Implementation of the Medicinal Cannabis Scheme in New Zealand: six emerging trends

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ABSTRACT

AIM: To evaluate the implementation of the New Zealand Medicinal Cannabis Scheme (MCS), including how products, prices, prescribing and patient access have evolved since 2020.

METHOD: Analysis of administrative data obtained via Official Information Act (OIA) requests and publicly available information on products and prices.

RESULTS: Six emerging trends were identified: 1) quarterly supply of medicinal cannabis products has increased fourteenfold since the implementation of the Scheme in early 2020, 2) most products are now THC-dominant rather than CBD, 3) most products are in the form of dried cannabis flower rather than oral liquids/oils, 4) prices of products have declined to be comparable to the illegal market, 5) specialised private cannabis clinics have expanded patient access, and 6) inequities persist due to expense, and disproportionately affect Māori and those on lower incomes.

CONCLUSIONS: The New Zealand MCS successfully established a domestic medicinal cannabis production sector, reduced prices and expanded the range of products to provide alternatives to illegal supply. It has also inadvertently created the conditions for the emergence of specialised cannabis clinics that have enhanced access. However, the increasing supply of THC-dominant and flower products, and the privatisation of prescribing via cannabis clinics, may have unintended negative consequences.

Since the establishment of the first medicinal cannabis schemes in California and Israel in the 1990s, a growing number of countries have legalised access to cannabis-based products for medicinal use.[1,2] Aotearoa New Zealand is one of the latest countries to implement a regulatory framework for prescribed cannabis, known as the Medicinal Cannabis Scheme (MCS), and develop a local production sector to improve patients' access. The reform was driven by high profile cases of cancer and palliative care patients, and media reports about children and teenagers without access to cannabidiol therapy.[3]

When the New Zealand Parliament debated the *Misuse of Drugs (Medicinal Cannabis) Amendment Act* in 2018, the then Minister of Health described it as "a bill about cultivation, cannabidiol and compassion."[4] Six years later, patient access to cannabis-based products for therapeutic uses has undoubtedly improved: there are now over 40 cannabis oral liquid and flower products authorised for sale under the MCS Scheme that can prescribed by any registered doctor.[5] Although many doctors remain concerned about prescribing cannabis due to limited scientific evidence of its efficacy,[6] private cannabis clinics have filled this gap, facilitating patients' access to prescribed products.

There is no shortage of anecdotal evidence for medicinal cannabis, but the scientific evidence for specific conditions remains scarce. Clinical trials confirm that cannabis improves chemotherapy-induced nausea and vomiting, may reduce symptoms of multiple sclerosis, and that cannabidiol (CBD) is useful in reducing seizures in two childhood epilepsy syndromes (Dravet and Lennox–Gastaut syndrome).[7–9] The efficacy of cannabinoids in the treatment of chronic non-cancer pain remains debated, with conflicting findings in reviews of clinical trials and methodological limitations noted.[10,11] For many other conditions for which patients seek cannabis, from social anxiety and PTSD to sleeping problems and gastrological conditions, the clinical trial evidence remains limited. Lower-quality observational studies demonstrated improvements in patient-reported quality of life and symptoms.[12]

With New Zealand's MCS now operational for over 4 years (regulations finalised in April 2020), it is timely to evaluate its achievements to date and discuss developing trends. We analyse the evolution of the legal medicinal cannabis market

in New Zealand, including how products, prices, prescribing and patient access have evolved. Findings will inform discussion of equity of access under the New Zealand MCS and provide learnings for other countries developing similar frameworks.

Methods

Our analysis draws on administrative data obtained through multiple Official Information Act (OIA) requests, information obtained via New Zealand cannabis clinics and pharmacy price lists, and a review of studies of medicinal cannabis use in New Zealand. We made multiple OIA requests from September 2020 to May 2024 to various health agencies (Medicinal Cannabis Agency, Medsafe, Te Whatu Ora – Health New Zealand and the Ministry of Health – Manatū Hauora [MOH]) for information on several aspects of the MCS, including the number of medicinal cannabis license holders, the total licensed cultivation area and the estimated medicinal cannabis production output, prescriptions (number of prescriptions and demographics of recipients) and the volume of supplied medicinal cannabis products. We reviewed the MOH website where OIA responses with information considered of public interest are posted, searching for those relevant to the MCS implementation.[13] We also searched the MOH website for information on products available under the MCS.[5] Finally, we requested the cannabis products price lists from two pharmacies (located in Auckland and Taranaki) and an online cannabis clinic, and consulted an online price list managed by a patients' advocacy group,[14] to estimate average medicinal cannabis product prices as of mid-2024.

Data on products (current as of 19 September 2024), prescriptions and demographics of patients who received prescriptions in the past 12 months (from 1 May 2023 to 30 April 2024) is reported descriptively. As past 12-month prescribing data was a bespoke dataset provided in response to our OIA, it has not undergone full data quality assurance by Te Whatu Ora – Health New Zealand. The past 12-month prescribing data and information on products under the MCS was categorised as follows: THC-dominant, CBD-dominant and balanced THC/CBD products. Age of patients who received prescriptions was categorised into 10-year age brackets. Prescription data where age, gender or ethnicity was unknown were removed as appropriate for relevant calculations. Note that one prescription may contain more than one medicinal cannabis product. Data on supply of medicinal cannabis products (from 2020 to 2023) were initially collated from multiple OIA requests,[15–17] and subsequently updated in September 2024 following MOH release of an amended dataset on its website.[18] Data on the supply of medicinal cannabis products were collated into quarters to illustrate developments with the MCS over time.

Results

We identify six developing trends that are shaping the current regime and are key to discussions about its future direction.

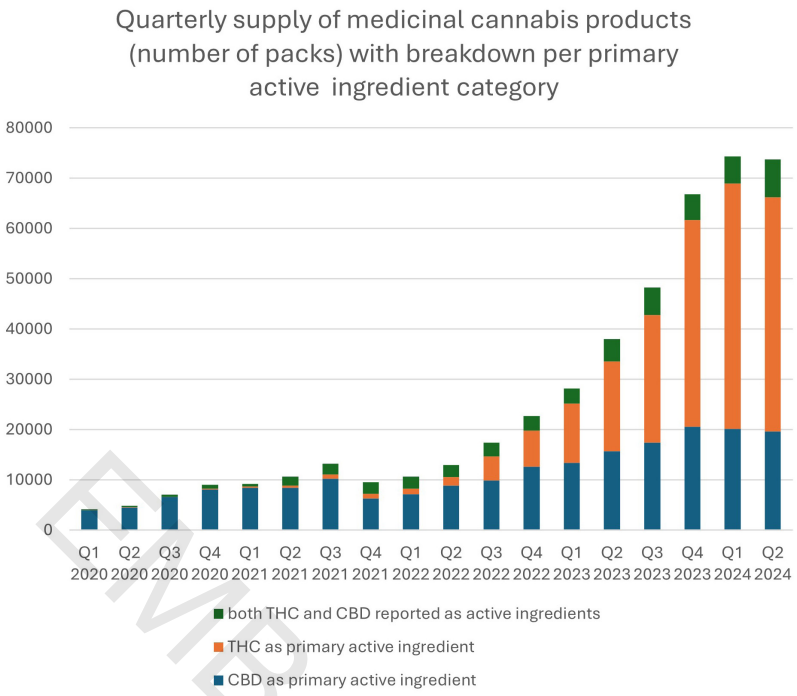
Quarterly supply of medicinal cannabis products increased fourteenfold since early 2020, and the supply of products containing THC overtook CBD-only products in early 2023

Medicinal cannabis products can be prescribed for any condition or symptom by any doctor registered to practice in New Zealand. While there is currently no publicly available database on cannabis prescribing, importers and manufacturers regularly notify and report to Medsafe (the national medicines regulatory authority) on the number of packs sold or supplied under the MCS (a requirement for all "unapproved medicines" under s29 of the *Medicines Act*).

The data collated from importers and manufacturers' reports indicates that the number of medicinal cannabis product packs supplied under the MCS has increased 14 times since Q2 of 2020 when the Scheme became operational, from 4,827 packs supplied in the second quarter of 2020 (mostly CBD-only products) to 73,725 packs supplied in the second quarter of 2024 (mostly THC-dominant products) (Figure 1). In early 2023, the supply of medicinal cannabis products containing THC surpassed the supply of products containing CBD as the main active ingredient for the first time.

The reports do not include data on the form of supplied products (e.g., oral liquid vs cannabis herb). Given that most THC-containing products are currently flower formulations (Table 1), the trend to sell and supply more THC-containing products may be driven by an increased supply of cannabis flower.

Figure 1: Quarterly supply of medicinal cannabis products (number of packs) per active ingredient category.



Source: collated from data submitted to Medsafe and published by MOH.[18]

Table 1: Products meeting Minimum Quality Standard under the Medicinal Cannabis Scheme per formulation and dominant active ingredient (as of 19 September 2024) (excludes two products consented for distribution as medicines: Sativex and Epidyolex).

	CBD-only	**CBD-dominant**	**Balanced CBD:THC**	**THC-dominant**	**THC-only**
Oral liquids and sublingual solutions (pack sizes from 25 to 50mL)	**Seven products**	**Six products**	**Three products**	**Two products**	**One product**
	Available concentrations:	Available concentrations:	Available concentrations:	Available concentrations:	Available concentrations:
	CBD 25mg/mL	CBD 120mg/mL +THC <0.6mg/mL	CBD 10mg/mL +THC 10mg/mL	CBD <1mg/mL +THC 10mg/mL	THC 25mg/mL
	CBD 100mg/mL	CBD 30mg/mL +THC <0.6mg/mL	CBD 15mg/mL +THC 10mg/m	CBD <2mg/mL +THC 25mg/mL	
		CBD 20mg/mL +THC <1mg/mL		CBD <1mg/mL +THC 30mg/mL	
		CBD 20mg/mL +THC 5mg/mL			
		CBD 50mg/mL +THC <2mg/mL			

Table 1 (continued): Products meeting Minimum Quality Standard under the Medicinal Cannabis Scheme per formulation and dominant active ingredient (as of 19 September 2024) (excludes two products consented for distribution as medicines: Sativex and Epidyolex).

Dried flower for inhalation via a vaporiser (pack sizes from 10 to 15 gram)			**One product**	**12 products**	
			Available potencies:	Available potencies:	
			9% THC + 8.3% CBD	26% THC + <1% CBD	
				25.5% THC + <1% CBD	
				25% THC + <1% CBD	
				22.5% THC + <1% CBD	
				22% THC + <1% CBD	
				21.3% THC + <1% CBD	
				22% THC + <1% CBD	
				20% THC + <1% CBD	
				19% THC + <1% CBD	
				18% THC+ <1% CBD	
Dried flower for preparation of tea (pack sizes from 10 to 35 gram)		**One product**		**13 products**	
		Available potency:		Available potencies:	
		12.5% CBD +<1% THC		25% THC + <1% CBD	
				24% THC+ <1% CBD	
				23% THC+ <1% CBD	
				22% THC + <1% CBD	
				21% THC+ <1% CBD	

Table 1 (continued): Products meeting Minimum Quality Standard under the Medicinal Cannabis Scheme per formulation and dominant active ingredient (as of 19 September 2024) (excludes two products consented for distribution as medicines: Sativex and Epidyolex).

				13 products	
				Available potencies:	
				20% THC+ <1% CBD	
				17% THC+ <2% CBD	
				16% THC + <1% CBD	
				15.25% THC+ <0.5% CBD	
				13.5% THC + <1% CBD	

Data source: MOH.[5]

Most products under the Scheme are now THC-dominant

Unlike standard medicines and prescribed pharmaceuticals, medicinal cannabis products under the MCS do not need to undergo clinical trials to prove their efficacy and evaluate side effects prior to market authorisation. Instead, the Medicinal Cannabis Agency verifies product compliance with the Minimum Quality Standards (MQS) to ensure product quality (e.g., contaminant-free), stability and consistency. Both cannabidiol (CBD) and tetrahydrocannabinol (Delta-9 THC) products are allowed under the Scheme.

The first products to be verified under the MCS in March 2021 were two CBD-dominant oral liquid solutions from Canadian-based Tilray. Since then, the number of products "approved" under the MCS has increased to 47 (as of 19 September 2024). (Additionally, two products [Sativex and Epidyolex] are exempt from the requirement to assess compliance with Minimum Quality Standards, because they are consented for distribution under the *Medicines Act* [i.e., they meet recognised standards for quality, safety and efficacy for medicines]). The early producer focus on cannabidiol (CBD) and balanced THC:CBD product formulations has increasingly shifted to THC products. Most products are now THC-dominant (i.e., 62% of the 47 verified products contain more THC than CBD). One oral liquid contains THC as the sole active ingredient. The market shift towards THC-dominant products is driven by the dry flower product category. Some dry flower products are as potent as 25–26% THC per weight. Nine out of 13 dry flower products for use in a vaporiser are high potency (i.e., ≥20 THC). These products are similar to cannabis sold in legal recreational cannabis markets in jurisdictions in the United States of America (USA) and Canada. They appear to be more potent than the average cannabis flower available in the New Zealand illegal market. For example, a recent analysis of 12 police-seized cannabis samples reported THC potencies between 1% to 13.4%.[19]

The increased availability of THC products is reflected in recent prescribing patterns. In the past year, approximately 45% of prescriptions were for THC-dominant and THC-only products (Table 2). THC-dominant products are now more prescribed than balanced or CBD-dominant products.

Most medicinal cannabis products are now dried flower rather than oral liquid formulations

Patient access to dried cannabis flower has been one of the key controversies in legal

Table 2: Number of prescriptions for medicinal cannabis products in the past year (1 May 2023–30 April 2024) per active ingredient and dosage form.

	CBD-dominant and CBD only	Balanced THC:CBD	THC dominant and THC only
Flower for vaporising	0	0	29,318
Flower (tea)	1,741	0	35,757
Oral oil/liquid/spray	68,055	20,062	10,046
Total	69,796	20,062	75,121

Source: collated from data obtained through Official Information Act request.[20]

medicinal cannabis schemes around the world. While smoking is an efficient way to deliver the active ingredients in cannabis, regular smoking is associated with increased respiratory symptoms (e.g., cough, wheeze) and risk of chronic bronchitis (the association between regular smoking cannabis and lung cancer is unproven).[9,21] Smoking is the dominant route of administration for many consumers who self-medicate with cannabis, including in New Zealand.[22] The inclusion of dry herb products in the legal MCS scheme is seen as a way to facilitate the transitioning of existing consumers to the prescribed quality-controlled channel.[23]

The MCS adopted a compromise approach by allowing prescribing of flower products as long as they are not "in a form intended for smoking." Consequently, flower products "approved" under MCS include tea preparations (14 products) and flower for inhalation via a vaporiser (13 products) (Table 1). Compared to smoking, vaporising cannabis can reduce exposure to several toxins, but the exact extent of this reduced harm and long-term effects of cannabis vaping remain unknown.[24]

Most products under the MCS (i.e., 27 out of 47) are now in a flower form, a shift from the early market focus on oral liquid formulations. The increased amount of flower product on offer is reflected in recent prescribing trends (Table 2). Although cannabis oil and liquid formulation are still dominant, 40% of prescriptions in the past 12-months were for a flower product.

Prices for some medicinal cannabis products are now equivalent with the illegal market

The high prices of imported cannabis products were one of the key reasons for the establishment of the local cannabis production sector under the MCS. As of May 2024, there were 48 medicinal cannabis license holders, including 36 licenses for cultivation activity (up from only three licenses to cultivate in August 2020).[25,26] A total of 53 hectares of land was reportedly used for licensed cannabis cultivation in New Zealand in 2023, up from 1.3 hectares of cannabis cultivation in 2020. Furthermore, the annual production of cannabis cultivated in 2023 was estimated at 71.3 tonnes, up from an estimated 8.3–14.9 tonnes in 2020.[25,26] However, not all the domestically grown cannabis is destined for sale in New Zealand; several companies report that they export cannabis overseas. Similarly, several New Zealand licensed distributors source cannabis and cannabis-based ingredients from overseas. More information is needed to fully understand the market dynamics and profit margins along the supply chain, but the development of a new cannabis production and distribution sector appear to have contributed to a decrease in the prices of both imported and locally manufactured products.

Prior to the MCS, medicinal cannabis users who accessed prescribed cannabis reported an average monthly spend of NZ$656.[22] For example, in 2019, the price of imported CBD oil from Tilray ranged from NZ$150–350 per 25mL bottle, depending on the CBD concentration, and excluding pharmacy-dependent markups.[27] We reviewed prices at three popular medicinal cannabis retailers around the country (two pharmacies and a cannabis clinic dispensary), as well as price lists collated by patients.[14] We found that the above Tilray products can now be purchased at somewhat lower prices (e.g., approximately NZ$300 for the most concentrated CBD Tilray 25mL bottle) (an approximately 15% price drop). Importantly, comparable oral

liquid formulations marketed by new licensed producers and distributors can be purchased at half the price or less. For example, one comparable CBD product "approved" under the MCS marketed by a local company is priced at NZ$100–120 (30mL bottle).

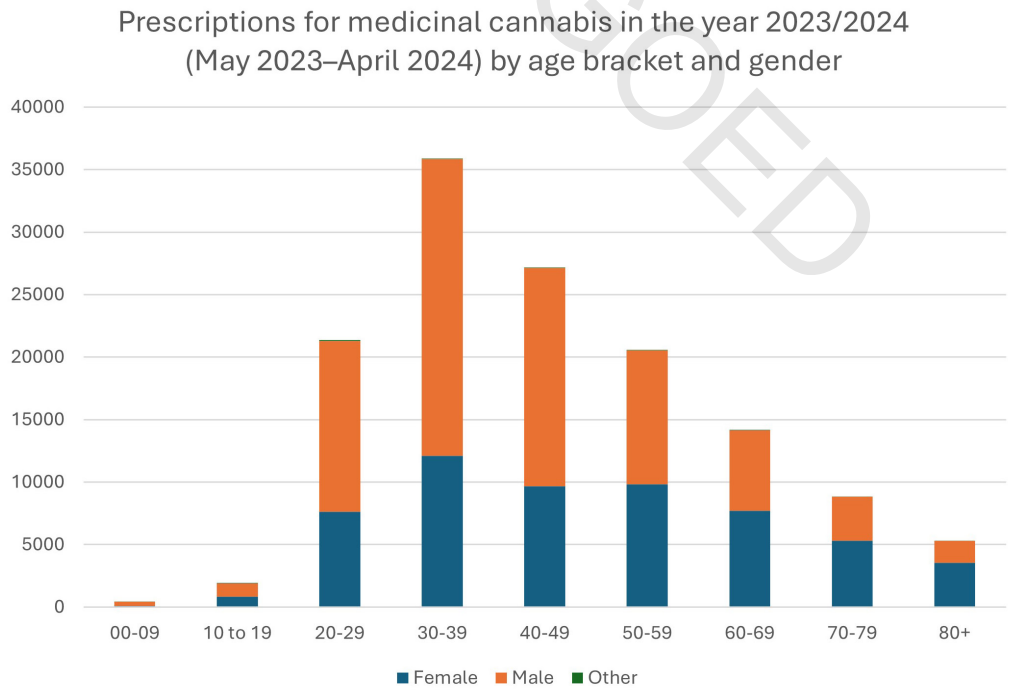
Dried flower medicinal cannabis products can be purchased for an average of NZ$15 per gram, with the lowest priced THC flower approximately NZ$11 per gram and the most expensive CBD-rich flower retailing at around NZ$20 per gram.[14] Some of the most potent THC flowers (25–26% THC) retail at NZ$12–14 per gram. This is comparable to the average dry herb prices on the illegal market in New Zealand. The latest New Zealand Drug Trends Survey, an annual snapshot of drug market trends, found consumers of illegal cannabis paid an average price of NZ$12 per gram for an ounce of flower (approximately 28 grams) of unspecified potency and quality.[28]

Cannabis clinics and online delivery have transformed patient access

The first private cannabis clinics opened in Auckland in 2018 and they appear to have become a major source of prescriptions and patient access. Cannabis clinics were not an intentionally planned part of the MCS. They emerged in response to a gap left by many doctors who were reluctant to prescribe cannabis due to limited clinical trial evidence of its efficacy.[29] One study of general medical practitioners in New Zealand found that approximately two in three did not prescribe cannabis at a patient's request,[30] and a survey of medicinal cannabis users found only one in three requests for a cannabis prescription were successful.[22]

The specialised cannabis clinics are commonly staffed with registered doctors and nurses with a special interest in cannabis and can be accessed privately without a referral.[29] Initially limited to New Zealand's biggest cities, Auckland and Wellington, a few clinics now operate in other major cities (e.g., Dunedin, Christchurch, Tauranga) and smaller centres (e.g., Nelson, Hastings), and several clinics offer telehealth services. An online search in mid-2022 found there were approximately 40 physicians with a special interest in cannabis therapy practicing across 11 cannabis clinics.[29] Some clinics run their own dispensaries, sometimes offering distance delivery services. This new development means that medicinal cannabis

Figure 2: Distribution of prescriptions for medicinal cannabis products by age and gender in the past 12 months (May 2023–April 2024).



Source: collated from data obtained through Official Information Act request.[20]

products can now be accessed without leaving one's home. With consultation prices ranging from NZ$50–150 at most clinics, they offer an alternative prescription pathway to traditional doctor practices, with the added benefit of advice from more experienced cannabis prescribers.

This unplanned "privatisation" of cannabis prescribing comes with some drawbacks, including the increased financial burden on patients due to private consultation fees and the compartmentalisation of patients' healthcare by separating health advice and treatment from patients' usual health service providers.[29] There is also a risk that financial conflicts of interests may blur the clinical judgement of doctors employed in cannabis clinics, due to their focus on a single treatment option. Clinic business partnerships and commercial arrangements may amplify concerns over this new model of care. For example, one cannabis clinic operates as a subsidiary of a company licensed to produce cannabis.[31]

Justice and the equity of access to medicinal cannabis

Although cannabis clinics have facilitated access to legal medicinal cannabis products, most people self-medicating with cannabis do not engage with the prescription scheme. According to the 2022/2023 New Zealand Drug Trends Survey, 45% of medicinal cannabis users (i.e., defined as those who use cannabis "only" or "mostly" for medicinal reasons, N=1,833) reported that legal cannabis products were "very difficult" to access, and only about one in ten had a medicinal cannabis prescription.[32] Another survey found that those on lower incomes, Māori and consumers who grow their own cannabis are less likely to transition to the prescription scheme.[23] The inequity in access to prescriptions means that the MCS may unintentionally exacerbate discriminatory criminal justice and health outcomes under the *Misuse of Drugs Act*, which prohibits the possession of non-prescribed cannabis and its use for any reason. For example, Māori have higher prevalence of using cannabis for medicinal purposes,[33] yet they are less likely to transition to the legal prescription scheme.[23] This is possibly due to stigma, income inadequacy and systemic barriers in access to healthcare, for example living in a rural area with poor access to a doctor. At the same time, Māori are more likely to be arrested or prosecuted for cannabis-related offences under the *Misuse of Drugs Act*.[34]

Prescription data for the past year (May 2023–April 2024) indicates that patients identifying as Māori (prioritised ethnicity) were under-represented, given they are more likely than other ethnicities to use cannabis medicinally. They received 12.9% of prescriptions over the past 12 months (for context, 17.4% of the New Zealand population identifies as Māori[35]). Interestingly, in younger age groups (0–9 and 10–19 years old), the proportion of prescriptions for patients identifying as Māori was higher (29% and 23% respectively).

Patients aged 30–39 received most prescriptions of all age groups (i.e., 26%), and males received more prescriptions than female patients (58%) in the past year. However, from age 60 females received more prescriptions, suggesting older women may be a key demographic for the MCS (Figure 2).

Discussion

There has been a noticeable improvement in access to medicinal cannabis products and prescriptions since the MCS came into effect over 4 years ago. For example, in the past year (May 2023–April 2024), more than 160,000 prescriptions for medicinal cannabis products have been written, and the supply of products to patients increased 14 times since the introduction of the MCS (up from 4,827 packs supplied in the second quarter of 2020 [mostly CBD-only products] to 73,725 packs supplied in Q2 of 2024 [mostly THC-dominant products]). Although cannabis oil and cannabis liquid products still dominate prescriptions, 40% of prescriptions in the past 12 months were for a flower product.

The medicinal cannabis market appears to be shifting to high THC and dry flower products. THC has recognised analgesic, anti-inflammatory and anti-emetic properties, and many patients prefer THC formulations to CBD-only products.[36] However, high potency THC cannabis also increases the risk of negative side effects, including impacts on cognition, memory, consumers' ability to complete daily activities (e.g., driving, work, parenting), risks of developing psychosis and cannabis dependency (cannabis use disorder).[37,38] Note, under the medical cannabis system, doctors are tasked with minimising these risks via detailed patient assessment, prescribing and monitoring. Frequent cannabis consumers may also develop a level of tolerance to THC intoxicating effects, and some studies suggested that CBD may counteract the acute side effects of THC, although evidence

remains mixed.[39,40] A few small-scale clinical trials report that low-THC dose cannabis products may be as effective in therapeutic applications as higher-THC potency products. For example, a small double-blind placebo-controlled study compared the effects of vaporising medium (3.53% THC) to low-dose (1.29% THC) cannabis and found equivalent analgesia in neuropathic pain patients, but less side effects.[41] It has been suggested there may be a therapeutic window for analgesic effects from herbal cannabis, with greater symptom relief at low and mid-range THC doses.[42]

While the relationship between THC potency, THC:CBD ratio, dosage and symptom relief requires further research, the market shift towards THC-dominant, high-THC potency and flower products may indicate a drift away from the original therapeutic focus of the medicinal cannabis regime. The harm reduction potential of vaporised cannabis means that theoretically, regular recreational cannabis smokers could access prescriptions as a way to reduce pulmonary harms, somewhat similar to how the Australian regime for prescribed nicotine e-cigarettes functions. The transitioning of cannabis consumers from the unregulated market with unknown product potencies, contaminants and lack of quality control[43] to a prescription regime may offer further benefits. Introduction of new non-flower product forms (e.g., chewable tables, topicals, edibles) could also facilitate the transitioning of patients from the unregulated cannabis market to the quality-assured prescribed products. Although prescribed cannabis flower products are supposed to be vaporised or brewed (for consumption as a tea), they may also be administered by patients via smoking. To our knowledge, there have been no studies investigating this potential risk with the MCS. The market shift towards products in a flower form and those with high concentrations of THC may also have unintended consequences for patients' access to medicinal cannabis. New Zealand studies have found that general practitioners (GPs) unfamiliar with medicinal cannabis are more reluctant to prescribe products in a dosage form other than pharmaceutical formulations and those containing THC, primarily due to concerns about side effects and lack of clear clinical guidelines on dosing.[6,44] If GPs are not confident prescribing the majority of products, it may contribute to further privatisation of cannabis prescribing through cannabis clinics.

Cannabis clinics have undoubtedly improved patients' access to medicinal cannabis prescriptions and products, but there are also concerns around the new model of care. In Australia, where cannabis clinics have also become a feature of the medicinal cannabis scheme, the Australian Health Practitioner Regulation Agency (APHRA) recently released a statement that such business models focused on a single medicine "*may take advantage of consumer demand*" and "*may be putting profit ahead of patient welfare.*"[45] In New Zealand, advertising medicinal cannabis products is prohibited (as they are "unconsented medicines"), but cannabis clinics appear to be able to advertise their services under general rules in the *Medicines Act* and the *Fair Trading Act*. The increasing commercialisation of the medicinal cannabis sector is an unintended consequence of the MCS, although the same consequence has been observed in other similar medicinal cannabis schemes overseas.[46]

According to cannabis clinic pricing information, the cost of monthly medicinal cannabis therapy in New Zealand may range from NZ$120 to NZ$400, depending on the dosage and products prescribed. While the product price decreases over the past 4 years are welcomed by many patients, affordability remains an issue for those on lower incomes. Some patients may be able to receive support through the Disability Allowance if their GP verifies that medicinal cannabis is essential, directly related to their disability and there are no suitable subsidised or partly subsidised alternatives (the last criteria being the main reason for declined applications, as the patients would need to have trialled an extensive range of medications and therapies prior to medicinal cannabis).[47]

Cannabis is the most widely consumed illegal drug in New Zealand (i.e., 14.2% last year prevalence based on the latest New Zealand Health Survey). According to the 2012/2013 New Zealand Health Survey, 42% of cannabis consumers used it for medicinal reasons,[48] and large proportions of medicinal cannabis users (69%) also consumed cannabis for non-medical reasons.[33] These findings illustrate the blurred boundary between therapeutic and recreational cannabis use, with many consumers using cannabis to help relax, sleep or improve overall wellbeing—motivations reminiscent of dietary supplement use rather than prescribed pharmaceutical medicines, or alternatively strictly recreational use.

Under the current law, consumers can access high potency cannabis flower through private clinics for any health-related reason, yet possession of non-prescribed cannabis and home growing of cannabis for therapeutic use remain criminal

offences. Although convictions for cannabis possession in New Zealand have fallen significantly, particularly after the 2019 amendment to the *Misuse of Drugs Act*, which legislated a public interest test for any prosecution for personal drug possession,[49] the MCS may unintentionally exacerbate discriminatory criminal justice and health outcomes, particularly for Māori, who are more likely to be arrested for cannabis-related offences.

The increasing use of legal cannabis products via the MCS has implications for the implementation of public safety legislation beyond the *Misuse of Drugs Act*. For example, the random roadside oral fluid screening regime for drugs (other than alcohol) may disadvantage patients who use prescribed medicinal cannabis products, as they can test positive for THC even when the impairment effect has passed. Some studies have found that frequent users of cannabis (a typical consumption pattern for medicinal cannabis patients) show less impairment than infrequent users at the same dose.[50] Patients should be advised against driving after use of THC-containing products, particularly during initiation of therapy and following each dose.[51] Exemption from legal sanctions for drivers who test positive for THC but who can prove they were prescribed medicinal cannabis and demonstrate that they are not impaired at the time of driving is a much needed amendment to this scheme, as is likely to be the case for other legal medicines that have the potential to impair driving.[52]

As part of medicinal cannabis legalisation, people in palliative care (legally defined as those who, in the opinion of a medical or nurse practitioner, have "an advanced progressive life-limiting condition and nearing the end of life") were granted a statutory defence against prosecution for possession and use of illegal cannabis, and possession of a cannabis utensil. However, this did not extend to growing cannabis at home for medicinal reasons, and anyone aiding or helping a palliative care patient in using and accessing medicinal cannabis remains vulnerable to prosecution. The existing exemption was implemented as an interim compassionate measure while regulations and a product assessment scheme were developed, but following ministerial review it was retained in the law.[53] To our knowledge, there is no data on the level of public knowledge about the exemption for palliative care patients, and whether it is used in practice, i.e., if eligible patients request support documents from their doctors. The legal definition of palliative care under the *Misuse of Drugs Act* is challenging to operate in practice, e.g., in the case of a fluctuating condition, change in prognosis or recovery, when does a patient become a criminal again? Extension of the palliative care provisions to include personal home cultivation could address some of the inequities, but political and community concerns about diversion would need to be debated.

Conclusions

Our review of the implementation of the New Zealand MCS to date has identified a number of important achievements, including the establishment of a licensed medicinal cannabis cultivation and production sector, a fall in the retail prices of prescribed medicinal cannabis products, expansion of the legal medicinal cannabis product range to attract patients away from the illegal market and albeit unintentionally, the establishment of private cannabis clinics that have improved patient access and care. However, there are signs of a shift towards THC-dominant and flower products, and a move away from the original focus on therapeutic applications of cannabidiol. There has also been some increase in the privatisation via private cannabis clinics, and the emergence of new business models, including some signs of vertical integration along the supply chain. While this may have improved the efficiency of the new medicinal cannabis sector and access to medicinal cannabis therapies and products, the unintended consequence is greater commercialisation of the health service and narrowing of patient care. If patients seeking prescriptions through cannabis clinics are not presented with a range of treatment options (beyond cannabis therapy), prescribers may be reduced to providing an administrative function for those willing to pay for cannabis.[45]

Despite the decrease in legal product prices, some patients continue to voice concerns about the cost of accessing legal prescribed medicinal cannabis products that are not subsidised by the government, unlike many prescribed medicines in the New Zealand public health system. Government funding of cannabis products that do not have clinical trial evidence to support their efficacy would be hard to justify given the competing funding priorities for Pharmac (New Zealand government medicines buying agency). Those who choose to grow medicinal cannabis at home remain vulnerable to prosecution for cultivation, and possession of non-prescribed cannabis remains

a criminal offence, with the sole exemption of people in palliative care. At the same time, there are anecdotal reports that some consumers may be accessing prescribed products as a legal pathway to cannabis used for non-medical purposes. Current health inequities would be exacerbated for Māori if they face greater barriers to access (e.g., financial, obtaining a prescription, distance from a cannabis clinic) while also facing a greater risk of arrest and prosecution. A number of immediate extensions to the MCS could be considered to enhance equity, including the extension of palliative care provisions to patients with non-terminal conditions and allowance for home cultivation of a limited number of plants for personal medicinal supply.

COMPETING INTERESTS
None.

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REFERENCES
1. de Souza MR, Henriques AT, Limberger RP. Medical cannabis regulation: an overview of models around the world with emphasis on the Brazilian scenario. J Cannabis Res. 2022;4(1):33. doi: 10.1186/s42238-022-00142-z.
2. Abuhasira R, Shbiro L, Landschaft Y. Medical use of cannabis and cannabinoids containing products - Regulations in Europe and North America. Eur J Intern Med. 2018;49:2-6. doi: 10.1016/j.ejim.2018.01.001.
3. Dew K, Armstrong L. Can the subaltern heal? Medical marijuana in Aotearoa New Zealand. J Sociology. 2020;57:429-42.
4. New Zealand Parliament. Parliamentary Debates (Hansard) for Tuesday, 11 December 2018. Misuse of Drugs (Medicinal Cannabis) Amendment Bill - Third reading [Internet]. Wellington (NZ): New Zealand Parliament; 2018. Available from: https://www.parliament.nz/mi/pb/hansard-debates/rhr/combined/HansD_20181211_20181211
5. Ministry of Health – Manatū Hauora. Medicinal cannabis products that meet the minimum quality standards [Internet]. Wellington (NZ): Ministry of Health – Manatū Hauora; 2024 [cited 2024 Sep 19]. Available from: https://www.health.govt.nz/regulation-legislation/medicinal-cannabis/information-for-health-professionals/minimum-quality-standard-medicinal-cannabis-products
6. Withanarachchie V, Rychert M, Wilkins C. Barriers and facilitators to prescribing medicinal cannabis in New Zealand. J Prim Health Care. 2023;15(2):135-46. doi: 10.1071/HC22122.
7. Allan GM, Finley CR, Ton J, et al. Systematic review of systematic reviews for medical cannabinoids: Pain, nausea and vomiting, spasticity, and harms. Can Fam Physician. 2018;64(2):e78-e94.
8. Chen JW, Borgelt LM, Blackmer AB. Cannabidiol: A New Hope for Patients With Dravet or Lennox-Gastaut Syndromes. Ann Pharmacother. 2019;53(6):603-11. doi: 10.1177/1060028018822124.
9. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on the Health Effects of Marijuana: An Evidence Review and Research Agenda. The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research. Washington, DC (US): The National Academies Press; 2017.
10. Campbell G, Stockings E, Nielsen S. Understanding the evidence for medical cannabis and cannabis-based medicines for the treatment of chronic non-cancer pain. Eur Arch Psychiatry Clin Neurosci. 2019;269(1):135-44. doi: 10.1007/s00406-018-0960-9.
11. Häuser W, Petzke F, Fitzcharles MA. Efficacy, tolerability and safety of cannabis-based medicines for chronic pain management – An overview of systematic reviews. Eur J Pain. 2018;22(3):455-70. doi: 10.1002/ejp.1118.
12. Schlag AK, O'Sullivan SE, Zafar RR, Nutt DJ. Current controversies in medical cannabis: Recent developments in human clinical applications and potential therapeutics. Neuropharmacology. 2021;191:108586. doi: 10.1016/j.neuropharm.2021.108586.
13. Ministry of Health – Manatū Hauora. Responses to Official Information Act requests [Internet]. Wellington (NZ): Ministry of Health – Manatū Hauora; date unknown [cited 2024 Jun 15]. Available from: https://www.health.govt.nz/about-ministry/information-releases/responses-official-information-act-requests
14. Medical Cannabis Aotearoa New Zealand. CannaCompare - medicinal cannabis price database [Internet]. NZ: MCANZ; 2024 [cited 2024 Jul 25].
15. Medsafe. Response to Official Information Act request (request dated March 14 2024) [Internet]. Wellington (NZ): Medsafe; 2024. Available from: https://www.health.govt.nz/system/files/documents/information-release/h2024036434_response.pdf. Archived at: https://web.archive.org/web/20240609120741/https://www.health.govt.nz/system/files/documents/information-release/h2024036434_response.pdf

16. Medsafe. Response to Official Information Act request (request dated 13 October 2023) [Internet]. Wellington (NZ): Medsafe; 2023. Available from: https://www.health.govt.nz/system/files/documents/information-release/h2023031735_response.pdf. Archived at: https://web.archive.org/web/20231113123156/https://www.health.govt.nz/system/files/documents/information-release/h2023031735_response.pdf
17. Medsafe. Response to Official Information Act request (request dated 7 December 2023) [Internet]. Wellington (NZ): Medsafe; 2023. Available from: https://www.health.govt.nz/system/files/documents/information-release/h2023033570_response.pdf. Archived at: https://web.archive.org/web/20240609134052/https://www.health.govt.nz/system/files/documents/information-release/h2023033570_response.pdf
18. Ministry of Health – Manatū Hauora. Data on the supply of unapproved medicinal cannabis products in New Zealand 2024 [Internet]. Wellington (NZ): Ministry of Health – Manatū Hauora; 2024 [cited 2024 Sep 19]. Available from: https://www.health.govt.nz/regulation-legislation/medicinal-cannabis/information-for-industry/data-on-the-supply-of-unapproved-medicinal-cannabis-products
19. Sheehan TJ, Hamnett HJ, Beasley R, Fitzmaurice PS. Chemical and Physical Variations of Cannabis Smoke from a Variety of Cannabis Samples in New Zealand. Forensic Sci Res. 2018;4(2):168-78. doi: 10.1080/20961790.2018.1445937.
20. Te Whatu Ora – Health New Zealand. Response to Official Information Act request (request dated 11 June 2024; response unpublished). Wellington (NZ): Te Whatu Ora – Health New Zealand; 2024.
21. Gracie K, Hancox RJ. Cannabis use disorder and the lungs. Addiction. 2021;116(1):182-90. doi: 10.1111/add.15075.
22. Rychert M, Wilkins C, Parker K, Graydon-Guy T. Exploring medicinal use of cannabis in a time of policy change in New Zealand. N Z Med J. 2020;133(1515):54-69.
23. Rychert M, Parker K, Wilkins C, Graydon-Guy T. Predictors of medicinal cannabis users' willingness to utilise a new prescription Medicinal Cannabis Scheme in New Zealand. N Z Med J. 2021;134(1534):66-75.
24. Chaiton M, Kundu A, Rueda S, Di Ciano P. Are vaporizers a lower-risk alternative to smoking cannabis? Can J Public Health. 2022;113(2):293-6. doi: 10.17269/s41997-021-00565-w.
25. Medicinal Cannabis Agency. Response to Official Information Act request (request dated 14 September 2020; response unpublished). NZ: Medicinal Cannabis Agency; 2020.
26. Medsafe. Response to Official Information Act request (request dated 14 May 2024; response unpublished). Wellington (NZ): Medsafe; 2024.
27. Christchurch Medicines Information Service. Cannabis-based products (part 3): cannabidiol [Internet]. Christchurch (NZ): Te Whatu Ora – Health New Zealand Waitaha Canterbury; 2019 [cited 2024 Jul 25]. Available from: https://www.medicinesinformation.co.nz/bulletins/cannabis-based-products-part-3-cannabidiol-cbd/
28. Wilkins C, Rychert M, van der Sanden R, et al. Cannabis prices decline as availability increases [Internet]. Auckland (NZ): SHORE and Whāriki Research Centre, College of Health, Massey University; 2023 [cited 2024 Jul 25]. Available from: https://static1.squarespace.com/static/59152c88b8a79bdb0e644f2a/t/64cb21c342a7237d4d9532ef/1691034061205/1+Cannabis+availability+bulletin+RELEASE+VERSION.pdf
29. Withanarachchie V, Rychert M, Wilkins C. The role of cannabis clinics in the health system: a qualitative study of physicians' views in New Zealand. BMC Health Serv Res. 2023;23(1):10. doi: 10.1186/s12913-022-09021-y.
30. Oldfield K, Braithwaite I, Beasley R, et al. Medical cannabis: knowledge and expectations in a cohort of North Island New Zealand general practitioners. N Z Med J. 2020;133(1508):12-28.
31. Cannasouth. Company information [Internet]. Hamilton (NZ): Cannasouth; 2024 [cited 2024 Sep 19]. Available from: https://www.cannasouth.co.nz/investors/company-information/
32. Rychert M, Wilkins C, Van der Sanden R, et al. One in ten medicinal users now have a prescription, but many still afraid to ask [Internet]. Auckland (NZ): SHORE and Whāriki Research Centre, College of Health, Massey University; 2023 [cited 2024 Jul 25]. Available from: https://static1.squarespace.com/static/59152c88b8a79bdb0e644f2a/t/651c82560bbcd55592938962/1696367202868/Medicinal+cannabis+bulletin+OCT.pdf
33. Pledger M, Martin G, Cumming J. New Zealand Health Survey 2012/13: characteristics of medicinal cannabis users. N Z Med J. 2016;129(1433):25-36.
34. Fergusson DM, Swain-Campbell NR, Horwood LJ. Arrests and convictions for cannabis related offences in a New Zealand birth cohort. Drug Alcohol Depend. 2003;70(1):53-63. doi: 10.1016/s0376-8716(02)00336-8.
35. Statistics New Zealand. Māori population estimates: At 30 June 2022 [Internet]. Wellington (NZ): Statistics New Zealand; 2023 [cited 2024 Jul 25]. Available from: https://

www.stats.govt.nz/information-releases/maori-population-estimates-at-30-june-2022/
36. Strand N, D'Souza RS, Karri J, et al. Medical Cannabis: A Review from the American Society of Pain and Neuroscience. J Pain Res. 2023;16:4217-28. doi: 10.2147/JPR.S425862.
37. Hasan A, von Keller R, Friemel C, et al. Cannabis use and psychosis: a review of reviews. Eur Arch Psychiatry Clin Neurosci. 2020;270(4):403-12. doi: 10.1007/s00406-019-01068-z.
38. Cuttler C, LaFrance EM, Stueber A. Acute effects of high-potency cannabis flower and cannabis concentrates on everyday life memory and decision making. Sci Rep. 2021;11(1):13784. doi: 10.1038/s41598-021-93198-5.
39. Lawn W, Trinci K, Mokrysz C, et al. The acute effects of cannabis with and without cannabidiol in adults and adolescents: A randomised, double-blind, placebo-controlled, crossover experiment. Addiction. 2023;118(7):1282-94. doi: 10.1111/add.16154.
40. Freeman AM, Petrilli K, Lees R, et al. How does cannabidiol (CBD) influence the acute effects of delta-9-tetrahydrocannabinol (THC) in humans? A systematic review. Neurosci Biobehav Rev. 2019;107:696-712. doi: 10.1016/j.neubiorev.2019.09.036.
41. Wilsey B, Marcotte T, Deutsch R, et al. Low-dose vaporized cannabis significantly improves neuropathic pain. J Pain. 2013;14(2):136-48. doi: 10.1016/j.jpain.2012.10.009.
42. Wallace M, Schulteis G, Atkinson JH, et al. Dose-dependent effects of smoked cannabis on capsaicin-induced pain and hyperalgesia in healthy volunteers. Anesthesiology. 2007;107(5):785-96. doi: 10.1097/01.anes.0000286986.92475.b7.
43. Raymond O, McCarthy MJ, Baker J, Poulsen H. Medicinal Cannabis – The Green Fairy Phenomenon. Aust J Chem. 2021;74(6):480-94.
44. Manoharan R, Kemper J, Young J. Exploring the medical cannabis prescribing behaviours of New Zealand physicians. Drug Alcohol Rev. 2022;41(6):1355-66. doi: 10.1111/dar.13476.
45. Australian Health Practitioner Regulation Agency. Concerns raised over emerging models of care [Internet]. AU: AHPRA; 2024 [cited 2024 Jul 25]. Available from: https://www.ahpra.gov.au/News/2024-06-03-joint-statement-prescribing-and-dispensing.aspx?trk=feed_main-feed-card_feed-article-content
46. Graham M, Chiu V, Stjepanović D, Hall W. A provisional evaluation of Australia's medical cannabis program. Int J Drug Policy. 2023;122:104210. doi: 10.1016/j.drugpo.2023.104210.
47. Ministry of Social Development. Response to OIA request regarding medicinal cannabis and disability allowance [Internet]. NZ: Ministry of Social Development; 2023 Aug 25. Available from: https://fyi.org.nz/request/23666/response/89435/attach/3/OIA%20Response%20DE%20BROUWER.pdf
48. Ministry of Health – Manatū Hauora. Cannabis Use 2012/13: New Zealand Health Survey [Internet]. Wellington (NZ): Ministry of Health – Manatū Hauora; 2015 [cited 2024 Jul 25]. Available from: http://www.health.govt.nz/publication/cannabis-use-2012-13-new-zealand-health-survey
49. Ministry of Justice. Research & Data – Cannabis offences [Internet]. Wellington (NZ): Ministry of Justice; 2024 [cited 2024 Jul 25]. Available from: https://www.justice.govt.nz/justice-sector-policy/research-data/justice-statistics/data-tables/
50. European Union Drugs Agency. Cannabis and driving: questions and answers for policymaking [Internet]. Lisbon (PRT): European Union Drugs Agency; 2018 [cited 2024 Jul 25]. https://www.euda.europa.eu/publications/joint-publications/cannabis-and-driving_en
51. Arkell TR, McCartney D, McGregor IS. Medical cannabis and driving. Aust J Gen Pract. 2021;50(6):357-62. doi: 10.31128/AJGP-02-21-5840.
52. Perkins D, Brophy H, McGregor IS, et al. Medicinal cannabis and driving: the intersection of health and road safety policy. Int J Drug Policy. 2021;97:103307. doi: 10.1016/j.drugpo.2021.103307.
53. Ministry of Health – Manatū Hauora. Review of the palliative cannabis provisions in the Misuse of Drugs Act 1975 [Internet]. Wellington (NZ): Ministry of Health – Manatū Hauora; 2021 [cited 2024 Jul 25]. Available from: https://www.parliament.nz/resource/en-NZ/PAP_118620/ba7257321365425126c19e49c727a916ee6cf1ea