83.52	82.00	81.09	83.87	67.35	80.36
Widowed	3	0	0	0	0	0	0	0	1	0	1	5
	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.68	0.32
Knowledge												
No	73	0	6	2	3	3	16	7	76	10	43	239
	19.01	0.00	12.00	33.33	15.00	1.69	17.58	14.00	15.29	8.06	29.25	15.44
Yes	311	1	44	4	17	175	75	43	421	114	104	1309
	80.99	100.00	88.00	66.67	85.00	98.31	82.42	86.00	84.71	91.94	70.75	84.56

First row has *frequencies,* and second row has *column percentages*
Source: Field Survey (2021)

4.6 Results: Logit Regression Model

Table 5 shows the results of the logit models, which predicted the likelihood of cannabis use inciting violence, suicide, rape, and crime, based on relevant covariates. In terms of the likelihood that cannabis use will lead to rape, men reported that cannabis is less likely to lead to rape than women and non-binary individuals, which is statistically significant at the 99 percent level of significance. Similarly, respondents from South Africa reported a significantly lower likelihood of cannabis use leading to rape than their Ghanaian counterparts did. A plausible explanation for this observation is that most South Africans were relatively more exposed to cannabis use than Ghanaians, who took a more conservative approach to accepting the countercultural revolution in which cannabis use is intertwined. It is also clear that the gender aspect of this subject matter, as the male gender significantly countered the view that cannabis use leads to rape, as there is a need to disentangle several factors that contribute to inciting any rape action rather than singling out cannabis use. In terms of race, white people are more likely than black, coloured, and other races to believe that cannabis use results in rape.

Another significant finding relates to how individual respondents expressed their views on the role of cannabis in cosmetic products, industry, recreational use, spiritual purposes, medicinal use, and well-being improvement. Individuals who emphasised cannabis's industrial benefits, recreational use, spiritual purpose, medicinal potential, and role in stress management reported that cannabis use was less likely to influence rape. As shown in column 1 of Table 5, all covariates were statistically significant. Those who reported that cannabis did not harm the body and instead improved well-being also reported that cannabis use was less likely to incite rape. Those who reported that cannabis is extremely dangerous reported that its use has a higher propensity to lead to rape, which was 95 percent statistically significant. Although insignificant, individuals who reported some level of cannabis knowledge also reported that its use was likely to result in rape.

Individuals reported the likelihood of cannabis use leading to violence in Column 2 of Table 5. In terms of gender, males reported that cannabis use was less likely to incite violence than females and their non-binary gender counterparts. Furthermore, South African residents indicated that cannabis use was less likely to result in violence than Ghana residents. In terms of race, the majority of white people reported that cannabis use was less likely to lead to violence than black, coloured, and other races.

A cluster of relevant findings relates to how individuals express their views on the likely association between cannabis and violence in medicine, cosmetic products, industry, recreational use, spiritual purpose, and well-being improvement. Individuals who highlighted industrial benefits, recreational use, spiritual purpose, medicinal potential, and stress release reported that cannabis use had a lower propensity to lead to violence. As shown in Column 2 of Table 5, all independent variables were statistically significant. Furthermore, respondents stated that cannabis use does not harm the body, but rather improves well-being; it has also been reported that cannabis use reduces the likelihood of inciting violence. Regardless of the above views, individuals who indicated that cannabis is extremely harmful reported a contrary view that cannabis use has a higher likelihood of causing violence.

It is important to note that the results obtained for the third dependent variable, crime, were consistent with those for rape and violence. Individuals with some level of cannabis knowledge reported that cannabis has a significantly positive relationship with the likelihood of committing crimes compared to those with no cannabis knowledge.

Similar to previous findings, respondents in South Africa reported that cannabis had a lower propensity to influence crime than did respondents in Ghana. This difference is statistically significant at the 99% level. White-race individuals reported that cannabis use is likely to influence crime, whereas those of the coloured and black races did not. Males reported that

cannabis use was less likely to lead to crime than its female and non-binary counterparts. As shown in Column 3 of Table 5, individuals who cited industrial benefits, recreational use, spiritual purpose, medicinal potential, and stress relief reported that cannabis use had a lower probability of leading to crime. Furthermore, individuals who stated that cannabis use causes no harm to the body and instead significantly improves well-being indicated that cannabis use is less likely to lead to crime at a 99 percent level of significance. On the other hand, respondents who believed cannabis was extremely harmful countered the preceding views by reporting that cannabis use was more likely to lead to crime.

Suicide is an important indicator that has been researched in the literature and is also relevant in the context of Ghana and, more specifically, South Africa owing to the recent increase in suicides. Essentially, these studies sought to investigate possible associations with suicide. Cannabis use was crucial for these variables. It is critical to note that fewer significant results have been reported on cannabis use and its association with suicide when compared to perspectives reported on rape, violence, and crime. In terms of race, both white and 'other' respondents reported that cannabis use is more likely to lead to suicide. Males reported that cannabis use was less likely to lead to suicide than females and non-binary genders, which was statistically significant at the 99 percent level of significance. As shown in column 4 of Table 5, individuals who reported spiritual benefits, positive well-being effect (99 percent statistical significance), and impact on stress and depression management of cannabis reported that cannabis use has a lower propensity to lead to suicide. It is important to note that educational level was statistically significant as a variable in all four (4) logit models representing rape, violence, crime, and suicide, with a positive association.

Table 5 Logit Regression Models for both South Africa and Ghana

Variable	(1) Rape	(2) Violence	(3) Crime	(4) Suicide
Knowledge (Yes)	0.038	-0.142	0.383**	0.219
	(0.171)	(0.199)	(0.193)	(0.163)
South Africa	-0.401***	-0.918***	-0.481***	0.156
	(0.141)	(0.160)	(0.159)	(0.138)
Colored	0.047	-0.131	-0.152	0.182
	(0.304)	(0.294)	(0.315)	(0.292)
Other	0.199	0.129	0.032	0.508**
	(0.234)	(0.236)	(0.237)	(0.231)
White	-0.335*	-0.568***	0.531**	0.509**
	(0.197)	(0.204)	(0.216)	(0.198)
Education	Yes	Yes	Yes	Yes
Male	-0.714***	-0.439***	-0.382***	-0.661***
	(0.123)	(0.131)	(0.133)	(0.117)
Non-binary	-0.483	-1.500**	-0.143	0.444
	(0.565)	(0.594)	(0.585)	(0.560)
Cosmetic use	0.064	0.255	0.358	-0.179
	(0.338)	(0.452)	(0.504)	(0.337)
Industrial benefits	-1.171**	-1.203**	-1.158**	-0.673
	(0.527)	(0.517)	(0.542)	(0.460)
Recreational benefits	-1.008***	-0.966***	-0.844***	-0.222
	(0.216)	(0.221)	(0.234)	(0.206)
Causes no harm to the body	-0.622**	-1.297***	-1.431***	-0.307
	(0.248)	(0.249)	(0.269)	(0.242)
Spiritual purpose	-1.145***	-0.985***	-1.372***	-0.637*
	(0.351)	(0.351)	(0.329)	(0.340)
Medicinal purpose	-0.595***	-0.555***	-0.803***	-0.092
	(0.153)	(0.174)	(0.183)	(0.151)
For stress and depression	-1.068***	-1.131***	-1.620***	-0.609**
	(0.242)	(0.242)	(0.250)	(0.240)
Very harmful	0.586**	0.817**	0.939**	0.506**
	(0.262)	(0.382)	(0.425)	(0.228)
Improve wellbeing	-0.803***	-1.248***	-1.092***	-0.929***
	(0.224)	(0.262)	(0.277)	(0.214)
Observations	1,544	1,542	1,540	1,544

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Field Survey (2021)

The sample was mostly from South Africa (55.1%), but almost half of them were from Ghana (44.9 percent). Because it is no longer illegal to use cannabis for fun in South Africa, but it is

still illegal to have it in Ghana, this distribution fits with the anecdotal observation that cannabis-friendly policies are much further along in South Africa than in Ghana. Compared to South Africans, most Ghanaians thought that cannabis was addictive (51.6 percent vs. 48.4 percent) and very harmful (70.8 percent vs. 29.2 percent). However, most Ghanaians also thought that the plant could be used for beauty (62 percent vs. 38 percent) and medicine (50.7 percent vs. 49.3 percent), and 50 percent of Ghanaians thought that cannabis could be used in industry. By contrast, most South Africans (but not Ghanaians) thought that cannabis was good for fun (88% vs. 11.2%), did not hurt the body (62.6 vs. 37.4%), helped with depression (74.2 vs. 25.8%), and had a spiritual purpose (78 percent vs. 22 percent). Similarly, South African respondents were much less likely to say that cannabis use led to rape than their Ghanaian counterparts. One possible reason for this is that most South Africans were more exposed to cannabis use than Ghanaians, who were more reluctant to join the counter-cultural revolution linked to cannabis use. In addition, South Africans have said that violence is less likely to occur when people use cannabis than when it is in Ghana. Similar to what was found before, people in South Africa said that cannabis was less likely to cause crime than people in Ghana.

4.7 Results: Logit Regression Model for South Africa

In order to demonstrate the variation in results at the country level, separate models have been run for both Ghana and South Africa. Table 6 below shows the results of the logit models for South Africa. It is important to indicate that the country-specific results are parallel to the overall joint results with a few variation due to the unique nature of each country understudy. Unlike the general results in table 5 above, respondents from South Africa who reported to have knowledge about cannabis indicated that cannabis use is less likely to incite rape, violence and crime, and these results are significant at 99 percent, 95 percent and 90% levels of

significant respectively. A plausible reason for the turn-around in this finding could be attributed to the country dummy as knowledge about cannabis and its use is relatively widespread in South Africa compared to Ghana. A racial outlook of the data also points out that the white race compared to their black and coloured counterparts perceive that cannabis use has lower likelihood to incite rape, violence and crime. The table 7 provide the marginal effects showing the respective predicted probabilities with. This finding is interesting given the fact that cannabis use for recreational purpose is higher among the black and coloured race than the white race in South Africa. It is important therefore to deeply inquire the racial variation and distribution of recreational cannabis use in South Africa.

Similar to the general findings, the male gender significantly countered the view that cannabis use leads to rape, violence, crime and suicide as there is a need to disentangle several factors that contribute to inciting these four outcome variables. This is significant at 99 percent level of significance for all except for violence that is 10 percent.

Respondents who believed that cannabis has industrial, recreational, medicinal use and causes no harm to the body reported that cannabis use had a lower propensity to lead to rape, violence, crime and suicide. As shown in the Column 1 to 4 of Table 6, all independent variables were statistically significant. Furthermore, respondents stated that cannabis use does not harm the body, but rather improves well-being; it has also been reported that cannabis use reduces the likelihood of inciting violence. Regardless of the above views, individuals who indicated that cannabis is extremely harmful reported a contrary view that cannabis use has a higher likelihood of causing violence. This country-specific finding is in line with the general

observation in the main findings in table 5. The average means of the individual specific covariate effects have been estimated in the marginal effect table in table 7 below.

Table 6 Logit Regression Models for South Africa

Logit Model for SA	(1) Rape	(2) Violence	(3) Crime	(4) Suicide
Knowledge (Yes)	-0.727***	-0.645**	-0.543*	0.037
	(0.271)	(0.288)	(0.282)	(0.270)
Colored	0.127	0.149	0.468	0.504
	(0.356)	(0.387)	(0.357)	(0.341)
Other	0.386	-0.044	0.211	0.248
	(0.250)	(0.237)	(0.240)	(0.239)
White	-0.447**	-0.705***	-0.126	0.025
	(0.221)	(0.222)	(0.215)	(0.205)
Male	-0.798***	-0.296*	-0.479***	-0.732***
	(0.170)	(0.164)	(0.163)	(0.161)
Industrial use	-0.992	-1.350*	-2.077***	-1.904**
	(0.642)	(0.723)	(0.718)	(0.847)
Recreational use	-0.832***	-0.987***	-0.952***	-0.602**
	(0.251)	(0.251)	(0.253)	(0.239)
Causes no harm to the body	-1.147***	-1.579***	-1.413***	-0.733**
	(0.385)	(0.372)	(0.346)	(0.331)
Spiritual use	-1.310***	-1.527***	-1.785***	-0.789**
	(0.432)	(0.424)	(0.412)	(0.387)
Medicinal use	-0.498**	-0.564**	-0.600***	-0.524**
	(0.217)	(0.220)	(0.229)	(0.211)
For stress and depression	-0.806***	-1.345***	-1.712***	-0.899***
	(0.298)	(0.299)	(0.304)	(0.291)
Very harmful	0.866*	1.031*	1.596**	0.627
	(0.446)	(0.528)	(0.746)	(0.408)
Indifferent about users	-1.136***	-1.147***	-0.932***	-0.896***
	(0.267)	(0.274)	(0.293)	(0.255)
Improve wellbeing	-0.457	-0.817***	-0.891***	-0.676**
	(0.306)	(0.317)	(0.328)	(0.298)
Constant	1.236	2.011***	2.004***	0.291
	(0.781)	(0.755)	(0.725)	(0.680)
Observations	850	850	850	847

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Field Survey (2021)

Table 7 Marginal effect for South Africa

Marginal Effect Model SA	Margins Rape	Margins Violence	Margins Crime	Margins Suicide
Knowledge (Yes)	-.149	-.130	-.108	.008
Colored	.0255	.030	.092	.111
Other	.079	-.009	.042	.054
White	-.085	-.135	-.025	.005
Male	-.156	-.058	-.097	-.159
Industrial use	-.209	-.292	-.449	-.380
Recreational use	-.178	-.219	-.206	-.137
Causes no harm to the body	-.237	-.333	-.312	-.166
Spiritual use	-.265	-.324	-.392	-.178
Medicinal use	-.109	-.126	-.126	-.120
For stress and depression	-.173	-.291	-.376	-.202
Very harmful	.183	.197	.203	.135
Indifferent about users	-.245	-.245	-.190	-.204
Improve wellbeing	-.101	-.176	-.181	-.154
Observations	850	850	850	850

Source: Field Survey (2021)

4.8 Results: Logit Regression Model for Ghana

Unlike the results obtained from South African respondents, findings from Ghana vary as per the logit model in table 8 and the marginal effect model in table 9 below. Race, knowledge about cannabis are not significant compared to cohorts from South Africa. It is imperative to indicate that race is an important variable/factor within the context of South Africa, not in Ghana. In terms of knowledge, the degree of perception is relatively deeper in Ghana which largely defiles knowledge as per respondents' views in the findings. The margins are relatively

high for Ghana in table 9 compared to table 7 above except for the outcome variable in column 4 – suicide as dependent variable.

It is important to reiterate that suicide is an important indicator that has been researched in the literature and is also relevant in the context of Ghana. Essentially, these studies sought to investigate possible associations with suicide. Cannabis use was crucial for these variables. Although positive relationship, it is critical to note that no significant results have been reported on cannabis use and its association with suicide. This is also true for crime as an outcome variable. There is lower likelihood that cannabis use lead to violence and crime among respondents who believed that cannabis causes no harm to the body. This is equally true for those who view cannabis as a plant with medicinal value, recreation purpose, spiritual use and as an escape route for stress and depression. For those who believe that cannabis use helps to improve wellbeing and those who are also indifferent about its use, there is lower propensity that cannabis use lead to rape, violence, crime and suicide as shown in table 8 with their respective individual covariate effects in the table 9 below.

Table 8 Logit Regression Models for Ghana

Logit Model for Ghana	(1) Rape	(2) Violence	(3) Crime	(4) Suicide
Knowledge (Yes)	-0.061	-0.450	0.029	0.113
	(0.241)	(0.362)	(0.334)	(0.216)
Colored	-0.077	-0.001	-0.710	-0.225
	(0.512)	(0.603)	(0.583)	(0.494)
Other	-0.391	-0.461	-0.023	-0.197
	(0.628)	(0.852)	(0.811)	(0.580)
White	1.048	-1.969***	-0.998	-0.391
	(0.863)	(0.700)	(1.005)	(0.735)
Male	-0.600***	-0.161	-0.402	-0.655***
	(0.191)	(0.274)	(0.261)	(0.182)
Industrial use	-0.517	-0.432	-1.797**	-0.942
	(0.644)	(1.130)	(0.746)	(0.726)
Recreational use	-1.230**	-0.682	-1.300**	-0.667
	(0.600)	(0.636)	(0.578)	(0.576)
Causes no harm to the body	0.246	-1.642***	-1.253***	-0.143

	(0.393)	(0.527)	(0.460)	(0.362)
Spiritual use	-0.632	-1.514*	-1.211	-0.100
	(0.716)	(0.877)	(0.787)	(0.670)
Medicinal use	-0.465**	-0.963***	-0.740**	-0.144
	(0.220)	(0.339)	(0.301)	(0.217)
For stress and depression	-1.429***	-1.654***	-1.225***	0.071
	(0.487)	(0.490)	(0.474)	(0.414)
Very harmful	0.510	0.164	0.657	0.360
	(0.322)	(0.724)	(0.699)	(0.287)
Indifferent about users	-1.089***	-1.981***	-2.273***	-1.186***
	(0.221)	(0.364)	(0.387)	(0.212)
Improve wellbeing	-0.575	-1.253**	-1.541***	-1.020***
	(0.399)	(0.556)	(0.568)	(0.370)
Constant	1.254***	3.184***	3.030***	0.809***
	(0.326)	(0.523)	(0.478)	(0.300)
Observations	693	619	688	690

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Field Survey (2021)

Table 9 Marginal effect for Ghana

Marginal Effect Model Gh	Margins Rape	Margins Violence	Margins Crime	Margins Suicide
Knowledge (Yes)	-.012	-.050	.003	.024
Colored	-.0150	-.000	-.091	-.047
Other	-.078	-.059	-.003	-.042
White	.175	-.293	-.132	-.082
Male	-.115	-.019	-.046	-.139
Industrial use	-.108	-.041	-.250	-.200
Recreational use	-.266	-.070	-.168	-.143
Causes no harm to the body	.047	-.211	-.161	-.031
Spiritual use	-.134	-.190	-.154	-.022
Medicinal use	-.097	-.107	-.086	-.031
For stress and depression	-.308	-.213	-.156	.015
Very harmful	.092	.013	.052	.076
Indifferent about users	-.229	-.235	-.273	-.274
Improve wellbeing	-.115	-.117	-.147	-.236
Observations	693	619	688	690

Source: Field Survey (2021)

4.7 Conclusion

This study investigated perceptions of cannabis users in Ghana and South Africa. This study used the social information perception (SIP) model to contribute to the existing discourse on how cannabis use and its users are perceived. As a result, the study emphasised some relevant indicators and how they are likely to influence perceptions. One of the goals of this research was to investigate how people perceive cannabis use and its links to crime, violence, rape, and suicide based on their social, cultural, demographic, and economic backgrounds as well as their level of knowledge about the plant. It is critical to emphasise that this does not imply a causation. To highlight the country-specific realities of cannabis, 1548 people were randomly sampled from Ghana and South Africa.

In general, males reported using cannabis for medicinal purposes more than females. When asked to report their views on how addictive (or not) cannabis is, females outnumbered males. Interestingly, most males reported that cannabis is very harmful compared to females, but they also hold a contradictory belief that it relieves depression and causes no harm to the body. Regardless of the fragmented nature of this viewpoint, it is critical to recognise that such views are likely to be influenced by the individual using cannabis, the strain used, the dosage used, and the conditions under which cannabis is used. Most females reported cannabis recreational significance, industrial benefits, and spiritual usefulness, which is reflected in their high ranking of plants for cosmetic use.

Based on relevant independent variables such as the respondents' gender, age, level of education, race, religious affiliation, level of cannabis knowledge, and other relevant variables, the logit regression model provided insight into the likelihood that cannabis use will lead to violence, suicide, rape, and crime. Individuals who emphasised industrial benefits, recreational use, spiritual purpose, medicinal potential, and stress relief reported that cannabis use had a

lower proclivity to lead to violence, crime, suicide, or rape. Similarly, respondents who stated that cannabis does not harm the body and instead improves well-being stated that cannabis use is less likely to incite rape, crime, violence, or suicide. Those who said cannabis was very dangerous said that it was more likely to lead to rape, crime, violence, or suicide.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

5.1 Introduction

This chapter summarises the entire study on the implications of regulated cannabis legalisation on well-being and economic growth by highlighting the main findings and the contribution of the study as well as recommendations for future studies. This chapter is grouped into sections which focus on summary and conclusion, policy recommendations, limitations, and suggestions for future research.

5.2 Summary

This chapter sheds light on emerging issues, highlights the main arguments, presents key findings, and draws conclusions and key policy recommendations from the preceding chapters. This study addresses three main research objectives. The first objective which is achieved in chapter two (2) of the thesis, developed a framework of cannabis potential and estimated parameters for scenarios where legalisation is at the embryonic stages and compares the results to decriminalisation and prohibition regimes using Ghana as a case study. The second objective in chapter three (3) examines the welfare implications of medical cannabis use in improving human well-being. The final objective achieved in Chapter four (4) of this study explored the public perception of cannabis use and addressed any imbalances emerging from lop-sided public information.

This chapter illuminates emerging issues, highlights key arguments, presents key findings, and draws conclusions and policy recommendations from the preceding chapters. This chapter lays empirical and theoretical groundwork for the key thematic subjects of cannabis/cannabis use and the policy landscape surrounding its regulated legalisation, prohibition, or

decriminalisation in Ghana and South Africa. It also examines the probable association between cannabis use and rape, crime, violence, and suicide based on relevant sociodemographic factors, in addition to individuals' level of knowledge about the plant and other relevant indicators, as well as perception issues in the context of Ghana and South Africa. This study contributes methodological rigor, empirical relevance, and policy insight into the discourse on cannabis, particularly in Africa.

Ghana's Parliament, through the Narcotics Control Commission Bill, decriminalised cannabis for health and industrial purposes. The law empowers the Ministry of Interior to grant licences for the cultivation of cannabis of not more than 0.3% tetrahydrocannabinol (THC), the active compound that gives the feeling of 'being stoned' or 'high'. Ghana joins Lesotho, Zimbabwe, Malawi, South Africa, and Zambia as the few African countries that have legalised cannabis. The race to legalise is strong and unstoppable. However, knowledge balancing the benefits and potential downsides, as well as appropriate conditions for a successful cannabis industry, is in short supply. It is imperative to highlight that this study does not tackle cannabis from a moral or emotional perspective, but from a purely objective and rigorous scientific perspective. This thesis also reviewed the multiplicity of roles played by the cannabis plant and presented a model of cannabis utilisation that simulates different supply chain paths and articulates the conditions for a successful cannabis industry.

Medical cannabis has various health benefits for various underlying human health conditions. The research fields of public health, psychiatry, and social welfare have been captivated by the ongoing debate regarding the expanding use of medical cannabis. However, the economic ramifications have received little attention. This study provides insights into the role of medical cannabis in enhancing well-being via cancer treatment, anxiety and stress management, chronic pain treatment, and migraine treatment. In spite of the fact that pharmaceutical drugs provide

relief for the aforementioned medical conditions, they do not guarantee a cure and are typically associated with adverse side effects. Moreover, the increase in opioid-related deaths has had an anaemic effect in individuals with chronic pain. In addition, the cost of treating these diseases with pharmaceuticals can be prohibitive for both individuals and society.

Drawing on Husserl's phenomenological framework, this study explored the lived experiences of individuals using medical cannabis to improve their well-being. This study draws on purely qualitative data to provide insight into medical cannabis use and self-reported well-being in terms of chronic pain management, coping strategies for stress and anxiety, migraine, and cancer treatment. While pharmaceutical drugs provide relief to the above-listed medical conditions, they do not guarantee a cure and are mostly associated with negative side effects. More importantly, opioid-related deaths have been on the rise, with anaemic effects on individuals with chronic pain. The cost of managing the above sicknesses with pharmaceuticals can be prohibitive for individuals and society. Conversely, the use of CBD-rich medical cannabis provides a cure with other added benefits of relief from stress, anxiety, and enhancement in productivity. However, this study was not able to disentangle causality and correlation issues. In effect, a legitimate concern is raised about having well-informed, research-driven knowledge and awareness before using medical cannabis for any health purpose.

Effectively, a legitimate concern is raised regarding the importance of possessing well-informed research-based knowledge and awareness prior to using medical cannabis for health purposes. The current study recognises the inherent methodological challenges in terms of validity and reliability in achieving methodological rigor as a result of sample size and adherence to existing methodological protocols. Despite this, this study represents only a subset of the larger body of research that captures the diverse dynamics of responses among

individuals with various underlying health conditions. Future studies that expand the sample to include multiple racial profiles, sexes, and environmental factors could help disentangle the causality and feedback effects of medical cannabis and its effects on pain management and migraine treatment.

Males were more likely than females to report that cannabis has medicinal applications. In contrast, when individuals were asked about their perceptions of how addictive (or not) cannabis was, more females than males believed the plant was addictive. Males are more likely than females to report that cannabis is extremely harmful, but they also hold contradictory beliefs that it alleviates depression and does not harm the body. Despite the fragmented nature of this view, it is essential to recognise that it is likely influenced by the individual using cannabis, the strain used, the dosage used, and the circumstances in which cannabis was used. In comparison to males, the majority of females reported recreational significance, industrial benefits, and spiritual utility of cannabis, which is reflected in their high ranking for the plant's cosmetic use. Based on relevant independent variables, including but not limited to the respondents' gender, age, level of education, race, religious affiliation, and level of knowledge about cannabis, the study provided insight into the likelihood that cannabis use will lead to violence, suicide, rape, and crime. Notably, those who highlighted industrial benefits, recreational use, spiritual purpose, medicinal potential, and stress relief reported that cannabis use has a lower propensity to lead to violence, crime, suicide, or rape. Similarly, respondents who reported that cannabis use does not harm the body and, in fact, improves well-being also reported that cannabis use is less likely to incite rape, crime, violence, or suicide. However, those who reported that cannabis is extremely harmful reported that its use is more likely to result in rape, crime, or suicide.

5.4 Conclusion

Despite its unofficial popularity, based on medicinal, recreational, and industrial benefits, the use of cannabis has not been formally accepted and legalised in most countries. A plausible reason is the persistent misleading social stigma attached to the cannabis plant because of the magnification of its adverse effects and the corresponding drastic minimisation of its positive benefits. The health benefits of medical cannabis have been widely debated at individual, societal, and global policy playgrounds. Some view cannabis as dangerous. Others indicate that it makes people mad, while others are of the view that it is a gateway to other harmful substances. These popular narratives and public opinion have played a key role in influencing society's acceptance and rejection of cannabis. However, these arguments are mainly based on anecdotal evidence with little scientific underpinnings.

There is evidence that the cannabis prohibition lacks empirical support. It was founded on the propaganda and politics of the alcohol, tobacco, textile, and paper industries. In cannabis-related medical research, it has been observed that cannabis, in the correct dose and in the right hands, cures a wide variety of diseases. Industrial cannabis is extensively used in the pharmaceutical, textile, paper, pulp, oil, biofuel, and automotive industries. This study also revealed that chronic cannabis use, especially in high-THC strains, is associated with impairments in cognitive behaviour, memory, motor coordination, and attention that can last up to two days. Individuals within the age range of brain development are highly susceptible to oppositional, psychoactive, and schizophrenic behaviours. High THC consumption during pregnancy results in low birth weight and problems with foetal development. Cannabis is a valuable source of medicine for nearly all diseases, although acute and prolonged recreational use is unquestionably harmful.

Before growing, distributing, and consuming cannabis, it is necessary to identify all the key actors in the value-added supply chain to better comprehend their roles at each stage of the

cannabis industry. This establishes the foundation for defining policy frameworks, protocols, action plans, and guiding principles that can effectively direct the cannabis industry from the farm to the final consumer. A proper cannabis governance and policy framework must therefore promote compliance, ensure inclusion, and comprehend ethics to achieve shared growth for all without leaving anyone behind. For the industry to flourish in Ghana and elsewhere, domestic laws must evolve, appropriate regulations must be enacted, and a level-playing field must be established for all citizens. A better understanding of how medical cannabis can be regulated, advanced, and incorporated into mainstream medicine, pharmacy, traditional medical curricula, and pharmacopoeias is required for future research. Additionally, future research must focus on how Africa can maximise its market share, and competitive edge and gain a comparative advantage in a more innovative, cost-effective and value-added approach to the commercial cannabis industry that will yield maximum benefits in both medical and industrial sectors, especially, in an era of the African Continental Free Trade Agreement (AfCFTA)[52].

5.5 Policy Recommendations

The fundamental question of why cannabis should be legalised, decriminalised, or prohibited has remained the most important issue in African research and policy. There has been a paradigm shift in its bedevilment from arguing for its regulated legalisation, despite the widespread belief that the plant is harmful and has no medicinal value due to one-sided claims without empirical evidence and its eventual classification as a schedule 1 drug. The cannabis plant has remained a global plant, with recurring legal status disputes and opposing viewpoints. Although this ongoing debate has gained sufficient traction in the research, theory, and policy arenas, no individual, government, or country can afford to downplay the plant's

[52] https://au.int/sites/default/files/treaties/36437-treaty-consolidated_text_on_cfta_-_en.pdf

socioeconomic benefits with its substantial medical potential that tends to heal the sick, calm the afflicted, and most importantly, contribute to the growth and development of the majority of the world's countries. Despite the significant progress made in the transition from prohibition and illegality to decriminalisation or eventual legalisation with regulations in place, there have been multiple calls to reschedule and reclassify cannabis so that it can be embraced as an agricultural crop in a timely manner.

Certain regions of Africa have decriminalised cannabis for recreational use. However, the plant has applications beyond recreational use, such as medical and industrial applications. The continent is a beacon of growth and development that attracts investments from neighbouring countries and beyond, serving as an industrial hub with an ideal climate for the commercial cultivation of cannabis. There is a high likelihood that utilising this timely opportunity to legalise cannabis for medical and industrial purposes will unlock opportunities for the continent. During the time of the Africa Continental Free Trade Area, a continent like Africa that is recovering from decades of colonialism has much to gain from the legalisation of cannabis use (AfCTA). A basic Keynesian model predicts that regulated cannabis legalisation in Africa will result in an increase in tax revenue that is likely greater than the revenue generated from alcohol (114% more harmful than cannabis) and tobacco.

Even though regulated cannabis legalisation has remained a complex issue, particularly in Africa, the potential medicinal use of the plant cannot be discounted. In a scientific world where the medicinal potential of cannabis plays a significant role in its legalisation, timely investment in medical cannabis research, training of specialists, and reorientation of the medical pharmacopoeia curriculum are both necessary and sufficient for achieving growth and development while sustainably managing pressure in the health sector. In addition, the de-scheduling of cannabis by the continent's member states and regional economic communities

will serve as a useful springboard for a more in-depth examination of the full medical benefits and industrial potential of cannabis. Although only 6% of the global research has been conducted on the medical benefits of cannabis, scientific discoveries regarding the relief of brain seizures, epilepsy, advanced Parkinson's disease, multiple sclerosis, chronic pain, and chemotherapy pain cannot be ignored.

Some African nations have decriminalised the use of cannabis, whereas others continue to prohibit it. Those who legalised it lacked the flexibility to advance research in the medical and industrial fields due to the high compliance costs associated with obtaining a licence to operate. This behaviour is prevalent throughout the continent. However, previous and recent research and policy designs have demonstrated that, if properly regulated and managed, cannabis legalisation can significantly contribute to socio-economic transformation in Africa, as the plant is not a threat to human existence but rather a timely solution to human, household, community, and national problems, such as health, wellbeing, livelihood strategies, and industries. Regulated legalisation of cannabis in Africa will not only generate tax revenue, foreign exchange, and other benefits for the continent, but it will also provide Africa with alternative energy supply options, given the continent's intermittent power supply. Regarding the manufacturing sector, cannabis has a greater potential for transforming the industrial sector to improve and enhance the quality of locally manufactured products and introduce new products.

To revitalise the African economy, particularly in the most impoverished communities, it is essential to develop a roadmap and policy document that prioritises a functional and sustainable value chain system coupled with an equitable investment regime that is pro-poor in theory, design, and practice. Recommendations based on a comprehensive review of existing empirical evidence, programs, policy, and legal frameworks on private–public partnership agreements

(PPPA) utilised by leading countries such as Canada in the cannabis industry to assess socioeconomic viability and feasibility without compromising human welfare are necessary to accomplish this objective. Lessons, proposals, and best practices from countries within and outside the continent will also serve as relevant information that will inform the governments of Africa to propose a more contextual, workable, innovative, and timely model for the cannabis industry, be it privately owned; an autonomous private community organised growing, processing, and distribution centres supervised by the governments; or a hybrid private-public partnership agreement that will facilitate the development of the cannabis industry. Considering the foregoing, the following recommendations serve as a pillar between research, theory, policy, and the African cannabis market to maximise benefits and minimise costs.

5.6 Study Limitations

There are several potential limitations, including bias, sample size, and sample selection. One limitation is that the study may be subject to bias, as the researcher had preconceived notions or beliefs about the effects of cannabis on people in Ghana and South Africa. This could have led to a lack of objectivity in the study, and the results may not accurately reflect the true effects of cannabis in these countries. Another limitation is that the sample size may be too small to accurately represent the population of people who use cannabis in Ghana and South Africa. If the sample size is too small, it may not be representative of a larger population and the results of the study may not be applicable to a broader population. Third, the sample selection for the study may not be random or representative of the population of cannabis users in Ghana and South Africa. If the sample selection is not random, it may be biased, which could affect the validity of the study. The SIP model discusses how people automatically evaluate and interpret social information; however, these processes are not captured in traditional assessment methods such as interviews and self-reports. These methods do not account for unconscious

processes and can confound low-level encoding with higher-level decision making. It is important to use methods that can tap into all processing levels to obtain a complete picture of people's knowledge and behaviour.

5.8 Future Research Areas

Cannabis remains illegal in the majority of the world, and research into it is prohibited, despite the fact that it has been used as a medicine by nearly every major civilisation in the last five thousand years. The legalisation of cannabis is one of the most significant social experiments in our era. As with any experiment, questions typically outnumber answers. Moreover, cannabis is viewed as either a miraculous panacea, harmless placebo, or lethal poisonous plant, depending on who enquires about it. It is essential to improve and advance cannabis research to separate facts from fiction in light of the aforementioned complexities that have significantly clouded human understanding of cannabis. This provides sufficient support for counterintuitive beliefs about plants.

Research on THC has highlighted its euphoric effects. THC is considered to be the primary psychoactive component of the cannabis plant, but the plant contains much more THC. CBD, also known as cannabidiol, is the second most studied cannabinoid, and research in this area has increased over the past five–ten years. However, there is still a great deal to learn; there are only two of the more than 200 cannabinoids found in cannabis. In addition, THCV, CBG, and CBC exist. However, research on these individual or combined cannabinoids is still in its infancy, with only a few studies investigating them. In addition to the complexity of the plant itself, there is also a complexity of formulations with varying effects among individuals.

The complexity of the legal landscape of cannabis is exacerbated by the plethora of therapeutic cannabis administration methods. Even though there is anecdotal and self-reported evidence about the welfare effects of cannabis, there is very little evidence to support this, and extensive

research is required in this area by the medical community. In the scientific literature on the therapeutic benefits of medical cannabis, only a handful of small-scale clinical trials have examined the relationship between cannabinoids, anxiety, and post-traumatic stress disorder.

Owing to the lack of research on the environmental and health effects of cannabis and cannabinoids in the agricultural and industrial sectors in Africa, policymakers are unable to make decisions regarding the regulations governing cannabis research and cultivation. To dispel negative rhetoric and cannabis myths through scientific and evidence-based research, it is essential to tackle and address the most pressing cannabis policy and research issues. Significant research on both medical cannabis and industrial hemp will increase the public's analytical acuity, and theoretical and practical competence in evidence-based policy discourse. Future research in these areas and beyond will significantly increase our understanding of cannabis, its medical benefits, industrial potential, and associated risks, and contribute to an objective understanding of these topics. This will also provide an opportunity to investigate new theoretical areas related to the context-specific peculiarity of the cannabis legalisation landscape.

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APPENDICES

Appendix 1 QUESTIONNAIRE FOR CANNABIS USERS

I am Emmanuel Quarshie, a doctoral researcher at the Wits Business School, University of the Witwatersrand, South Africa. As part of the requirements, I need to undertake rigorous research which demands that I collect data on my subject and analyze in my doctoral thesis. I am researching on the topic: Implication of regulated cannabis legalisation on wellbeing and economic growth. This survey seeks to inquire about how non-cannabis users perceive the plant and its users. Your response will be treated with the strictest confidentiality which complies with the ethical standards of the university of the Witwatersrand and the Republic of South Africa. You can contact my supervisor: imhotep.alagidede@wits.ac.za or myself on 2245031@students.wits.ac.za. Also, If you have any queries, concerns or complaints regarding the ethical procedures of this study, please feel free to contact the University Human Research Ethics Committee (non-medical), telephone +27(0)-11-717-1408, email: hrec-medical.researchoffice@wits.ac.za/Shaun.Schoeman@wits.ac.za.

Section 1: Socio-Demographic Information

Q1 Sex of respondent (a) Male (b) Female

Q2 Age (above 18)

……

Q3 Race ……

Q4 Religion …….

Q5 Ethnicity …….

Q6 Highest level of education

Q7 Employment status (a) Employed (b) Unemployed (c) Don't know

Q8 If employed, which sector? ……..

Q9 If unemployed, why? ……..

Q10 Monthly Income level (USD) ……..

Q11 Marital Status ……..

Section 2: History of Cannabis Use – (at least 6 months experience)

Q12	Q13	Q14	Q15	Q16	Q17	Q18
how long have you been using cannabis? USE CODEBOX 12	**who introduced you to cannabis?** USE CODEBOX Q13	**What do you use the cannabis plant for?** USE CODEBOX 14	**How do you use cannabis?** USE CODEBOX 15	**Prior to using cannabis, did you use any product for the main reason why you are using cannabis?** ENTER CODE Yes…01 No…02	**Prior to using cannabis, did you use any product for the main reason why you are using cannabis?** ENTER CODE Yes…01 No…02	**What kind of product?** USE CODEBOX 18
____ ____ ____	____	____	____	____	____	____

CODEBOX 12: Number of years
01 less than a year 02 one year 03 1-5 years 04 above five years

CODEBOX 13: point of reference to cannabis
01=myself 02= a friend 03= parents 04= siblings **05 = Other (specify)**

CODEBOX 14: purpose for using cannabis
01=medicinal 02= domestic 03= recreational 04= industrial 05= spiritual **05 = Other (specify)**

CODEBOX 18: Type of product
01 pharmaceutical 02 Herbal/orthodox 03 Therapeutic approach 04 generic product **05 Other (specify)**

CODEBOX Q15 Ways of using cannabis
01=smoking 02= vaporing 03= infusion 04= drinking **05 = Other (specify)**

Section 3: Cannabis Use, Knowledge and Experiences (Phenomenological Approach)

Q19	Q20	Q21	Q22	Q23	Q24	Q25
Do you know the type of strain of cannabis you use? ENTER CODE Yes…01 No…02 |_|_|	**which type of strain do you use?** Multiple responses allowed USE CODEBOX 20 |_|_| |_|_| |_|_|	**What informed your decision?** Multiple responses allowed USE CODEBOX 21 |_|_| |_|_| |_|_|	**How often do you use cannabis?** Multiple responses allowed USE CODEBOX 22 |_|_| |_|_| |_|_|	**what is your reason for using cannabis?** Multiple responses allowed USE CODEBOX23 |_|_| |_|_| |_|_|	**Where do you usually get your cannabis?** Multiple responses allowed USE CODEBOX 24 |_|_| |_|_| |_|_|	**How much do you spend on every gram of cannabis?** INSERT AMOUNT (USD)

CODEBOX 20: Types of Cannabis

01 CBD-rich
02 THC-rich
03 CBN-rich
04 Other (specify)

CODEBOX 21: Reason for such choice

01 Due to my situation
02 Based on recommendation
03 based on availability
04 don't know
05 Other (specify)

CODEBOX 22: Frequency of smoking

01 once a day
02 once a week
03 2-5 times a day
04 2-5 times a week
05 More than 5 times a day
06 More than 5 times a week
07 Other (specify)

CODEBOX 23:

01 for relaxation
02 for chronic pain
03 to overcome stress/depression
04 for manufacturing products
05 meditation
06 for illness
07 Other (specify)

CODEBOX 24:

01 I grow it
02 I buy it
03 from a friend
04 a relative
05 Other (specify)

Section 4: View on the Relationship between Cannabis and Societal Behaviour

Q26a	Q26b	Q26c	Q26d	Q26e
what is your view about cannabis plant in general?	**What is your view about cannabis and crime?**	**What is your view about cannabis and violence?**	**What is your view about cannabis and rape?**	**What is your view about cannabis and suicide?**
USE CODEBOX 26a __ __ __	USE CODEBOX 26b-26e __ __ __	USE CODEBOX 26b-26e __ __ __	USE CODEBOX 26b-26e __ __ __	USE CODEBOX 26b-26e __ __ __

CODEBOX 26: Knowledge on cannabis	
01 medicinal 02 causes no harm to the body 03 very harmful 04 Addictive	05 resolves stress and depression 06 it has spiritual purpose 07 Other, specify

CODEBOX 26b – 26e: effect of cannabis	
01 leads to crime 02 has no link with crime 03 leads to violence 04 has no link with violence 05 leads to rape	06 has no link with rape 07 leads to suicide 08 has no link with suicide

Section 5: Position on cannabis policy options: Prohibition, Decriminalization and/or Legalization

Q27
What do you think is society's view on cannabis users? USE CODEBOX 27

Q28
What do you think government should do about cannabis? And WHY? USE CODEBOX 28

CODEBOX 27: societal perception
01 They are dealing in drugs 02 They are irresponsible 03 they have mental disorder 04 They are not different from another people violence 05 Other (specify)

CODEBOX 28: societal perception
01 prohibit 02 decriminalize 03 legalize

Appendix 2 INTERVIEW GUIDE FOR CANNABIS USERS

INTERVIEW GUIDE (USERS)

1. Could you tell me about your wellbeing prior to using cannabis? (probe for conditions like chronic pains, severe health issues, anxiety, paranoia, stress, fear among other conditions that affect individual's wellbeing. Inquire about the number of years this lasted, how started and the rate of severity over the years)

2. How did you handle your poor wellbeing? (probe for any intervention, be it medical, pharmaceutical, therapeutic. The duration, the cost estimated involved over the years; availability and accessibility of intervention; time involved efficiency of intervention, any observed side effect among other observations. How did it improve your situation and wellbeing in general)?

3. How different did cannabis influence your condition? (probe for the duration, the cost estimated involved over the years; availability and accessibility of intervention; time involved efficiency of intervention, any observed side effect among other observations. How did it improve your situation and wellbeing in general)?

4. How do you rate your earlier intervention and cannabis in improving your wellbeing? (probe for the duration for both interventions, the cost estimated involved over the years for the two interventions; availability and accessibility of both interventions; time involved efficiency for both interventions, any observed side effect among other observations for both interventions. How different is the two interventions in terms of your situation and wellbeing in general)?

Appendix 3 QUESTIONNAIRE FOR NON-CANNABIS USERS

INDIVIDUAL QUESTIONNAIRE (NON-USERS)

I am Emmanuel Quarshie, a doctoral researcher at the Wits Business School, University of the Witwatersrand, South Africa. As part of the requirements, I need to undertake rigorous research which demands that I collect data on my subject and analyze in my doctoral thesis. I am researching the topic: Implication of regulated cannabis legalisation on wellbeing and economic growth. This survey seeks to inquire about how non-cannabis users perceive the plant and its users. Your response will be treated with the strictest confidentiality which complies with the ethical standards of the university of the Witwatersrand and the Republic of South Africa. You can contact my supervisor: imhotep.alagidede@wits.ac.za or myself on 2245031@students.wits.ac.za. Also, If you have any queries, concerns or complaints regarding the ethical procedures of this study, please feel free to contact the University Human Research Ethics Committee (non-medical), telephone +27(0)-11-717-1408, email: hrec-medical.researchoffice@wits.ac.za/Shaun.Schoeman@wits.ac.za.

Section 1: Socio-Demographic Information

Q1 Sex of respondent (a) Male (b) Female

Q2 Age (above 18)

……

Q3 Race ……

Q4 Religion …….

Q5 Ethnicity …….

Q6 Highest level of education

Q7 Employment status (a) Employed (b) Unemployed (c) Don't know

Q8 If employed, which sector? ……..

Q9 If unemployed, why? ……..

Q10 Monthly Income level (USD) ……..

Q11 Marital Status ……..

Q14
What is your view on cannabis users? USE CODEBOX 14

CODEBOX 14: societal perception
01 They are dealing in drugs 02 They are irresponsible 03 They have mental disorder 04 They are not different from another people violence 05 Other (specify)

Section 4: Position on Cannabis Policy options: Prohibition, Decriminalization and/or Legalization

Q15
What do you think government should do about cannabis? And WHY? USE CODEBOX 15

CODEBOX 15: societal perception
01 prohibit 02 decriminalize 03 legalize

Section 3: View on the Relationship between Cannabis and Societal Behaviour

Q13a	Q13b	Q13c	Q13d	Q13e
what is your view about cannabis plant in general?	**What is your view about cannabis and crime?**	**What is your view about cannabis and violence?**	**What is your view about cannabis and rape?**	**What is your view about cannabis and suicide?**
USE CODEBOX 13a ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋	USE CODEBOX 13b-13e ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋	USE CODEBOX 13b-13e ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋	USE CODEBOX 13b-13e ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋	USE CODEBOX 13b-13e ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋

CODEBOX 13a: Knowledge on cannabis	
01 medicinal 02 causes no harm to the body 03 very harmful 04 Addictive	05 resolves stress and depression 06 it has spiritual purpose 07 Other, specify

CODEBOX 13b – 13e: effect of cannabis	
01 leads to crime 02 has no link with crime 03 leads to violence 04 has no link with violence 05 leads to rape	06 has no link with rape 07 leads to suicide 08 has no link with suicide

Section 2: Cannabis: Knowledge and Perception about Users

Q11	Q12
Do you know about cannabis and any type of strains? ENTER CODE Yes…01 No…02 ⌊_⌋⌊_⌋	**which type of strain do you know of?** Multiple responses allowed USE CODEBOX 12 ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋

CODEBOX 12: Types of Cannabis
01 CBD-rich 02 THC-rich 03 CBN-rich 04 Other (specify)

Appendix 4 INFORMATION SHEET FOR CANNABIS USERS

Participant Information Sheet for Users

Dear Sir/Madam,

I am Emmanuel Quarshie, a doctoral researcher at the Wits Business School, University of the Witwatersrand, South Africa. As part of the requirements, I need to undertake rigorous research which demands that I collect data on my subject and analyze it in my doctoral thesis. I am researching the topic: Implication of regulated cannabis legalisation on wellbeing and economic growth. This survey seeks to inquire about the impact of cannabis on the well-being of users. Your response will be treated with the strictest confidentiality which complies with the ethical standards of the university of the Witwatersrand and the Republic of South Africa. As part of this project, I would like to invite you to take part in an online questionnaire through MS Forms. This task will include you answering the questions as thoroughly and as precisely as you can, and it will take about 10 minutes to complete. There will be no personal costs to you if you participate in this project, you will not receive any direct benefits from participation, but there will be no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw or not answer any question at any time if you do not wish to do so. The questionnaire will be fully confidential and anonymous, as I will not ask for your name or other identifying details, and the details you send to me will be kept safe and not revealed to anyone else. I will use a pseudonym (false name) to reflect your involvement in my final research study.

If you have any questions about this research during or after this, please feel free to contact me for the information below. This research will be published as a research paper, which will be accessible online via the University Library website. If you would like to receive a summary of this study, I would be happy to submit it to you. The data obtained from this research project will be stored under lock and key for the hard copy in a safe location and on a password-protected computer for the soft copy and will be kept for 5 years and then destroyed.
Completing and submitting the survey online through the Microsoft Form is taken to mean consent to participate in this survey.
You can contact my supervisor: at imhotep.alagidede@wits.ac.za or me on 2245031@students.wits.ac.za. Also, If you have any queries, concerns or complaints regarding the ethical procedures of this study, please feel free to contact the University Human Research Ethics Committee (non-medical), telephone +27(0)-11-717-1408, email: hrec-medical.researchoffice@wits.ac.za/Shaun.Schoeman@wits.ac.za.

Sincerely,

Emmanuel Quarshie

PhD Candidate
Wits Business School
Email: 2245031@students.wits.ac.za

Supervisor:

Professor Imhotep Paul Alagidede
Wits Business School
Email: imhotep.alagidede@wits.ac.za

Appendix 5 INFORMATION SHEET FOR CANNABIS NON-USERS

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Participant Information Sheet for Non-Users

Dear Sir/Madam,

I am Emmanuel Quarshie, a doctoral researcher at the Wits Business School, University of the Witwatersrand, South Africa. As part of the requirements, I need to undertake rigorous research which demands that I collect data on my subject and analyze it in my doctoral thesis. I am researching the topic of the Implication of regulated cannabis legalisation on wellbeing and economic growth. This survey seeks to inquire about non-cannabis users' knowledge and perception of the cannabis plant, its uses and its users. Your response will be treated with the strictest confidentiality which complies with the ethical standards of the university of the Witwatersrand and the Republic of South Africa.

As part of this project, I would like to invite you to take part in an online questionnaire through MS Forms. This task will include you answering the questions as thoroughly and as precisely as you can, and it will take about 10 minutes to complete. There will be no personal costs to you if you participate in this project, you will not receive any direct benefits from participation, but there will be no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw or not answer any question at any time if you do not wish to do so. The questionnaire will be fully confidential and anonymous, as I will not ask for your name or other identifying details, and the details you send to me will be kept safe and not revealed to anyone else. I will use a pseudonym (false name) to reflect your involvement in my final research study.

If you have any questions about this research during or after this, please feel free to contact me for the information below. This research will be published as a research paper, which will be accessible online via the University Library website. If you would like to receive a summary of this study, I would be happy to submit it to you. The data obtained from this research project will be stored under lock and key for the hard copy in a safe location and on a password-protected computer for the soft copy and will be kept for 5 years and then destroyed.

Completing and submitting the survey online through the Microsoft Form is taken to mean consent to participate in this survey. You can contact my supervisor: at imhotep.alagidede@wits.ac.za or me on 2245031@students.wits.ac.za. Also, If you have any queries, concerns or complaints regarding the ethical procedures of this study, please feel free to contact the University Human Research Ethics Committee (non-medical), telephone +27(0)-11-717-1408, email: hrec-medical.researchoffice@wits.ac.za/Shaun.Schoeman@wits.ac.za.

Sincerely,

Emmanuel Quarshie
PhD Candidate
Wits Business School
Email: 2245031@students.wits.ac.za

Supervisor:

Professor Imhotep Paul Alagidede
Wits Business School
Email: imhotep.alagidede@wits.ac.za

Appendix 6 CONSENT FORM FOR CANNABIS USERS

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Consent Form for Users

Title of project: Implication of regulated cannabis legalisation on wellbeing and economic growth
Name of researcher: Emmanuel Quarshie

I, ……..., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

Please circle the relevant options below:

I agree that my participation will remain anonymous	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO

…… (signature)
…… (name of participant)

…… (date)

…… (signature)
…… (name of the person seeking consent)
…… (date)

Appendix 7 CONSENT FORM FOR CANNABIS NON-USERS

Consent Form for Non-Users

Title of project: Implication of regulated cannabis legalisation on wellbeing and economic growth
Name of researcher: Emmanuel Quarshie

I, ……..., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

Please circle the relevant options below:

I agree that my participation will remain anonymous	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report	YES	NO
I agree that the interview may be audio recorded	YES	NO

I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO

…… (signature)
…… (name of participant)
…… (date)

…… (signature)
…… (name of the person seeking consent)
…… (date)

Appendix 8 ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

OFFICE OF THE DEPUTY REGISTRAR

08 March 2021

Emmanuel Quarshie
Student number (2245031)
PhD Management
Wits Business School

TO WHOM IT MAY CONCERN

"Implication of regulated cannabis legalization on wellbeing and economic growth"

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

Ethical clearance has been obtained. Protocol number: (**H20/09/47**)

Research expiration: (17 November 2023)

Potgieter

Nicoleen Potgieter
University Deputy Registrar