

SYSTEMATIC REVIEW OF MEDICINAL BENEFITS OF CANNABIS SATIVA L. AND ITS IMPACT ON SOCIO-ECONOMIC DEVELOPMENT.

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Abstract

Medical *Cannabis sativa* inflorescence has gained popularity in recent years due to the therapeutic pharmacological characteristics of its components. *Cannabis sativa L.*-based drugs are effective in treating a variety of illnesses, including constipation, certain types of pain, epilepsy, and anxiety, among others. The therapeutic potential of medicinal *Cannabis sativa* has been established in different medical illnesses, such as sleep disorders, nausea, anorexia, emesis, pain, inflammation, neurodegenerative diseases, epilepsy, and cancer. *Cannabis* inflorescences contain a high concentration of secondary metabolites, primarily cannabinoids and terpenes.

Cannabis phytochemical components known as cannabidiol and 9-tetrahydrocannabinol have significant medicinal importance due to their effects on the central nervous system. Tetrahydrocannabinol is a pharmacological compound used to control and treat chemotherapy-induced nausea and vomiting, as well as to promote appetite. Tetrahydrocannabinol is the principal psychoactive constituent of *Cannabis* and one of at least 113 total cannabinoids identified in the plant.

The study aims to assess the medicinal benefit of *Cannabis sativa* and its impact on socioeconomic development. *C. sativa* has a wide-ranging impact on socioeconomic development, which has resulted in major economic gains in regions where it has been authorized. Projections indicate that the legal *Cannabis* market has generated significant tax income, which may be reinvested in community activities. Most clinical trials focused on the Western World, thus leaving a lack of data on how *Cannabis sativa* affects diverse African communities from lower socio-economic backgrounds. Future research must investigate the impact of cannabis production on poverty reduction and income inequality, as well as how benefits are distributed.

Keywords: *Cannabis sativa*, phytochemical, medicinal benefits, socio-economic development, chemotherapy, cannabinoid, pharmacology, tetrahydrocannabinol.

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Introduction

Cannabis sativa has been used for thousands of years for recreational, medicinal, and religious purposes, and its therapeutic potential has been proven to treat a variety of medical ailments (Malabadi et al., 2024). The plant is commonly referred to as Marijuana with different names and terms used worldwide (Table 1). Medical *Cannabis sativa L.* inflorescences have gained popularity in recent years due to the therapeutic pharmacological characteristics of its components (Kumar et al., 2021; Sarma et al., 2020). Cannabis laws and regulations are rapidly evolving internationally due to its therapeutic effects (Hammond et al., 2020; Pacula et al., 2022).

Table 1: Common names and terms used for Cannabis sativa L.

Common Names	Terms Used
Marijuana	Most widely recognized terms for cannabis, particularly in the context of its psychoactive properties. The term has historical roots and has been used in various cultural contexts.
Weed	A popular slang term commonly used among users and non-users alike.
Pot	It is a frequently used slang name that has become synonymous with marijuana.
Mary Jane	A playful nickname derived from the phonetic pronunciation of "marijuana."
Bud	Refers specifically to the flowering part of the cannabis plant that is harvested for consumption.
Ganja	A term with origins in Jamaica, often associated with Rastafarian culture, referring to cannabis.
Reefer	An older slang term that gained popularity during the early 20th century, often associated with jazz culture.
Chronic	Typically refers to high-quality cannabis but can also be used more generally.
Herb	A term that emphasizes the plant's botanical nature, often used in a more natural or organic context.
Bhang	A traditional Indian preparation made from <i>Cannabis</i> , often consumed in drinks or sweets during festivals.
Spliff	A joint contains both tobacco and cannabis.
Roach	The end part of a joint or blunt that is too small to hold, which may also refer to a clip used to hold it.

Cannabissativa plants are native to Eastern Asia, but due to widespread cultivation, they are now globally widespread (McPartland et al., 2020). *Cannabis sativa L.* is an annual herbaceous flowering plant (Rehman et al., 2021; Malabadi et al., 2023) first classified by Carl Linnaeus, a Swedish botanist, in 1753 (Pant et al., 2024) (Table 2). Malabadi et al. (2024) indicate that there are two major species in the genus, *C. sativa L.* and *C. indica*, which are used for several medicinal and recreational purposes. Different strains have produced higher amounts

of specific cannabinoids compared to others, while certain species with lower cannabinoid content have been cultivated for their fiber content (Rehman et al., 2021). Charitos et al. (2021) allude that *Cannabis sativa* has been cultivated throughout recorded history and used as a source of industrial fiber, seed oil, food, and medicinal purposes. Although *C. sativa* has a stimulating effect, *C. indica* has a more soothing effect, which aids sleep (Malabadi et al., 2023).

Table 2: Medical and industrial uses of Cannabis sativa L.

Medicinal Uses	Industrial Uses
Pain	Textile
Nausea	Fabrics
Appetite	Construction material
Neurological disorder	Food products
Mental Health	Cosmetics
Anti-inflammatory effects	Biofuels
Anorexia	Paper production
Emesis	Cotton
Sleep disorders	
Epilepsy	
Cancer	

Cannabis sativa has a long history of medicinal use attributed to its rich supply of bioactive compounds, particularly cannabinoids and terpenes. The primary medical applications include Cannabinoids such as Δ 9-tetrahydrocannabinol (THC) and cannabidiol (CBD), which have been shown to alleviate chronic pain conditions, including neuropathic pain and pain associated with cancer (Table 2) (Malabadi et al., 2023).

THC is effective in reducing nausea and vomiting, especially in patients undergoing chemotherapy for cancer treatment (Sukpiriyagul et al., 2023). Synthetic cannabinoids like Marinol (dronabinol) and Cesamet (nabilone) are FDA-approved for this purpose (Feliciani, 2022). THC can stimulate appetite in patients suffering from conditions that cause weight loss, such as HIV/AIDS or cancer (Somboonwit et al., 2024). Research indicates the potential benefits of THC in treating neurological disorders like epilepsy, multiple sclerosis, and Parkinson's disease (de Fátima et al., 2024). CBD has gained attention for its anticonvulsant properties (Malabadi et al., 2023). Stanciu et al. (2021) indicate that some studies suggest that cannabinoids may help manage anxiety, depression, and post-traumatic stress disorder (PTSD), although more research is needed to establish efficacy. Cannabinoids exhibit anti-inflammatory properties that may be beneficial in treating conditions like arthritis or inflammatory bowel disease (Carvalho et al., 2020).

Rehman et al. (2021) indicate that industrial hemp is a type of *Cannabis sativa* with minimal THC levels, which has several applications across various industries. Hemp fibers are robust and resilient, making them appropriate for textiles used in clothing, ropes, and other fabric items (Mariz et al., 2024). Martínez et al. (2023) allude that hemp can be turned into materials such as hempcrete (a sustainable building material), insulation goods, and construction bio composites. Hemp seeds have been reported to be extremely nutritious and rich in protein, vital fatty acids (omega-3 and omega-6), vitamins, and minerals (Tănase et al., 2024). Literature indicates that hemp seeds can be ingested fresh and processed into oil or protein powder (Cerino et al., 2021). Baral et al. (2020) indicate that hemp oil is increasingly being utilized in cosmetics because of its hydrating characteristics. Bakowska-Barczak et al. (2022) allude that hemp oil is also present in lotions, shampoos, soaps, and other personal care products. Historically, hemp was used for paper production due to its high cellulose content (Lawson et al., 2022). Amode et al. (2021) reported that hemp paper is more durable than traditional wood-based paper. Literature indicates that there is ongoing research into the use of hemp biomass for producing biofuels as a sustainable energy source (Parvez et al., 2021).

Table 3: Botanical nomenclature of *Cannabis sativa* L.

Rank	Scientific Name and Common Name
Kingdom	Plantae - Plants
Subkingdom	Tracheobionta - Vascular plants
Superdivision	Spermatophyta - Seed plants
Division	Magnoliophyta - Flowering plants
Class	Magnoliopsida - Dicotyledons
Subclass	Hamamelididae
Order	Urticales
Family	Cannabaceae
Genus	<i>Cannabis</i>
Species	<i>Cannabis sativa</i> L.

Since the late 1980s, governments have gradually abandoned tight prohibition in favor of alternate measures that legalized *Cannabis* for recreational and sales for industrial use (Adams, 2024). *Cannabis* legalization is an essential source of economic growth because it helps to increase revenue taxes and create new jobs (Kavousi et al., 2022). The therapeutic potential of medicinal *Cannabis* has been established in different medical illnesses, such as sleep disorders, nausea, anorexia, emesis, pain,

inflammation, neurodegenerative diseases, epilepsy, and cancer (Leinen et al., 2023) (Table 2).

Both medical *Cannabis* and industrial *Cannabis sativa* hemp are used for controlling numerous diseases, such as cervical cancer, chronic pain, asthma, rheumatoid arthritis, wound healing, constipation, multiple sclerosis, cancer, inflammation, glaucoma, and neurodegenerative disorders (Malabadi et al., 2024) (Table 2). Moreover, *Cannabis sativa* is documented to control diseases such as Epilepsy-

seizure disorder, Alzheimer's disease, Parkinson's disease, obesity, weight loss, anorexia, and emesis, osteoporosis, schizophrenia, cardiovascular disorders, sleep disorders, traumatic brain injury, post-traumatic stress injury, drug addiction, AIDS wasting syndrome, amyotrophic lateral sclerosis, depression and anxiety, diabetes, and migraine (Malabadi et al., 2024). COVID-19 (SARS-CoV-2), Leishmaniasis (Kala-Azar), and metabolic syndrome-related disorders are being treated or have the potential to be treated by cannabinoid agonists, antagonists, and cannabinoid-related compounds (Malabadi et al., 2024).

The *Cannabis* industry in South Africa has been rapidly evolving (Gwala, 2023). According to Huberfeld (2021), in 2018, the Constitutional Court ruled that private adult cannabis use is no longer illegal. According to Vilakazi (2023), medical *Cannabis* and hemp can now be produced legally with licenses from the South African Health Products Regulatory Authority (SAHPRA) and the Department of Agriculture, Land Reform, and Rural Development.

Cannabis sativa inflorescences contain a high concentration of secondary metabolites, primarily cannabinoids and terpenes (Kotiranta et al., 2024). Cannabis-based products are widely utilized for a variety of therapeutic purposes, such as treating a variety of illnesses, including constipation, certain types of pain, epilepsy, and anxiety, among others (Ortiz et al., 2022; Legare et al., 2022). Cannabis's phytochemical components, such as cannabidiol and 9-tetrahydrocannabinol, known as THC, have significant medicinal importance due to their effects on the central nervous system (Yadav et al., 2023; Kumar et al., 2022).

Tetrahydrocannabinol is a pharmacological compound used to control and treat chemotherapy-induced nausea and vomiting, as well as to promote appetite (Mortimer et al., 2019). Tetrahydrocannabinol is the principal psychoactive constituent of *Cannabis* and one of at least 113 total cannabinoids identified in the plant (Malabadi et al., 2023). Cannabis use for recreational purposes is illegal in most nations (Kalayasiri et al., 2023). However, several countries have chosen a decriminalization policy, making simple possession a non-criminal offense (Gruben et al., 2024). Asian and Middle Eastern countries impose far harsher punishments, with even minor possession of Cannabis punishable by several years of imprisonment (Brewster, 2022).

Medicinal *Cannabis sativa* has been proven to have over 50,000 industrial uses, including as an alternative to paper, cardboard, and cotton (Boone, 2021) (Table 2). According to a 2019 Africa Regional Hemp and *Cannabis* research, Africa contributed \$37.3 billion to the global *Cannabis* market, accounting for 11% of the total (Orenstein et al.,

2020). The South African government is still working on plans to ensure that Southern African countries can capitalize on the plant by turning marijuana into a profitable company (Manu et al., 2021). The *Cannabis* industry is projected to grow at a 34% combined annual growth rate (CAGR) between 2023 and 2030, reaching \$444.34 billion (Malabadi et al., 2024). In South Africa, the global legal marijuana market is predicted to reach \$73.6 billion by 2027, with a CAGR of 18.1%.

China has the world's largest cannabis cultivation area, accounting for roughly half of the world's total (Zhao et al., 2021). In China, industrial *Cannabis* is not yet permitted for medical purposes, so the market has yet to develop, resulting in low overall usage of industrial *Cannabis* (Sun, 2023). The product is increasingly recognized as having a variety of real medicinal benefits and therapeutic applications (Sahu et al., 2021). According to Malabadi et al. (2024), it is the world's most extensively farmed, trafficked, and consumed drug. There is widespread agreement that increasing legalization of *Cannabis* for both medical and adult use will promote growth (Zamengo et al., 2020; Anderson et al., 2023; Fischer et al., 2022).

To achieve social fairness, the *Cannabis* sector must include indigenous producers whose livelihoods rely on *Cannabis* cultivation and have historically been overlooked because of prohibition. Legal adult-use markets appear to provide the best opportunities for egalitarian growth, but traditional producers may face significant competitive disadvantages (Cunningham, 2021; Taylor, 2021). The barriers to legal cannabis production are significant, and small businesses, particularly those in underdeveloped rural areas, may struggle to participate without extensive support and innovative regulation (Moriconi et al., 2022).

Many countries in Africa have legalized the commercial use and export of *Cannabis*, including Lesotho, Zambia, Zimbabwe, Morocco, Uganda, Malawi, Rwanda, and South Africa. Lesotho became the first African country to legalize *Cannabis* for medical purposes in 2017, with the Drugs of Abuse Act of 2008 governing its use (Thetsane, 2024). Zimbabwe legalized medical Cannabis in 2018, becoming the second African country to do so (Ref). Uruguay became the world's first country to legalize *Cannabis* production, distribution, and consumption in 2013 (Queirolo, 2020; Laqueur et al., 2020). Argentina has legalized cannabidiol oil for the treatment of certain illnesses, including epilepsy (Guido et al., 2020).

Canada, the United States, Malta, Georgia, Luxembourg, Mexico, Brazil, Chile, Denmark, Finland, Germany, Panama, Peru, Poland, Portugal, Spain, Switzerland, the Czech Republic, the United Kingdom, New Zealand, Norway, Thailand, including Uruguay have all allowed recreational Cannabis use (Kitchen et al., 2022). In

addition, many countries, including the Netherlands, have embraced a policy of slack policing, with *Cannabis* being sold in regulated coffee shops (Brewster, 2022).

Aims of the study

Cannabis sativa has been extensively researched; various investigations have addressed the medical benefits of *Cannabis sativa*, but there is a very little information on the impact of this plant on socioeconomic development. This study aims to assess the medicinal benefit of *Cannabis sativa* and its impact on socioeconomic development.

Materials and Methods

A systematic review of published literature was adopted. The principal medical applications of *cannabis sativa* include tetrahydrocannabinol (THC) and cannabidiol (CBD).

To find the most recent information, the current literature was searched using electronic databases such as Scopus, Google Scholar, Google Books, ScienceDirect, ResearchGate, and Web of Science. Journals for the past 10 years were considered, as well as cross references from journals. Only English language literature was reviewed, and only articles that specified the medicinal benefits and impact on socioeconomic development were included. The published articles were summarized when necessary. Keywords used in the search included *Cannabis sativa*, medicinal benefits, pharmacology, therapeutic effect, and socioeconomic development. Moreover, taxonomy and the recreational and industrial use of *Cannabis sativa* were included. The authors established inclusion and exclusion criteria to screen and assess relevant articles. Identified articles were selected and reviewed independently to determine eligibility and to extract relevant research information. All sources used have been acknowledged and are listed in the reference section.

A total of 87 articles were identified, with 63 articles reviewed. The review strategy adopted was to review relevant information immediately.

Results and Discussion

The cannabis market may benefit some people or groups more than others, aggravating pre-existing social and economic disparities. The scarcity of credible data and research on the socioeconomic effects of cannabis makes it difficult to design evidence-based laws and restrictions. In South Africa, these constraints are worsened by high unemployment, poverty, and inequality.

Industrial use of Cannabis

In South Africa, amendments to the Medicines and Related Substances Act, 1965 (Medicines Act) came into force in 2018, and the rescheduling'19 of Cannabis in the Medicines Act in May 2020 enabled the legalization of high tetrahydrocannabinol medical *Cannabis*. The Health Professions Act of 1974 authorized licensed practitioners to prescribe *Cannabis* and cultivate high tetrahydrocannabinol products, provided they had an SAHPRA license (Maule, 2022). Raw or industrial *Cannabis* commodities with less than 0.2% tetrahydrocannabinol, processed products with less than 0.001% tetrahydrocannabinol, and raw plants with tetrahydrocannabinol for private personal consumption are all de-scheduled.

Cannabidiol authorizations from Schedule 4 to Schedule 0 include 600 mg per sales pack, 20 mg daily dose, or processed items that contain 0.0075% cannabidiol, which are permitted for general sale while preserving restrictions on medical practitioners' prescriptions (Akhtar, 2021). Under the upcoming Certified Professional Public Buyer amendments, high tetrahydrocannabinol or high cannabidiol medical *Cannabis* can only be legally obtained with a prescription from a licensed practitioner or approved prescriber (Arnold et al., 2020). The formal domestic medical *Cannabis* market is very small at present (Arnold et al., 2020). Medical users are likely accessing *Cannabis* illegally or through home cultivation (Goodman et al., 2020). This setback also makes South African legal medicinal *Cannabis* producers dependent on export markets, diminishing their bargaining strength and increasing risks. The system also means that traditional medicine practitioners, who have utilized *Cannabis* for millennia, nevertheless lack legal methods to use the plant (Alexander, 2020). The domestic market for Schedule 0 cannabidiol supplementary medicines is quickly expanding and has become a target for publicly traded companies with branded cannabidiol wellness products and retail operations (Malabadi et al., 2024).

Recreational use of Cannabis

Cannabis has been prohibited in South Africa for the past century under the Drugs and Drug Trafficking Act of 1995 (Nkosi, 2021). However, a groundbreaking 2018 Constitutional Court decision concluded that the Drugs Act's prohibition of private *Cannabis* usage violates the constitutional right to privacy (Mogoro et al., 2020). The Certified Professional Public Buyer supports the prohibition of commercial adult use of *Cannabis* while proposing amendments to the Drugs Act that decriminalize the cultivation, possession, and use of small quantities of Cannabis for adult private use. Recreational use is

quantified as 600 g in private settings, 100 g in public settings, 1200 g per dwelling, four flowering plants in private, and one flowering plant in public (Orenstein et al., 2020).

In addition, 100 g of *Cannabis* may be given to others for free, for medical purposes without exchange of consideration. There are unique provisions in place for the Rastafarian faith that allow a cultural or religious community to apply for authorization to cultivate, possess, and supply *Cannabis* in quantities that adult community

members reasonably demand for cultural or religious rituals (Malcolm, 2020).

It has been suggested that legislation should thoroughly examine the following aspects; (i) the harm reduction, and demand reduction, (ii) public education and awareness campaigns in respect of the harms associated with recreational *Cannabis*, (iii) the prevention of persons under the age of 18 years to access recreational *Cannabis*, (iv) the prohibition of advertising or promotion of recreational *Cannabis*, (v) monitoring of use and associated negative impacts of recreational *Cannabis* (Malabadi et al., 2024).

Table 4: Recreational uses of Cannabis and its consumption methods.

Recreational Uses	Recreational Consumption Methods
Relaxation and Stress Relief	Smoking
Social Interaction	Vaporizing
Enhanced Sensory Experiences	Edibles
Creativity Stimulation	Concentrates
Enjoyment of Activities	

Cannabis, or marijuana, is used for a variety of recreational reasons due to its euphoric characteristics, which are principally related to the chemical THC (delta-9-tetrahydrocannabinol) (Kruger et al., 2023). Goodman et al. (2020) indicate that recreational *Cannabis* use can be classified into three primary areas: (i) Many users consume *Cannabis* to achieve a state of relaxation and to alleviate stress. Das et al. (2024) pointed out that the euphoric effects produced by THC can help individuals unwind after a long day or cope with anxiety. Ekendahl et al. (2020) allude that the relaxing effect is one of the most frequently claimed justifications for the recreational use of *Cannabis*. *Cannabis* is frequently used in social situations, where it can improve social relations and build a sense of

camaraderie among users (Bræmer et al., 2023). (ii) Some of the users indicate that *Cannabis* makes them feel more sociable, decreases inhibitions, and improves talk, making it popular at gatherings and parties. (iii) Other users frequently report that *Cannabis* heightens sensory perception, making activities such as listening to music, watching movies, or enjoying food more pleasurable. This enhancement can lead to a greater appreciation for art, music, and culinary experiences.

Literature reports that some individuals use *Cannabis* as a tool for enhancing creativity Warnick et al., 2021). *Cannabis* can be ingested in a variety of methods to suit individual preferences (Borodovsky et al., 2024) (Table 5).

Table 5: Different formats used for the consumption of Cannabis.

Methods used	
Smoking	Traditional methods include joints (cigarettes made with <i>Cannabis</i>), blunts (cigars filled with <i>Cannabis</i>), pipes, or bongs.
Vaporizing	Vaporizers heat <i>Cannabis</i> products to release THC without combustion, providing a smoother inhalation experience.
Edibles	<i>Cannabis</i> -infused foods and beverages offer an alternative consumption method that provides longer-lasting effects but requires careful dosing due to delayed onset.
Concentrates	Products like oils or waxes contain high concentrations of THC and are often used in dabbing.

Socioeconomic Impact of Cannabis

Economic growth and job creation

Cannabis sativa has a wide-ranging impact on socioeconomic development, including public health, economic growth and job creation, social equity, justice reform, and law enforcement expenses (Ferreira, 2023). Legalizing *Cannabis* has resulted in major economic gains in regions where it has been authorized. The Cannabis industry has expanded rapidly, producing numerous jobs across multiple sectors (Parvez et al., 2021). According to projections, the legal *Cannabis* market is projected to generate significant tax income, which may be reinvested in community activities (Malabadi et al., 2024). Allen et al. (2023) indicated that Cannabis tax revenue has been allocated to services like homelessness support and education initiatives in other countries and states such as Colorado. This development suggests that a regulated *Cannabis* industry might benefit local economies by creating jobs and providing necessary services (Kelly et al., 2020).

Public Health

While *Cannabis* legalization has economic benefits, there are also public health consequences to consider. Hammond et al. (2020) agreed that increased access to *Cannabis* may result in higher rates of use among specific demographics, particularly adolescents. Studies have found links between *Cannabis* usage and mental health concerns like anxiety and depression (Halladay et al., 2020). The healthcare system may face higher expenditures associated with treating diseases exacerbated by *Cannabis* usage or accidents caused by impaired driving while under the influence of marijuana (Jain et al., 2024).

Social Equity and Justice Reform

The drug war has disproportionately affected underprivileged groups, prompting calls for social equality in *Cannabis* policy (Garcia-Fuerte et al., 2023). Legalization attempts frequently contain clauses intended to rectify the harms caused by prior drug regulations, such as the erasure of criminal records for nonviolent *Cannabis* use and sales charges (Weiser, 2023). This aspect highlights the potential for a more equitable society through responsible legalization practices that address historical injustices.

Law Enforcement Expenses

Legalizing *Cannabis* can result in lower law enforcement costs connected with policing marijuana-related offenses (Wu et al., 2022). A large portion of money spent each year enforcing drug prohibition laws may be transferred

and redirected to community activities improving public safety and the welfare of many countries (Robinson et al., 2022). In several nations, *Cannabis* users have been imprisoned and faced the stigma and negative consequences of having a criminal conviction or an arrest record (Scher et al., 2023). These constraints have unreasonably affected socioeconomically disadvantaged ethnic groups (Simard et al., 2024).

Risks Associated with Cannabis Use

Despite the potential benefits of *Cannabis* use, there are several hazards associated with the greater availability of *Cannabis* products, such as a rise in substance addiction disorders and traffic collisions involving impaired driving (Brands et al., 2021; Kilmer et al., 2021). *Cannabis*'s socioeconomic impact includes both positive outcomes, such as job creation and higher tax income, as well as problems, such as public health concerns and the need for social justice reform. It can, therefore, be stressed that these concerns demand extensive public health efforts that educate people on appropriate usage (Kruger et al., 2020).

Conclusion

The legal *Cannabis sativa* markets often prioritize profit over people, excluding low-income communities and small-scale farmers from participating in the market. More research is needed to explore affordable and equitable access models. Recent research study focuses on large-scale commercial production, and therefore, there is a need for detailed research on sustainable, small-scale farming practices that benefit local communities and promote food security.

Most clinical trials focus on the Western World, leaving a lack of data on how *Cannabis sativa* affects diverse Indigenous groups, especially those from lower socio-economic backgrounds. Moreover, future research must investigate the impact of cannabis production on poverty reduction and income inequality, as well as how benefits are distributed. Lastly, to achieve social fairness, the cannabis sector must include Indigenous producers whose livelihoods rely on cultivation and have historically been overlooked because of prohibition.

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All authors have contributed equally to this research work.

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Data availability.

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The authors confirm that the data created or analyzed in this study are included in this manuscript.

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Competing Interests.

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

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