A Public Health Analysis of Two Proposed Marijuana Legalization Initiatives for the 2016 California Ballot:

Creating the New Tobacco Industry

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February 2016

This work was funded in part by National Cancer Institute Grant CA-61021 and UCSF funds from the FAMRI William Cahan Endowment Fund and Dr. Glantz' Truth Initiative Distinguished Professorship. The funding agencies played no role in the selection of the research question, the conduct of the research, or the preparation of the manuscript. This report is available on the internet at www.escholarship.org/uc/item/4qg8k9wz

EXECUTIVE SUMMARY

- Even though tobacco is legal in California, its use is not socially accepted and prevalence is falling.
- Marijuana is illegal, but its use is socially accepted and its prevalence is increasing.
- The fact that most marijuana sales and possession is illegal has led to serious negative social costs, particularly imprisonment of hundreds of thousands of nonviolent offenders, mostly young black men, and existence of an illegal market that generates crime, violence, and corruption.
- This report is based on the premise that treating marijuana like tobacco – legal but unwanted – under a public health framework is an appropriate response to the social inequities and large public costs of the failed War on Drugs.
- The two major legalization initiatives (Adult Use of Marijuana Act and Marijuana Legalization Initiative Statute) do not accomplish this goal.
- The initiatives are written primarily to create a new business and only include minimal protections for the public that are unlikely to prevent public health harms caused by the burgeoning marijuana industry.
- The tobacco industry has been considering entering the marijuana business since 1969.
- There is evidence that marijuana use and secondhand exposure pose health risks, including increased risk for cancer, heart attack, stroke, reproductive toxicity, respiratory impairment, long-lasting detrimental changes in brain function, and increased risk for addiction.
- As marijuana use increases it is likely that the understanding of these disease links will become more detailed and extensive.
- Evidence from tobacco and alcohol control demonstrates that without a strong public health framework, a wealthy and politically powerful marijuana industry will develop and use its political clout to manipulate regulatory frameworks and thwart public health efforts to reduce use and profits.
- Successes and failures regulating tobacco products, alcoholic beverages, public utilities, and other products in California, as well as the lessons from other state regulatory efforts, should be applied to marijuana regulations if California legalizes the cultivation, production, marketing, and retail sale of marijuana.
- The goal of any marijuana regulatory framework should be to treat marijuana regulation like tobacco regulation, allowing sale and use to be legal, while simultaneously creating an environment where falling numbers of people are interested in buying and using it.
- To minimize public health risks, marijuana regulations in California should be modeled on the California Tobacco Control Program, which has successfully countered the lobbying and marketing tactics of the tobacco industry for the last twenty-five years.
- The California Legislative Analyst's Office, in its fiscal impact estimate reports on the proposed initiatives, failed to consider the economic impact of marijuana legalization on increasing health costs in California.
- Separate medical and retail markets, with different rules, creates complexity that favors large corporate interests, so it is important to create a unitary market in which all legal sales are through a single retail market.

- The regulatory licensing authorities defined in the pending marijuana legalization initiatives are agencies whose primary goals are to create a competitive marketplace for businesses, not protect public health.
- The marijuana advisory committees created in the initiatives contain marijuana industry representatives, so are unlikely to prioritize public health over maximizing business potential.
- The initiatives do not create a comprehensive marijuana prevention and control program that denormalizes marijuana use and counters industry activity at the local and state level.
- Without broad-based media campaigns aimed at the general public (not just youth), California is at risk of reversing years of progress on tobacco control as well as increasing the potential health costs associated with legalizing marijuana.
- The marijuana tax in the initiatives may not cover the regulatory and public health costs of legalizing marijuana and may require taxpayers to subsidize the adverse consequences and health-related costs associated with increased marijuana use and secondhand exposure, caused by the new marijuana industry, just as they now do for tobacco.
- The initiatives do not provide adequate funding or time to conduct scientific research to gain a comprehensive understanding of the evolving adverse health effects of legalizing marijuana on population health that can be used to modernize regulation as understanding of these effects improves.
- The advertising and marketing restrictions in the initiatives will not prevent targeting underage persons (defined as under age 21) or other vulnerable populations.
- The proposed warning label is based on ineffective warnings on alcohol products and ignores the extensive research on the effectiveness of using plain or dissuasive tobacco product packaging to reduce and prevent tobacco use.
- The marijuana product safety and testing standards will be based on voluntary codes established by industry organizations not independent public health agencies, so could compromise public health for the sake of business.
- In California there is an opportunity to legalize marijuana in a way that would address and prevent the emerging and future public health problems associated with marijuana use (e.g., youth initiation, indoor use, social normalization, and health disparities) by preventing the growth of another large industry similar to the tobacco or alcohol industries, through a strong public health-focused regulatory system.
- Accomplishing this goal requires that a comprehensive public health education and regulatory framework modeled on the California Tobacco Control Program, to minimize social normalization and use, be established *concurrently with* full legalization, before a marijuana industry similar to the tobacco industry fully develops in California.

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INTRODUCTION

Marijuana is the most widely used illicit substance worldwide, and there is a fast growing movement to legalize marijuana sales for both medical and recreational use.[1] In 2012 and 2014, four states (Colorado, Washington, Alaska, and Oregon) and the District of Colombia passed citizen initiatives to legalize and regulate retail marijuana sales. Ballot question activity and public opinion polls suggest that California, which already permits marijuana sales for medical purposes, could be one of the next states to legalize the retail sale of marijuana products.[2 47, 3-5] By November 2015, seventeen initiative proposals for the November 2016 general election had been submitted to the California Attorney General to legalize retail sales of marijuana.[6]

Two initiatives that appear to have the best chance of qualifying for the 2016 ballot because of financial backing and political support are the "Control, Regulate and Tax Adult Use of Marijuana Act"[7] and the "Marijuana Legalization. Initiative Statute."[8]

- The Control, Regulate and Tax Adult Use of Marijuana Act[*] (the AUMA initiative), filed on November 3, 2015, is backed financially by Sean Parker, cofounder of Napster and former president of Facebook.[9] Lt. Governor Gavin Newsom has publicly endorsed the AUMA initiative, calling it a "thoughtful measure"[9] that aligned with the July 2015 recommendations of Newsom's Blue Ribbon Commission on Marijuana Policy.[10] Other groups that endorsed the AUMA initiative include drug reform groups (Drug Policy Alliance and Marijuana Policy Project) and commercial interests (WeedMaps and the California Cannabis Industry Association).[11]
- The Marijuana Legalization. Initiative Statute[†] was placed on the ballot by the Coalition for Cannabis Policy Reform (the ReformCA initiative), the organization that led the unsuccessful California Proposition 19 legalization campaign in 2010.[12] Compared to the other industry-led initiative campaigns, the Coalition for Cannabis Policy Reform is the largest and best funded, largely because of support from the existing medical marijuana industry,[13] including the California Cannabis Industry Association and Emerald Growers Association. Other coalition members include National Association for the Advancement of Colored People (NAACP), Americans for Safe Access, Law Enforcement Against Prohibition (LEAP), the National Organization for the Reform of Marijuana Laws (NORML), and the United Food & Commercial Workers Union, Medical Cannabis and Hemp Division, among others.[14]

These two initiatives contain many similar provisions, but differ substantially in the way they assign authority to regulate marijuana cultivation, production, distribution, and sales. The AUMA initiative grants authority to existing local and state governments, and the California Legislature. The ReformCA initiative creates and grants rulemaking authority to a 13-member California Cannabis Commission consisting of representatives from the marijuana industry and organized labor to adopt, amend, and rescind any "reasonable" rules or regulations.

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[*] Adult Use of Marijuana Act Initiative: https://oag.ca.gov/system/files/initiatives/pdfs/15-0103%20%28Marijuana%29_1.pdf?

[†] Marijuana Legalization Initiative Statute: https://oag.ca.gov/system/files/initiatives/pdfs/15-0075%20%28Marijuana%29.pdf?

This analysis focuses on the AUMA initiative because, as of December 2015, several key members of the Coalition for Cannabis Policy Reform, the coalition that introduced the ReformCA initiative, endorsed the AUMA initiative.[15] In addition, it is more detailed (at 64 pages) and more prescriptive than the ReformCA initiative.[*]

Experience from tobacco and alcohol control supports a public health framework for regulating marijuana. The history of the major tobacco and alcohol companies using aggressive marketing strategies and political tactics to increase and sustain tobacco[16-22] and alcohol use,[23-28] including using their economic and political power to fight effective public health regulations, illustrates the risks associated with multinational corporations entering and dominating a legalized marijuana market. Indeed, the tobacco companies seriously considered entering the marijuana market in the late 1960s when legalization seemed a real possibility.[29]

A public health framework for marijuana is particularly important in California because of its well-established (medical and illicit) marijuana industry. Although the California marijuana industry has operated largely in the shadows, it is estimated that it currently supplies the nation's illicit marijuana market.[30] Experience from legal markets in Colorado, Washington, Alaska, and Oregon demonstrates that marijuana marketing firms are growing and working to quickly modernize the marijuana industry using marketing techniques aimed at positively influencing the perceptions of marijuana and marijuana products,[31, 32] to maximize market size and sustain profits.

This analysis is premised on five points:

- Marijuana legalization through a pro-public health framework is an appropriate response to the social inequities and large public costs of a failed War on Drugs.
- There is an opportunity to legalize marijuana in a way that would address and prevent the emerging and future public health problems associated with marijuana use (e.g., youth initiation, indoor use, social normalization, and health disparities) by implementing a strong public health-focused regulatory system.
- Left unchecked, a wealthy and politically powerful marijuana industry, which is even larger than the existing medical marijuana industry, will rapidly appear and eventually resemble (and may become a subsidiary of) the tobacco industry.
- Legalization will make it easier for this new industry to exercise political power to block effective regulation, and marijuana prevention and control.
- The California Tobacco Control Program should be used as an operative model because it has effectively countered the tobacco industry and substantially reduced use and associated health costs of tobacco without making it illegal.

In short, the goal would be to minimize use by treating marijuana like tobacco through social denormalization. The central idea would be to establish a vigorous marijuana prevention and control program *simultaneously with* creating the retail market, before the new industry

[*]We discuss the unique aspects of the ReformCA initiative at the end of the detailed analysis of the AUMA initiative's provisions.

accumulated the economic and political power to block effective public health education, legislation, and regulation.

MARIJUANA TOXICITY

Despite emerging scientific evidence on the adverse health risks of marijuana smoke, many people think that marijuana smoke is less toxic than tobacco smoke.[33-37] Marijuana smoke contains chemicals (e.g., polycyclic aromatic hydrocarbons, carbon monoxide, cyanide, benzene) known to cause cancer and reproductive toxicity, many of which are also in tobacco smoke.[38] Indeed, except for the psychoactive ingredient — THC versus nicotine — marijuana smoke is similar to tobacco smoke.[39, 40]This similarity makes it likely that marijuana use will have comparable health effects as tobacco, a prediction supported by recent findings that marijuana and tobacco secondhand smoke exposure both have adverse cardiovascular effects.[37] For example, combustible marijuana use[41, 42] and secondhand marijuana smoke exposure[41] significantly impair blood vessel function, similar to tobacco, in ways that would increase the risk of atherosclerosis (partially blocked arteries), heart attack, and stroke.[37]

Marijuana smokers are also at an increased risk of respiratory problems including chronic bronchitis,[43] as marijuana smoke is associated with inflammation of the large airways, increased airway resistance, and lung hyperinflation.[42, 44] Marijuana smokers also report increased rates of respiratory infections and pneumonia compared to nonsmokers.[45]

Increased marijuana use may produce other adverse effects such as long-lasting detrimental changes in brain function in adolescents,[46] increased risk for addiction (especially when initiated in adolescence), and elevated risks of mental health disorders (e.g., anxiety, mood, and psychotic).[42] Increased marijuana use also may result in increased traffic accidents from driving while impaired by marijuana.[47, 48]

Aerosolizers are used for both nicotine (e-cigarettes) and marijuana, and do not involve combustion, so produce fewer toxic chemicals than combusted products. While not fully understood, e-cigarettes do, however, expose users and bystanders to nicotine, ultrafine particles, and other toxins.[49-54] Research on the health effects of marijuana leaf aerosolizers, THC concentrate (e.g., oil and wax) aerosolizers, and liquid THC-filled e-cigarettes is hampered by the same factors that hamper research on marijuana in general.[55] However, there is evidence on the adverse health risks of flavorants used in both e-cigarettes and marijuana products (concentrates, liquid THC), which contain the chemical diacetyl. Diacetyl inhalation is associated with bronchiolitis obliterans and other severe respiratory diseases.[56]

Marijuana remains a Schedule I substance under the Federal Controlled Substances Act, in which the use, sale, and possession of cannabis (marijuana) is a criminal offense under federal law,[57] and which has resulted in a huge deficit in knowledge on marijuana use and secondhand exposure, whereas tobacco is now one of the most comprehensively researched substances. In addition, because, at least at the present time, adults who use marijuana often also use tobacco,[34, 58-61] it is difficult to separate the effects of these two products. These factors also make it difficult to study the possible medical benefits from certain forms and chemical components of marijuana. It is important to emphasize, however, that the current situation in which there is relatively little

evidence (especially compared to tobacco) on the health effects of marijuana,[62] is not the same as evidence of little or no adverse effect.

In California tobacco is legal, but its use is increasingly denormalized, while marijuana is illegal but becoming more socially accepted.[33, 63, 64] This reality is reflected by the fact that, in California, more youth are now using marijuana than tobacco. Between 2011-2013, 24% of 11th graders and 15% of 9th graders reported past 30 day marijuana use, compared to 12% of 11th graders and 7% of 9th graders for past 30 day cigarette use.[65] If current tobacco and marijuana use trends in California continue, with tobacco use continuing to fall and marijuana use continuing to increase, and as retail marijuana becomes legal in more places and time passes, we are likely to develop a more detailed and precise understanding of the associated health risks.

POLICY BACKGROUND

Arguments for marijuana policy reform generally are centered on social justice,[39, 66, 67] public safety,[68-70] and the economic impact[39, 71, 72] of marijuana criminalization. Some marijuana policy reformists argue that legalizing retail marijuana for recreational use will eliminate the incarceration of responsible users and nonviolent dealers and shrink or eliminate existing illicit markets without significantly increasing the health harms and costs of marijuana use.[71] Others advocate for policy change somewhere between incarceration and legalization, often advocating for decriminalizing possession and lesser penalties for production and distribution.[22]

Full legalization advocates generally envision a commercial marijuana regulatory framework modeled on state alcohol regulations.[73, 74] They also argue that the revenues from new marijuana taxes will cover the costs not only of overseeing and regulating legal sales but also will cover programs to prevent youth initiation and control abusive use associated with increased access to marijuana, with revenue to spare for the state government general fund.[12, 75] Whether these predictions materialize will depend on how the production, distribution, marketing, and sale of the newly-legalized marijuana market are structured and regulated, and what the new legal marijuana industry looks like and how it operates.

A public health framework would seek to minimize consumption (and associated health costs) through public health regulations and public education, and create a social and legal environment modeled on California's tobacco control program, which discourages the use of tobacco and protects nonusers from secondhand exposure. Through government regulation[76-79] and market intervention,[25, 80] a strong public health framework would prevent a wealthy and powerful marijuana industry from using its political clout to manipulate regulatory frameworks and thwart public health efforts to minimize use.

RECENT POLICY ANALYSES

In 2014, Lt. Governor Gavin Newsom, in collaboration with the American Civil Liberties Union (ACLU), formed the Blue Ribbon Commission on Marijuana Policy (BRC) in anticipation that an initiative to legalize retail sales of marijuana would be placed on the 2016 California

ballot.[81] Members of the Blue Ribbon Commission consist of academics,[*] physicians, policymakers, drug policy reformists, criminal and tax lawyers, economists, and public health experts and were appointed to conduct policy research and identify problematic issues and alternative solutions for marijuana legalization in California. The Commission did not have a direct role in preparing any legislation or initiatives; it was meant to inform the policymaking process.

The Tobacco Education Research Oversight Committee (TEROC) is the legislatively mandated committee (California Health and Safety Code Sections 104365-104370[82]) that oversees California's tobacco prevention, education, and tobacco-related research programs created by the Tobacco Tax and Health Protection Act of 1988 (Proposition 99).[83] In particular, TEROC is charged with advising the Legislature and Administration on the effectiveness and priorities of California's tobacco control program and tobacco policy broadly. Its members are appointed by the Governor, Speaker of the Assembly, Senate Rules Committee, and Superintendent of Public Instruction to fill seats that represent different areas of technical expertise related to tobacco control.

In July 2015, both the BRC and TEROC issued policy analyses and recommendations on how to regulate marijuana in California (detailed below). While BRC and TEROC share many policies for retail marijuana legalization, TEROC's recommendations are stronger. Table 1 compares the BRC and TEROC recommendations with the AUMA and ReformCA initiatives.

Blue Ribbon Commission Report

On July 21, 2015 the BRC published its report: *Pathways Report: Policy Options for Regulating Marijuana in California.*[10] The report's strong recommendations, many informed by past tobacco and alcohol control efforts, included measures relating to local control, public usage, health messaging, research priorities, and marketing and advertising restrictions. The overall goal of the report was to provide recommendations for regulations that would "prevent the growth of a large, corporate marijuana industry dominated by a small number of players, as we see with Big Tobacco or the alcohol industry."[10]

Specifically, the BRC recommended:

- Establish an advisory committee or board whose representatives do not have an economic stake in the marijuana industry.
- Adopt regulations that would limit the size and power of any sector of the marijuana industry.
- Set 21 as the minimum age of purchase and access to marijuana.
- Implement broad based media campaigns aimed at the general public and not limited to youth.

[*]Rachel Barry, first author of this analysis, is a member of the Blue Ribbon Commission.

- Dedicate funds to marijuana prevention education and marijuana-related disease research and education.
- Include marijuana in existing smokefree laws to reduce exposure to secondhand smoke.
- Use resulting tax money to sponsor data collection and research on the health risks of marijuana (including cardiovascular, respiratory, and brain development/function).
- Require the state to periodically publish reports of comprehensive data, including on the success, failure, and challenges of implementation of the new laws.
- Limit advertising and marketing to inside retail stores.
- Protect local control over licensing, sales, and public usage aspects of marijuana regulations.

The BRC recommended several provisions that the AUMA and ReformCA fail to include:

- Neither establishes advisory committees with members that only represent the public health interest. Rather the advisory committees or boards these initiatives establish will contain individuals with an economic stake in the marijuana industry.
- Neither establishes limits on the number of licenses issued to the same person or entity.
- Neither establishes health education and prevention programs for the general public.
- Neither prioritizes marijuana-induced disease research, including collecting and analyzing data on marijuana use with tobacco, e-cigarettes, as well as demographic data, including race, gender, and income level, on marijuana initiation, prevalence and use disorders, to make further, evidence-based decisions for effective implementation.
- Neither requires the state to publish reports on the successes, failures, and challenges of implementation of the new laws that would allow the public and stakeholders to recommend corrections.
- While AUMA prohibits marijuana use wherever combustible tobacco products and e-cigarettes are prohibited under local and state smokefree laws, both initiatives grant local governments the authority to permit indoor use in licensed marijuana facilities.
- Neither requires that advertising and marketing of marijuana be limited to inside retail stores.
- The AUMA initiative grants local governments the authority to regulate the marijuana industry, including prohibiting any marijuana licensed facility; ReformCA only allows doing so after a majority vote in an election by the voting public.

Tobacco Education and Research Oversight Committee Letter

On July 17, 2015, TEROC wrote a letter to the BRC containing specific recommendations for regulating marijuana in California, in a way that would protect public health. Broadly, TEROC recommended that any legalization initiative:

- Institute a comprehensive health education and prevention program similar to the mandate of the California Tobacco Control Program.
- Include marijuana in existing smokefree laws for cigarettes and e-cigarettes.
- Implement policies modeled on tobacco regulations concerning sales, taxation, and marketing of marijuana.[84]

Likewise TEROC recommended several provisions that the AUMA and ReformCA initiatives fail to include that are necessary to protect the public health.

- Neither initiative establishes a comprehensive marijuana prevention and control program modeled on the California Tobacco Control Program, with the kind of mass-media education campaigns necessary to denormalize marijuana use and counter industry activity at the local and state level.
- Neither initiative provides adequate funding for marijuana prevention and control programs aimed at youth, young adult, or adult populations.
- Both initiatives permit local governments adopt exemptions for indoor marijuana use inside retail stores and marijuana clubs that would undermine enforcement of smokefree laws to reduce tobacco smoking and exposure, fail to protect nonusers from secondhand marijuana smoke, as well as further contribute to occupational health disparities.
- Neither initiative includes strong restrictions on advertising and marketing necessary to make it difficult for marijuana companies to target youth, young adults, and other vulnerable populations (e.g., prohibiting advertising on billboards, television and radio, coupons, event sponsorship, and payments to promote marijuana in movies).
- Neither initiative includes sunshine disclosure policies, in which marijuana companies would be required to report price discounting and incentives, promotional allowances, and payments to retailers and wholesalers, and contributions to elected officials.
- Neither initiative includes requirements that advertising and marketing not be designed in a way that is known to or has the effect of appealing to certain demographics, which will benefit marijuana companies who could argue that they did not intend for advertisements or sponsorships to attract children, young adults, and other vulnerable populations.
- Neither initiative prohibits marijuana products that are designed in a way that has the effect of or is known to be appealing to children or easily confused with other products that do not contain marijuana, which may increase the chances that children and adults will overdose or accidentally ingest marijuana products.
- Neither initiative requires effective warning labels to safeguard and inform the public about the adverse health risks of using marijuana, thereby increasing the chances that adults will improperly use these products.

ANALYSIS OF THE INITIATIVES WITHIN A PUBLIC HEALTH FRAMEWORK

This report provides a detailed analysis of the specific provisions in AUMA assuming that the overarching public policy objective is to prevent the growth of a powerful marijuana industry that would work to thwart public health protections, while solving some of the social justice problems associated with the criminalization of marijuana.

Broadly, the problems contained within these initiatives are:

- The regulatory licensing authorities consist of agencies whose primary constituencies are businesses that will likely seek to maximize sales and use, rather than agencies whose focus is protecting public health and minimizing consumption of harmful substances.

- Since several marijuana industry representatives sit on marijuana advisory committees that will guide regulations and implementation, it seems unlikely that they would prioritize public health over maximizing business potential.
- Licensing regulations will permit corporations to dominate the marijuana market whose likely goal would be to maximize market growth and sales through widespread use.
- The marijuana market is unlikely to remain a cottage industry of small-scale home growers, collectives, and dispensaries that would be necessary to facilitate government control over the size of the market and the resulting marijuana industry.
- It will be legal to sell marijuana products in ways that would increase underage (defined as under age 21) access and appeal , including through vending machine, internet, and mail order sales, coupons, promotional discounts, and flavored products.
- Implementation of effective public health policies are complicated by maintaining both the medical and retail marijuana markets.
- The California Department of Public Health, the agency with experience implementing effective tobacco prevention and control programs, is not in charge of a similar program for marijuana.
- The initiatives do not create a marijuana health education, or a marijuana prevention and control program, or include funding for a statewide media campaign dedicated to the primary purpose of reducing marijuana use and protecting the public from secondhand exposure.
- The marijuana tax revenue will be dedicated to youth substance abuse programs and economic development projects, not broader and more effective public health programs modeled on the California Tobacco Control Program, to prevent marijuana initiation in underage persons or minimize adult use.
- Local governments will be granted authority to permit marijuana smoking inside marijuana retail stores or marijuana clubs, which, if implemented, will expose marijuana industry workers to secondhand marijuana smoke, contributing to occupational health disparities.
- Research priorities favor growth of the industry while ignoring the need for marijuana-induced disease research as a foundation for future policy.
- Research program funding will end ten years after implementation without enough time to gain a comprehensive understanding of the evolving adverse health effects of legalizing marijuana on population health.
- The marketing and advertising restrictions will fail to prevent underage persons (defined as under age 21) from being exposed to marijuana advertising and marketing.
- Businesses, like the tobacco companies, will be permitted to market and sell products that contain nicotine, alcohol, caffeine, or other additives that make marijuana more addictive, potent, or toxic when consumed as intended.
- Labeling requirements will not require state of the art tobacco control warning labels that are effective at informing consumers on the health risks associated with consuming a substance with adverse effects.
- ReformCA will grant authority to an industry-led commission to develop marijuana regulations for licensing, health education programs, research, marketing and advertising, and product, packaging, and labeling standards.

The initiatives provide regulatory licensing authority to agencies that do not prioritize the protection of public health and safety

The AUMA initiative grants broad authority to the Department of Consumer Affairs, rather than the California Department of Public Health, an agency with experience in successfully counteracting the lobbying and marketing tactics of multinational tobacco companies, and grants limited oversight to other licensing authorities that would likely have a vested interest in establishing regulations that would increase market growth.

The AUMA initiative models its regulatory structure on the 2015 California Medical Marijuana Regulation and Safety Act (Health and Safety Code Sections 11362.7-11362.83[85]), which was state legislation that established a regulatory structure for medical marijuana. The AUMA creates the Bureau of Marijuana Control in the Department of Consumer Affairs[85] as the agency that oversees the entire marijuana regulatory system, including administration and enforcement, and that regulates commercial marijuana activity. The Department of Consumer Affairs is an agency tasked with serving consumers by creating a competitive market place for businesses.[86]

Other agencies, which under the AUMA will be given limited oversight over the marijuana industry, are the California Department of Food and Agriculture (cultivation), the California Department of Public Health (manufacturing and testing), and the California Board of Equalization (taxation). The California Department of Food and Agriculture is an agency tasked with protecting and promoting agriculture.[87] The Board of Equalization's mission is to "maximize efficiencies" and "develop [California's] workforce" through effective tax administration.[88] These agencies are given authority to issue regulations that shall not make "compliance unreasonably impracticable," in collaboration with the Bureau of Marijuana Control's Advisory Board (detailed below).

The Bureau of Marijuana Control will license marijuana retailers, distributors, and microbusinesses, the Department of Food and Agriculture will license marijuana cultivators, and the Department of Public Health will license and oversee marijuana manufacturers and testing facilities. The CDPH will develop procedures for testing marijuana and marijuana products such as how often licensees will be required to test products and that testing takes place prior to distribution. The Department of Food and Agriculture will also, in collaboration with the Board of Equalization, oversee the track and trace marijuana program. These agencies are given authority to set annual fees that will be scaled dependent upon the size of the business. An advisory committee appointed by the Director of the Department of Consumer Affairs (consisting of representatives from the marijuana industry, labor organizations, appropriate state and local agencies, public health experts, and other subject matter experts, including representatives from the Department of Alcoholic Beverage Control) will assist in the development of annual fee schedules and licensing procedures. The Bureau will have authority to create additional licenses necessary to carry out the duties imposed by the initiative.

Three out of four of the regulatory agencies under AUMA were not created by the State Legislature with the primary goal to protect and promote public health. Indeed, the only agency

that does not have business interests in its mission or value statement is the Department of Public Health, as an agency tasked with "optimizing the health and well-being" of people in California. From the tobacco control experience, granting authority to agencies, such as the Department of Food and Agriculture,[89, 90] that would support the interests of marijuana growers and retailers, may result in these agencies issuing regulations that would help to increase market size, rather than institute strong controls to protect public health. In US tobacco growing states, commissioners of agriculture have been important allies to the tobacco industry and have blocked tobacco control policies (e.g., smokefree laws, tobacco taxes) to support the financial interests of tobacco growers.[90]

Science-based regulatory agencies with a mission to protect public health would be more appropriate for developing regulations to mitigate the risks associated with commercializing a potentially harmful substance. A better strategy than that proposed in the initiative would be to adopt a public health framework that would place the California Department of Public Health (CDPH), with the mandate to protect public health and denormalize marijuana use, as the lead agency overseeing the entire marijuana regulatory system, with other specialty agencies playing supporting roles. The CDPH could develop regulations that prioritize the public health goals of reducing the impact of marijuana on public health by protecting nonusers, preventing initiation, encouraging users to quit, regulating the manufacturing, marketing and distribution of marijuana products, establishing marijuana product standards appropriate to protecting public health, and requiring marijuana companies to submit detailed applications prior to marketing or selling new marijuana and marijuana products.

As an agency with the goal to create a competitive marketplace for businesses,[86] the Department of Consumer Affairs may not be the appropriate agency to counter the harmful influence of large corporate interests. Indeed, at a January 2016 informational joint meeting of the California State Assembly on medical marijuana regulation, the Department of Consumer Affairs and Department of Food and Agriculture stated that each were seeking counsel from the medical marijuana industry to guide the process of regulating and implementing the 2015 California Medical Marijuana Regulation and Safety Act.[91]

It is likely that the authors chose to model the retail regulatory system on the Legislature's language for the medical marijuana regulatory system to facilitate implementation of the law rather than considering that the California Department of Public Health would be the more appropriate agency. Most notably the CDPH has successfully countered the lobbying and marketing tactics of the tobacco industry for the last twenty-five years.[92-94] The CDPH also has broad competencies in relevant areas including licensing, food safety, drug safety, laboratory testing, occupational health, pesticide contamination, enforcement of underage tobacco sales, surveillance and evaluation systems, health communications, public education and outreach, and relationships with vulnerable community groups and populations.

The initiatives include marijuana industry representatives on advisory committees rather than independent public health experts

The Bureau of Marijuana Control as envisioned by AUMA is required to convene a marijuana advisory committee that includes marijuana industry representatives, labor

organizations, public health experts (it is not specified that this member have a background in preventing or reducing marijuana consumption), state and local agencies, and the Department of Alcoholic Beverage Control to guide regulations and implementation. This is a direct conflict of interest, because many of these members will prioritize business interests over public health. The members are appointed by the Director of the Department of Consumer Affairs (Table 2), who is in charge of an agency whose primary objective is to protect professionals from unfair competition and consumers from unlicensed businesses.[86]

An independent oversight advisory committee is critical for a marijuana regulatory framework because it provides public accountability and public protection from the marijuana industry. Prioritizing public health would lead to an independent oversight committee similar to the California Tobacco Education Research Oversight Committee (TEROC) whose members would be appointed by the Governor and the California State Legislature, and would include experts in public health as well as academic researchers that have experience in marijuana prevention and control (or a similar substance such as tobacco). It would be considered a conflict of interest to include members with a direct interest in promoting the marijuana industry. Another possibility would be to model advisory committee language for the California Air Resources Board's (CARB) conflict of interest rules, in which a public official with a financial interest in a decision must not engage in the decision-making process.[95] Other participants may serve as consultants but may not exercise decision-making power.

Marijuana industry representation on advisory boards raises serious public health and safety concerns. For example, Colorado allowed industry involvement in developing initial regulations for packaging, labeling, and potency restrictions for marijuana edibles, which did not sufficiently protect public health, as evidenced by a significant increase in the number of children brought to emergency rooms for accidental marijuana ingestion.[96, 97] Calls to poison control centers involving accidental marijuana ingestion in children doubled between 2013 and 2014 in Colorado (45 calls for children under age 8[98]).

Including the tobacco industry on advisory committees on the development of smokefree laws or other regulations blocks, delays, or weakens implementation of adequate public health policies.[18, 47, 99, 100] As a result, there has been serious attention toward avoiding conflicts of interest between public health and the tobacco industry, with global efforts to monitor and contain tobacco industry influence over public health policies.[25, 99] Indeed, the World Health Organization Framework Convention on Tobacco Control, a global public health treaty ratified by 180 parties as of January 2016 (not including the United States), includes Article 5.3., which specifies that:

> The involvement of organizations or individuals with commercial or vested interests in the tobacco industry in public health policies with respect to tobacco control is most likely to have a negative effect… [Governments] should not allow any person employed by the tobacco industry or any entity working to further its interests to be a member of any government body, committee or advisory group that sets or implements tobacco control or public health policy."[101]

A marijuana regulatory framework that prioritizes public health should have similar provisions.

Because the licensing systems will be overseen by an advisory committee with marijuana industry representatives, it is unlikely that these members will recommend a licensing system with adequate enforcement or fees high enough to cover administrative and enforcement costs, or create penalties for retailers that violate the law, including license suspensions, fines and revocations.

The initiatives' licensing rules are inadequate to prevent the growth of a tobacco-style marijuana industry

The AUMA initiative creates a licensing system with thirteen license classifications for cultivators, two for manufacturers, and one each for testing, retailers, distributors, and microbusinesses, each with annual licensing fees determined by the licensing authority in charge of the specific activity (Table 3). Companies licensed to test marijuana products may not be licensed for any other activity or vice versa. A strong provision under the AUMA is that tobacco and alcohol retailers will be prevented from holding a retail marijuana license. Another strong provision in the AUMA is that local governments are granted authority to adopt stronger licensing ordinances than the state, including the authority to prohibit marijuana businesses.

Except for companies licensed to test marijuana products, there are, with few exceptions, no limits on the number of licenses per stage of production. Licensees may be issued more than one license, and may hold licenses in multiple stages of production. In contrast to AUMA, the Medical Marijuana Regulation and Safety Act, passed by the California Legislature in September 2015, permits the Department of Food and Agriculture to limit the total number of cultivation licenses for medical marijuana.[85]

To protect public health, the new legal marijuana market would be structured to prevent large corporate entities, such as tobacco, pharmaceutical, or food companies,[29] from dominating the market. Large corporate entities have the power to engage in mass marketing and product engineering to maximize addictive potential, and likely would use their political power to minimize effective regulation. A strong licensing system would reduce the chances of this happening if it required licenses for each part of the supply chain, prohibited private license transfers, and prohibited entities from holding more than one license.[102]

The AUMA initiative states that it "ensures the nonmedical marijuana industry in California will be built around small and medium sized businesses by prohibiting large-scale cultivation licenses for the first five years."[7] Beginning on January 1, 2018, licensing authorities will issue licenses for each stage of production except large scale cultivation, which will be licensed beginning January 1, 2023. The Legislature, by majority vote, may extend the date beyond January 1, 2023. These provisions for the first five years will likely have little effect on controlling the size of the marijuana industry. As evidenced from the Colorado and Washington experiences,[103, 104] five years is a short timeframe in terms of building a new marijuana market.

The AUMA initiative directs licensing authorities to prioritize issuing licenses to companies in the medical marijuana industry, including those that have been established businesses for at least twenty years, and operated in compliance with California's 1996

Compassionate Use Act[105] before September 1, 2016. It is unclear how a company that has been in operation for five versus twenty years will be treated under this provision. Licensing authorities will not issue or renew a license to a person or entity that cannot demonstrate continuous California residency from before January 1, 2015. There are, however, no provisions preventing out-of-state businesses from entering the market through individuals acting as intermediaries.

The sales restrictions under the initiatives are inadequate to prevent initiation in underage persons

The AUMA initiative appropriately prohibits sales of marijuana to minors (defined as under age 21) and prohibits anyone under the minimum age be allowed in any store that sells marijuana and marijuana products, including staff. This provision is stronger than regulations for retail alcohol stores, which explicitly allow underage people in convenience stores.[106] However, AUMA fails to include other important provisions that will prevent underage access and appeal including vending machine, internet and mail order sales, coupons, promotional discounts, and sales of flavored products, including THC-containing e-liquid.

The AUMA initiative also prohibits marijuana businesses within a 600-foot radius (and prohibits marijuana advertisements and marketing within a 1,000-foot radius; detailed below) of "a school providing instruction in kindergarten or any grades 1 through 12, day care center, or youth center that is in existence at the time the license is issued, unless a licensing authority or a local jurisdiction specifies a different radius." AUMA establishes a series of discretionary criteria for determining whether a license should be issued, including "excessive concentration." However, this term is not adequately defined and is applicable if such limitation did not impede development of the legal market or perpetuate the illicit market. The effectiveness of these licensing criteria is severely hampered because they are discretionary and lack specificity. An important provision in AUMA is that local governments will be permitted to adopt retail licensing restrictions stronger than the state law.

Prevention of marijuana use for underage persons is an important public health goal. Good public health practice, based on provisions for tobacco retailers,[107-109] would prohibit marijuana retail stores within 1,000 feet of schools and parks. There would be requirements against issuing new licenses in areas that already have a significant number of retail outlets, which would not be contingent upon whether or not such limitation impeded market growth. Retail marijuana businesses would be prohibited from selling marijuana through vending machines or self-service displays, using coupons including digital coupons, promotions, discounts, sale of flavored products (that largely appeal to children),[110] and other offers that would encourage underage initiation and frequent use, as well as impulse buys.

In addition to these prohibitions, the law would also mandate that retailers be required to verify government-issued identification cards through age-verification systems for face-to-face sales. Electronic commerce such as internet, mail order, text messaging, and social media sales would be prohibited because these forms of nontraditional sales are difficult to regulate, age-verification is impossible,[23] and they can easily avoid taxation.[111] (Preventing internet, mail order, text messaging, and social media sales will also reduce the size of the illicit market,[112-114] a

defined goal of AUMA.[7]) The state would establish a minimum set of restrictions for marijuana retailers that local governments could not weaken (i.e. floor preemption) and local governments would be permitted to adopt stronger regulations than the state law, including additional annual licensing fees and penalties for noncompliance (i.e. ceiling preemption).

The stated goal of the AUMA initiative is to simultaneously "legalize marijuana for those over 21 years old [and] protect children."[7] However, there are no provisions that will prevent marijuana retail stores from being located within 1,000 feet of a college or university property, recreational center or facility, public park, library, or a game arcade, malls, movie theaters, churches, substance abuse treatment facilities, or hospitals, where underage (defined as under age 21) people are likely to congregate. Furthermore, it will be legal to sell marijuana in ways that will increase underage persons' access and appeal, through vending machines, self-service displays, and coupons, and through nontraditional sales, such as the internet, mail order, text messaging, and social media.

Under the AUMA initiative it is likely that marijuana legalization will have a negative impact on the health of young people and communities of color. Experience from tobacco and alcohol control shows that retailer density is positively associated with youth and young adult smoking[115] and alcohol use.[116] It is likely that marijuana retail density will have the same impact. There are also no provisions that will require new marijuana retailers be located a minimum distance from other retail stores or that will limit the number of marijuana retailers in a specific geographic unit (i.e., county, city, town). This is a key problem with tobacco retailers and alcohol outlets in poor communities, and is an emerging issue in Colorado's minority, mostly Latino, neighborhoods with retail marijuana.[117] Similar to tobacco and alcohol, it is likely that marijuana retail stores and marijuana cultivation sites will be over-concentrated in low-income communities and communities of color. In order to uphold the social justice goals on which the initiative stands,[118, 119] it is important that clustering and over-concentration of licensed marijuana facilities is prevented.

While an age-restriction for marijuana (21 years and above) and compliance checks to deter sales to underage persons are included in the initiative, it severely limits the capacity to use the licensing system to enforce this restriction on retailers by suspending or revoking licenses for businesses that sell to underage persons. In particular, the initiative states that retailers will be penalized if they "intended" or "knowingly" sold to underage persons. Experience from tobacco and alcohol control[120] demonstrates that requiring knowledge (rather than a more strict "negligence" standard) makes enforcement difficult, if not impossible, and compliance much less likely. Further, the initiative's language requiring licensees see documentation prior to selling or transferring marijuana is weak and at risk of being violated by marijuana retailers. The initiative states a licensee shall not sell marijuana unless presented with "documentation which *reasonably* appears to be a valid government-issued identification card showing that the person is 21 years of age or older [emphasis added]."[7]

Rather than creating a duplicative system, a public health framework would model the marijuana retail licensing system on existing inspection systems (e.g., the Stop Tobacco Access to Kids Enforcement (STAKE) or the Target Responsibility for Alcohol Connected Emergencies (TRACE) programs in California). As with tobacco and alcohol enforcement programs,

marijuana retailers would be required to ask for identification from anyone that looks under the age of forty. Marijuana retailers would be required to enter government-issued identification cards into age-verification system for face-to-face sales or the transaction would be cancelled. Violations would be for cases in which retailers do not ask for identification before selling marijuana to consumers and for cases in which the retailer asked for identification but still sold marijuana to an underage person without the state having to prove intent.

The initiatives will complicate policy efforts to prevent underage appeal and access by maintaining the medical and retail marijuana markets

The AUMA initiative maintains separate medical and retail marijuana markets, complicating policy efforts to prevent initiation and reduce marijuana use. The experience in Colorado, where the separate medical and retail marijuana markets are being maintained provides strong support for a unitary market.[121] In Colorado, although legalization advocates claimed that retail marijuana legalization would reduce the number of medical marijuana users, the medical marijuana industry has continued to grow.[122, 123] Regulatory inconsistences between the medical and retail markets are likely driving medical marijuana market growth. For example, marijuana possession and cultivation limits are higher for medical marijuana than retail marijuana, medical is more affordable because it is exempt from state and local excise taxes, and persons under age twenty-one can purchase marijuana through the medical marijuana program but not through the retail market.[122]

It is important to avoid complexity in the marijuana regulatory environment because complexity favors large corporations with the financial resources to hire powerful lawyers and lobbyists.[124-126] A public health framework for marijuana legalization would create a unitary market, in which all legal sales are regulated as retail marijuana and marijuana products, and the medical market is eliminated. A unitary market would simplify regulatory efforts, including licensing enforcement, implementation of underage access laws, prevention education programs, and taxation. A unitary market would also avoid sending mixed messages to the general public about the safety of marijuana, particularly as more research accumulates on the adverse health effects. Without a unitary market, it is likely that California, which has a stronger medical marijuana advocacy community and industry than Colorado, will experience similar regulatory distortions.

It is important to note that in 2015 the State of Washington merged its medical and retail marijuana markets. Licensed marijuana retailers that want to also sell medical marijuana are required to obtain a medical marijuana endorsement that meets the Department of Health's requirements.[127]

Under AUMA dedicated funds will not be dedicated to effective programs modeled on the California Tobacco Control Program to minimize marijuana use

The AUMA initiative focuses funding on youth-centered substance abuse treatment programs without a specific mandate dedicated to the primary purpose of preventing and reducing marijuana use and protecting the public from secondhand smoke exposure. The experience from tobacco control[128-131] is that dedicating taxes solely to youth-based and school

programs is not the best way to prevent initiation or minimize use, and may have counteractive effects. Evidence-based tobacco prevention and control programs aimed at the general population are the most effective way to prevent youth initiation.[93, 94, 132]

AUMA assigns the Department of Health Care Services (DHCS), an agency that provides information to the public on how to improve access to health care services, such as Medi-Cal and Family Planning,[133] responsibility to educate on and prevent substance use disorders in youth. The initiative allocates $5 million from the General Fund to the DHCS to develop and run a public information campaign on the provisions of AUMA, penalties for sales to minors, dangers of driving while intoxicated by marijuana, potential harms of using while pregnant or breastfeeding, and potential harms of overconsumption. In contrast, the California Department of Public Health's media budget for tobacco control was $43 million (adjusted for inflation to 2015 dollars) when it first aired in fiscal year 1989/90.[134]

There are no funds earmarked to provide for the continued public information program or for an ongoing statewide media campaign aimed at the general population informing the public on the harms of marijuana use, production (i.e. pesticide, water issues), driving under the influence, secondhand smoke, industry manipulation, or offering cessation services for users. The Legislature will have to appropriate these funds from the General Fund to continue such a public information campaign.

Beginning in Fiscal Year 2018-2019, AUMA would require sixty percent of the left over marijuana tax revenue to be allocated to youth programs "designed to" educate and prevent substance use disorders. These programs may include prevention and treatment services for youth and caregivers, early intervention services, grants to schools to develop school-based intervention programs (Student Assistance Programs), grants to programs to address substance abuse for homeless youth, family-based interventions, and workforce training to increase the number of available behavioral health staff with substance use disorder prevention and treatment expertise. The DHCS is given broad latitude to determine where the funding is allocated and how much a particular program will receive. For example, the DHCS may dedicate most of the funding toward prevention and early outreach or it may dedicate most of the funding toward workforce training. If funding exceeds demand for youth substance abuse prevention and treatment services, then funds may be dedicated to treatment for adults with substance use disorders.

Because these programs will not impact market growth, it is likely that the marijuana industry will either not oppose or may lobby to continue their funding. As is the case in tobacco and alcohol control,[135-138] dedicating taxes to programs other than marijuana prevention and control may be popular among policymakers and likely will be promoted by marijuana companies to displace effective denormalization campaigns. Often these programs are not controversial and fund important causes like early childhood education, college scholarships, or to fund state school projects (as was the case in Colorado[121]), or focus prevention programs on pregnant women and children, or provide funding to healthcare services unrelated to preventing tobacco[139] or alcohol use.[138] Without a specific legal requirement, the emphasis on substance abuse prevention and treatment programs suggests that funding will not go towards preventing and reducing marijuana consumption. For the same reasons as the tobacco and alcohol

companies, marijuana companies may endorse these programs to boost their public image and strengthen relationships with policymakers.

Marijuana companies may also launch voluntary youth prevention programs or corporate social responsibility projects, to displace effective denormalization campaigns used to prevent and control marijuana use. Similar to the alcohol industry's "drink responsibly" campaign, which is ineffective at informing the public on the actual harms of alcohol use,[140] in 2014, the Marijuana Policy Project launched its own "Consume Responsibly" campaign, with the "goal to educate [consumers] about the substance, the laws surrounding it, and the importance of consuming it responsibly."[141] It is likely that marijuana responsibility messages on consumption will be used to promote marijuana and marijuana products rather than providing accurate public health information to deter and minimize use.

As noted above in California use of tobacco, a legal product, has been dropping while use of marijuana, despite being illegal, is rising. The most efficient way to minimize marijuana use would be to use funds from taxes on marijuana sales to implement a marijuana prevention and control program, modeled on the successful California Tobacco Control Program (CTCP), under the administration of the California Department of Public Health.

The key to the success of the CTCP has been that it is a broad-based campaign focused on reinforcing the nonsmoking norm aimed at the population as a whole – not just smokers or youth, [93] for each element of the program, including the statewide hard hitting, evidence-based media campaign.[93, 94, 132] Indeed, by focusing on adults through its comprehensive tobacco control program, California has achieved one of the lowest youth smoking rates (10%) in the country.[92, 142-146]

Similar to the CTCP, an effective marijuana prevention and control program would implement social norm change strategies including: 1) Countering pro-marijuana influences in the community; 2) Reducing exposure to secondhand marijuana smoke and aerosol, marijuana smoke and aerosol residue, marijuana waste, and other marijuana products (including protecting vulnerable workers from these types of exposures); 3) Reducing availability of marijuana and marijuana products; and 4) Promoting and supporting services that help marijuana users quit. There would be a state-level administrative office housed in the Department of Public Health with separate funding, dedicated to the primary purpose of preventing and reducing marijuana use and protecting the public from secondhand smoke exposure. Funding would be earmarked in the initiative and be protected from diversion by the Legislature or Governor.[19, Chapter 10]

If modeled on the CTCP, a marijuana prevention and control program would allocate funding to local health departments and, on a competitive basis, to community-based organizations to create marijuana prevention and control coalitions, and to coordinate efforts with schools. The marijuana prevention and control program would mount an ongoing statewide media campaign, and would provide continuous training and technical assistance to local marijuana prevention and control programs, in large part through the competitive statewide grantees. The marijuana tax would provide an ongoing annual revenue stream to support implementation of a statewide media campaign that would consist of paid radio, television, billboard, internet and social media, and print advertising. The media campaign would include

public relations campaigns for general market and population-specific communities, including various ethnic populations, young adult, and Lesbian Gay Bisexual Transgender (LGBT) communities. The media campaign would frame the messages and inform the public on the harms of marijuana use and secondhand exposure, expose and publicize predatory marketing by the marijuana industry, and encourage quitting through a cessation helpline.

The CTCP statewide campaign aimed at the general population has reduced smoking and provided billions of dollars in healthcare savings for Californians, both as individuals and as taxpayers.[92, 142-145] It is reasonable to hypothesize that a marijuana prevention and control program based on the CTCP would have similar effectiveness and financial benefits.

The CTCP was most effective in its early years when it was larger[19, Chapter 10] and before inflation eroded its purchasing power.[134] Based on the experience of the CTCP, an annual budget of $340 million would be adequate ($175.6 million in 1989,[19, p. 90] adjusted annually for inflation) and would allow for mounting an effective campaign to counter the adverse public health impact of the new marijuana industry.

It is unlikely that the tax revenue will cover the full costs of marijuana legalization

The AUMA initiative imposes a cultivation and retail sales tax on marijuana and marijuana products. The cultivation tax will be for marijuana flower: $9.25 per dry weight ounce and for marijuana leaves: $2.75 per dry weight ounce. The retail sales tax will be an ad valorem tax of 15% of the total sale. The Board of Equalization will have the authority to adjust the tax rate for marijuana leaves annually to reflect changes in the price of marijuana flowers and will have the authority to adjust the cultivation and retail sales tax for inflation (although the specific measure of inflation is not specified).

After money is dispersed to the regulatory agencies to cover administrative costs, the marijuana tax will be used to support youth substance abuse and prevention programs, economic development, medical marijuana research, and to research the implementation and effect of AUMA. Marijuana tax will also be dedicated to the California Highway Patrol for enforcement and to develop standards and programs, including field sobriety testing protocols, and to environmental restoration and protection (Table 4).

The AUMA initiative states that retail marijuana sales will “generate hundreds of millions of dollars annually”[7] to cover the costs of administrating the new law and will provide funds for programs designed to educate and treat substance use disorders in youth. Most of the first money, however, is allocated to programs that prioritize marijuana businesses rather than to programs that would prevent marijuana use and reduce consumption, likely increasing the external costs associated with marijuana legalization, such as increased healthcare spending (Table 4). The program that receives the most funding is the Governor’s Office of Business and Economic Development that will reach $50 million in 2023 to invest in economic development and job placement for communities affected by “past federal and state drug policies.”[7] The initiative provides $2 million annually to the University of California, San Diego Center for Medicinal Cannabis Research to conduct research on the benefits and adverse effects of marijuana as a pharmacological agent. Other research priorities that will be conducted by

universities in California are discussed below and do not prioritize funding marijuana-related disease research as a basis for future policy.

The AUMA initiative provides $3 million for five years to the California Highway Patrol and law enforcement to develop standards and programs, including field sobriety testing protocols. Given the lack of accurate and reliable chemical tests to determine marijuana impairment,[147, 148] five years might not be sufficient to develop methods to determine marijuana impairment while driving. In Colorado, in which retail sale of marijuana became legal in 2014, regulators are still trying to determine the best way to detect marijuana impairment while driving.[121, 149, 150] While this is an important provision that should be addressed, a more effective approach would be to earmark marijuana tax revenue to a comprehensive marijuana prevention and control program aimed at the general population. Such program would have the effect of preventing marijuana initiation and heavy consumption that would be associated with increased marijuana-related traffic accidents and fatalities.

Earmarked funds to support comprehensive prevention and control programs over time, which are not included in the initiative, will be critical to reduce marijuana prevalence, marijuana-related diseases, and costs arising from marijuana use. A public health framework for legalized marijuana would require that the marijuana tax be at least budget neutral, so as to cover the costs of legalizing marijuana, including marijuana prevention and education, marijuana-related disease research and education, as well as the costs of managing the business aspects of the new marijuana market. The marijuana tax would also need to be high enough to cover health-related costs as a result of increased marijuana use (Table 5). Additional tax increases would be permitted if doing so was determined to be appropriate as a way of reducing marijuana initiation and promoting cessation, as a general revenue source, or both.

While an ad valorem tax is simple to implement, there is no guarantee that it would cover the costs associated with legalizing marijuana in California. In particular, as market prices fall, the revenues generated from the marijuana tax will also fall. As evidenced by the Colorado experience,[151] greater supply likely will drive down the price of marijuana and marijuana products in California. There is also a danger of price manipulation by the marijuana industry.[147] In Colorado, price manipulation has been an issue, in which retailers are increasingly lowering prices to compete with other marijuana retail outlets.[152-154]

The existence of an illicit untaxed market complicates tax policymaking due to concerns that if the marijuana tax is too high it would drive consumers to the illicit market.[155] A comprehensive demand reduction program would probably reduce this problem.

If marijuana-related costs follow the same trajectory as tobacco, then it is likely that the tax will not generate enough revenue to cover administrative costs and healthcare costs to California taxpayers. While the costs of treating marijuana-induced illness is unknown, in 2009, the healthcare costs of smoking in California was $18.1 billion,[156] an amount that would have been much higher without California's comprehensive tobacco control program.[157] For an ad valorem tax to be large enough to cover total costs, it would need to be increased as costs go up, which, if marijuana use increases, are likely to grow faster than inflation.

The fiscal impact estimate reports of the California Legislative Analyst's Office of the two initiatives do not include the economic impact of a retail marijuana market on increasing health care costs for California government or the state as a whole.[158, 159]

AUMA includes marijuana in smokefree laws but with a problematic loophole

The AUMA initiative is strong in that it will prohibit marijuana use wherever smoking or e-cigarette use is prohibited by state or local laws, and grants authority to local governments to adopt smokefree laws stronger than the state. Because the 1995 California statewide smokefree law contained exemptions, marijuana use will be permitted in 65% of hotel/motel guestrooms, banquet facilities and meeting rooms, small businesses (five or fewer employees), designated break rooms, private smoker lounges, warehouses, taxis, long-term health care facilities, and in multi-unit housing,[160] unless these venues are covered under local laws stronger than the state law. The AUMA initiative also creates a problematic loophole that will allow local governments to permit marijuana use in licensed facilities that admit only adults 21 years and older, are not visible to the public, and do not sell tobacco or alcohol. It will also permit smoking in private residences in the 1,000-foot buffer zone "only if such smoking is not detectable by others," which is an unenforceable measure.

Smokefree laws are designed to protect the health and safety of the public from secondhand smoke. They also have the beneficial side effect of decreasing the normalization of tobacco use, and supporting smoking cessation.[79, 162, 163] To accomplish these goals for legalized marijuana, a public health framework would prohibit consumption anywhere combustible tobacco product consumption is prohibited under local and state smokefree laws. Local governments would not be preempted from adopting stronger regulations than the state, and local and state smokefree laws would not contain exemptions for indoor use in hospitality venues, marijuana retail stores, and marijuana clubs.

Both initiatives grant local governments authority to permit marijuana smoking inside marijuana retail stores or marijuana clubs. This provision ignores an important lesson from tobacco control that smokefree bars are particularly effective at protecting workers from secondhand smoke exposure and at denormalizing smoking. For example, employees working in bars and nightclubs with higher ambient nicotine concentrations (because smoking was permitted) have higher levels of nicotine exposure regardless of own smoking status.[161]

If local governments implement laws that would permit marijuana smoking inside marijuana stores or clubs, it will likely negatively impact the working class poor, immigrants, and individuals from communities of color, and will contribute to health disparities. Lower socioeconomic status individuals are more likely to work in establishments that do not have 100% smokefree coverage or circumvent the law through exemptions (i.e. workplaces that employ five or fewer employees).[164] In California, for example, exemptions in the statewide smokefree law disproportionately expose low income workers, Latinos, and young adults to secondhand tobacco smoke in the workplace,[165, 166] thereby contributing to health disparities.[161, 167] In addition, women may be disproportionately impacted by permitting marijuana smoking in hospitality venues because women are overrepresented in the hospitality industry.[168]

This potential loophole also ignores the fact that exemptions in smokefree laws are difficult to amend once the law has been passed.[169] For example, over the last twenty years, the State of California has failed to close important loopholes (as noted above) in the state smokefree law (65% of hotel/motel guestrooms, banquet facilities and meeting rooms, small businesses [five or fewer employees], designated break rooms, tobacco retail stores, private smoker lounges, warehouses, taxis, long-term health care facilities, and multi-unit housing[160]) despite attempts from legislators.[134] This situation highlights the importance of enacting effective measures initially to prevent unnecessary secondhand exposure to the public.

In addition, these exemptions will likely promote consumption and other risky behavior, such as driving while under the influence of marijuana. While allowing for such on-site consumption at marijuana businesses or clubs is based on the view that it will allow for adults to use marijuana in a responsible way, such social use away from home not only creates a risk of increasing overall use but also facilitates marijuana consumption prior to driving home while still under its influence. The reality is that similar to bars failing to promote socially responsible alcohol consumption,[170-172] marijuana retailers with the financial incentive to promote overconsumption will replicate this behavior with marijuana.

The initiative's research program does not prioritize marijuana-induced disease research as a foundation for future policy

The AUMA initiative allocates $10 million annually for ten years to support research conducted by universities in California. The Bureau of Marijuana Control will determine the grant amount, what type of research, and which universities will be funded. Research priorities may include but are not necessarily limited to:

- The University of California, San Diego Center for Medicinal Cannabis Research to conduct research on the benefits and adverse effects of marijuana as a pharmacological agent;
- Marijuana prevalence, maladaptive use among youth and adults, and prevalence of marijuana use disorders;
- Increase or decrease in alcohol or other drug use;
- Impact of treatment for maladaptive marijuana use or effectiveness of treatment programs;
- Public safety issues related to marijuana use;
- Health costs associated with marijuana use;
- Marijuana market prices and illicit market prices;
- Tax structures and rate;
- Economic impact analyses including job creation, workplace safety, revenues, taxes generated for state and local budgets;
- Criminal justice impacts;
- Analyzing regulatory authority of agencies in charge of enforcing the Act and whether other agencies may be more effective;
- Environmental impact;
- Geographic and demographic data of marijuana businesses;
- Outcomes achieved by AUMA to reduce marijuana-related offenses.

As noted earlier, it has already been established that marijuana is a human carcinogen and reproductive toxin[38] and has adverse cardiovascular effects.[37] It is likely that, as marijuana use expands and as more research is conducted, further adverse health effects will be identified and quantified. A public health framework would require continuing support for scientific research to understand the adverse health consequences of marijuana and guide marijuana prevention and control with the goal of preventing and minimizing marijuana use, and mitigating the human and economic costs of marijuana use in California. Research would also include evaluation of the marijuana prevention and control program as a crucial element to inform and assess program performance and impact, and provide government accountability.

Based on the Tobacco Related Disease Research Program created by Proposition 99 and administered by the University of California (based on peer review procedures developed by the National Institutes of Health), a comprehensive marijuana research program, developed by an independent research oversight committee that considers the changing marijuana prevention and control, and marijuana-related disease research environment, would include:

- Collecting surveillance data prior to legalization of retail sales to establish baseline data with which to measure regulatory effort success or failures, and to adjust future policy to protect the public health;
- Marijuana initiation and prevalence, impacts of marijuana use trends on tobacco, alcohol, and illicit drug use, and safety and health risks, including secondhand and third-hand exposure, and dual use of marijuana with other substances;
- Trends in abusive, heavy/regular use compared to intermittent use;
- The full range of adverse health effects, including increased risks of marijuana addiction, particularly during adolescence, increased and earlier risk of psychosis with heavy use of high-potency marijuana, the effects of exposing young brains to the substance such as long-lasting changes in brain function, accidental poisoning, cancer, pulmonary, cardiovascular, and reproductive effects;
- The public health risk of driving while under the influence of marijuana, including vehicle and other accidents caused by marijuana use;
- Taxation policies on initiation and prevalence, including related effects on health status, morbidity, mortality, and medical savings as well as efficiency of the tax system in deterring tax evasion;
- Identifying and countering industry efforts to undermine local and state initiatives that support marijuana prevention and control;
- Effect of marketing, advertising, packaging, and labeling on marijuana use, abuse, and initiation by underage persons, nonusers, and former users; and
- Market research data on the marijuana industry.

Based on the funding for the Tobacco Related Disease Research Program, a marijuana research program funded at $85 million annually (based on the $43.9 million allocated to TRDRP in 1989[173]), adjusted annually for inflation, would likely allow timely accomplishment of these goals.

While addressing some of the research issues relevant to public health, AUMA fails to include other topics that are critical to gain a comprehensive understanding of the evolving

effects of legalizing marijuana on population health. Experience from Colorado, in which marijuana retail sales were legalized prior to the public health department receiving funding to conduct marijuana surveillance and prevention research,[122] highlights the need to fund surveillance research prior to legalization. Without such data, it is impossible for public health officials and researchers to establish baseline data with which to measure regulatory effort successes or failures, or to adjust future policy to protect public health. In addition, the initiative ignores the high rates of dual tobacco and marijuana use and associated risk of nicotine and marijuana dependence,[60, 174] as an important part of its research program.

The initiative's marketing and advertising restrictions fail to prevent underage exposure or heavy and regular use

The advertising and marketing restrictions in AUMA prohibit the use of cartoon characters, giveaways, and advertising on billboards located on an "Interstate Highway or State Highway which crosses the border of any other state." The signage requirements for marijuana licensees prohibit advertisements within 1,000 feet of schools and playgrounds. Event sponsorship, payments to promote marijuana in movies, and branded merchandise will be permitted as long as these promotions are not "specifically designed to appeal to certain demographics." There are no requirements that discounted offers and coupons be prohibited. Advertising on broadcast, cable, radio, print and digital communications will be permitted as long as 71.6% of the audience is "reasonably expected to be 21 years or older" based on audience composition data. Any individualized or direct digital advertising or marketing through email, the internet, and mobile devices will be required to use a method of age verification (e.g. user confirmation or birth date disclosure; Section 26151(c)), which is modeled on voluntary codes for digital direct marketing established by the alcohol industry that have failed to reduce underage minors' exposure to alcohol advertising and marketing.[23] Advertising and marketing restrictions will not apply to noncommercial speech.

Prohibiting advertising and marketing is one of the most effective tobacco and alcohol control interventions to protect the public from industry strategies having the effect of or known to target youth and young adults.[175-178] A public health framework for retail marijuana would prohibit the use of cartoon characters, event sponsorship, product placement in popular media, and branded merchandise. It would also prohibit giveaways, free samples, coupon redemption, distributing coupons in public areas, and distributing ads or coupons to underage people. Marijuana advertising would be prohibited on television, radio (where tobacco products have been prohibited from advertising since 1971), billboards, public transit, and restricted in print and digital communications (e.g., internet, social media, text, and other new-age advertising platforms) with 15% as the maximum underage audience composition for permitted advertising (roughly the percentage of minors over the age of 12 but under the age of 21).[24]

There are at least eight problems with the advertising and marketing restrictions that will limit the AUMA initiative's ability to prevent underage (defined as under 21 years old) and other vulnerable group exposure to marijuana company advertising and targeted marketing.

1) While cartoon characters and giveaways are prohibited, marijuana advertising on billboards will be permitted as long as they are not on an "interstate highway or state

highway which crosses the border of any other state." It is unclear whether this will mean that billboards are only illegal on interstate highways or on state highways that cross into other states, or if they are both illegal. A public health framework would protect underage persons and vulnerable populations from exposure to advertising by explicitly prohibiting a licensee from advertising or marketing marijuana, marijuana products, or marijuana accessories using outdoor advertising, including billboards and outdoor stadium signs.

2) All advertising is prohibited within 1,000 feet of a "school," which is defined as grades K-12 (Section 26152(g)). Even though the initiative makes it illegal to use or sell to anyone under 21, the definition of "school" does not include community colleges or universities where a substantial fraction of the students are under age 21. A more consistent rule with the stated intent of AUMA to prevent underage initiation would be to prohibit all advertising within 1,000 feet of a school, community college, or university, recreational center or facility, public park, library, or game arcade, malls, movie theaters, or in a public transit vehicle or public transit shelter; and on or in a publicly owned or operated property, similar to Washington State's advertising restrictions.[179]

3) It will be legal for marijuana companies to promote their products through payments to movie productions and through branded merchandise. For years, tobacco companies have used product placement in movies[180, 181] and tobacco-branded merchandise (i.e. baseball cards, clothing apparel, backpacks, etc.) as a strategy to indirectly target youth and young adults who would otherwise be less susceptible to smoking initiation.[16] Tobacco company promotional activities cause the onset and progression to smoking among teenagers and young adults.[182] Owning alcohol-branded merchandise is also positively associated with underage alcohol initiation,[183-185] and binge drinking among adolescent never drinkers.[186] In Colorado, without specific restrictions prohibiting branded merchandise, an entire marijuana apparel industry has developed,[31, 32, 187] which likely will lead to serious public health consequences including increased underage appeal toward marijuana companies and their products. Preventing this situation from developing for marijuana in California would require marketing to be defined as "any promotional activity used to sell or encourage use of marijuana or marijuana products, including but not be limited to product placement in the media, branded merchandise (i.e. hats, t-shirts, backpacks or other merchandise that contains a company logo), free product samples, brand name sponsorships, and gifts in exchange for proofs of purchases", and to prohibit these forms of promotional activity.

4) Marijuana marketing, including but not limited to, sponsorship of sporting events and point of sale advertising, will be prohibited only if it is "specifically designed" to appeal to certain demographics. Event sponsorship will also be permitted as long as at least 71.6% of audience is "reasonably" expected to be 21 years of age or older. Language such as "calculated to" or "designed to" is problematic for public health because it requires a marijuana company to admit intent to market to or target underage persons. As is the case with the tobacco companies manipulating public

health regulations through industry lawyers,[18, 126, 188, 189] marijuana companies may challenge these restrictions, arguing that they did not "intend" to market to or target underage persons, even if in effect their marketing practices led to underage use. A public health framework would replace the words "calculated to" or "designed to" with "known to" or "has the effect of" attracting underage persons (Sections 26150(b), 26150(e), 26151(b), 26152(e), 26155).

5) The stated intent of the drafters of AUMA is to "prohibit the marketing and advertising of nonmedical marijuana to persons younger than 21 years old or near schools or other places where children are present." Effectively operationalizing this intent would require that marijuana licensee sponsorships of all events including entertainment events (not just sporting events) be prohibited, unless they are adult-only events (defined as 21 and above). The initiative does not include such a provision.

6) Digital advertising is prohibited but is not clearly defined (Section 26151(b)). Effective public health legislation would define digital advertising explicitly and include, but not be limited to, text messaging, Instagram, Facebook, pop-up ads online, mobile ads or apps or other new-age advertising platforms in which those under 21 might download or use.[24, 190-192]

7) There is an explicit exception for labels and coverings affixed to marijuana packages that will allow advertising on packaging (like inserts) and may be effective as point-of-sale advertising (Section 26150(b)(1)).

8) There is an explicit exception for editorials and news releases in magazines and newspapers, in which third parties, for example public relations firms, will be permitted to write "news pieces" that, are actually ads for marijuana and marijuana products (Section 26150(b)(2)). Additionally, the provision that exempts noncommercial speech (Section 26155(b)) from advertising and marketing restrictions will exclude testimonials written by public relations firms or other third parties (i.e., industry trade groups) that would have the effect of promoting marijuana use.

Experience with tobacco and alcohol control provides a strong public health rationale for requiring the threshold for underage exposure be reduced from 28.4% to 15%, as the 28.4% (100%-71.6%) threshold is an ineffective measure that permits companies to advertise and market their products in media outlets where youth are more likely to be exposed.[23, 24] For example, a 2000 study found that *Sports Illustrated* had the highest number of tobacco and alcohol advertisements whereas *Rolling Stone* had the highest number of alcohol advertisements.[120] (For comparison purposes, *Rolling Stone's* audience under age 18 is twice that of *Time* magazine[193]). Similarly, researchers at the Center on Alcohol Marketing and Youth at Georgetown University found that youth (12-20 years old) were exposed to 45% more beer and 27% more spirits advertisements than legal drinking-aged adults.[194] The AUMA initiative's advertising and marketing restrictions will permit marijuana companies to place advertisements where youth are likely to be exposed, and possibly more likely to be exposed than adults.

The way to protect youth most effectively and prevent advertising that encourages excessive or abusive use (while still allowing advertising to legal adult customers), would be to allow retail marijuana advertising only inside licensed, adult-only retail outlets that sell retail marijuana and marijuana products (with some text-only signage allowed outside to inform adult buyers that they can purchase such products there). In addition, tax deductions for advertising and marketing would not be allowed in order to increase costs of marijuana company promotional activity.

An additional tool to protect underage people and vulnerable populations from marijuana industry targeted marketing tactics would be to have in place a comprehensive set of sunshine disclosure policies. Through sunshine disclosure laws, marijuana companies would be required to report to the California Department of Public Health all paid advertising expenditures, price discounting and incentives, promotional allowances, payments to retailers and wholesalers, and contributions to elected officials.[195] The CDPH would create reports of the data collected from marijuana companies and these reports would be required by law to be publicly available.[196] These laws are important to promote government transparency (e.g., political campaign contributions) and to discourage industry payments to professionals (e.g., pharmaceutical industry payments to physicians). Additionally, these laws are an important strategy to address and reduce health disparities by removing access, as evidenced by tobacco and alcohol company marketing practices,[197] to key marketing tools that would target underage persons, low income groups, and communities of color.

The AUMA initiative is strong in that it prohibits marijuana companies from advertising or marketing their products using false or misleading health-related statements or claims. These claims may include that the product has therapeutic benefits; all advertising will be required to be "truthful" and "appropriately substantiated" (Sections 26154 and 26151(d)).

The AUMA initiative fails to include other important restrictions that would prevent marijuana companies from using marketing claims to increase the appeal and safety of their products. Marijuana companies will be permitted to market their products as "natural" or "less harmful" than other marijuana, tobacco, or alcohol products. Marijuana and marijuana products with a "certified organic designation" will not be required to include an additional warning statement that informs the consumer that the product is not safe or safer than other marijuana products because it is organic. Tobacco companies use similar marketing claims on tobacco products (e.g. Natural American Spirit uses descriptors such as "additive-free" and "organic"), which are often rated by young people and smokers as more appealing and less harmful than products without these descriptors.[198, 199]

One way to prevent the likelihood that marijuana companies would take advantage of the weak language for restrictions on health-related messaging, would be to require that all advertising and marketing statements and claims be evidence-based and approved by the Department of Public Health, including claims about the product improving sex, energy, sleep, weight reduction, vitamin supplements, among other health-related claims that would increase product appeal.

The initiative's product standards do not protect consumers

Under the AUMA initiative, product standards will be based on voluntary codes established by industry organizations rather than independent public health agencies, whose primary mission is protecting public health. AUMA prohibits the sale of marijuana and marijuana products that exceed the minimum level of contaminants set forth by the American Herbal Pharmacopoeia, an herbal product industry organization[200] that creates herbal product industry standards, reviews traditional and scientific data, and publishes this information in monographs and other materials for public and commercial distribution.[201] These contaminants include residual solvents, butane, propane, and poisons, toxins, or carcinogens, such as methanol, isopropyl alcohol, methylene chloride, acetone, benzene, toluene, and trichloroethylene. The toxic chemical, nicotine, is not included.

AUMA prohibits the sale of marijuana and marijuana products that exceed the level of residual volatile organic compounds of the voluntary standards established by the United States Pharmacopeia, a nonprofit organization that includes members of the pharmaceutical, food, and dietary supplement industries[202] that, in collaboration with stakeholders including industry representatives, sets national standards for the strength and quality of drugs, food, and dietary supplements. Licensed testing facilities would be required to follow standard methods set forth by the International Organization for Standardization (ISO) for testing and calibration activities including marijuana and marijuana product sampling, rather than the Department of Public Health.

As is the case with tobacco companies influencing tobacco product standards that are antithetical to public health, it is likely that industry representation in these organizations will result in standards that prioritize commercial interests over public health. The standards established by the ISO for tobacco and tobacco products have failed to protect consumers' health and safety, largely due to the tobacco companies' role in influencing ISO standard methods to measure tar and nicotine levels.[199] The tobacco companies, through the industry-dominated Cooperation Center for Scientific Research Relative to Tobacco (CORESTA), pushed industry-friendly tests and scientific evidence to establish ISO standard methods that yielded lower tar and nicotine levels than those actually present in cigarettes. The flawed measurement permitted the cigarette companies to market their products using specific health claims (e.g. "mild" or "light"), suggesting these products were safe or had a reduced risk of harm. Tobacco companies have also claimed their products were "less toxic", "natural", or "additive-free", among other misleading claims that would lead consumers to perceive their products were safe.[198, 199, 203, 204]

A public health framework would provide the CDPH with the power to enact strong potency limits and product quality testing for marijuana products, with a clear mission to protect public health. The CDPH would set a maximum THC per serving size level using evidence-based recommendations for new users, with packaging indicating individual single servings and a maximum amount per package. The CDPH would be permitted to change these amounts based on the available and emerging evidence. The independent advisory committee would advise the Legislature on how to create tax incentives for producers to create less potent products. Additives that would increase potency, toxicity, or addictive potential, or that would create unsafe combinations with other psychoactive substances would be prohibited. In addition to

additives prohibited by the CDPH, marijuana and marijuana products would not include nicotine, alcohol, caffeine or other chemicals that increase the carcinogenicity, cardiac effects, or other toxicity when consumed as intended, as well as flavors that appeal to underage persons.[205-207] Products that contain dangerous contaminants such as residual butane and other solvents, and other chemicals not safe for consumption or inhalation would not be approved. Marijuana companies would be required to submit applications to the CDPH prior to marketing or selling new marijuana products.

Under the AUMA initiative, the marijuana product safety requirements are inadequate to minimize public health harms. There are no limitations on how many servings may be in a single marijuana product. The AUMA initiative's serving size THC level is twice the maximum limit recommended by the Oregon Retail Marijuana Scientific Advisory Committee to the Oregon Health Authority, which is that marijuana and marijuana products contain 5 mg of THC per serving (recommended amount for new users[208]) and each package be limited to a maximum of 10 servings (10 x 5 mg = 50 mg per package).

The maximum THC per serving size level of 10 mg of tetrahydrocannabinol (THC) per serving is written into the initiative and, so, cannot be easily changed as new information on the effects and toxicity of marijuana and marijuana products accumulates. The Legislature will be able to adjust THC per serving amounts; however, as noted above the Legislature has failed to close important loopholes in the state smokefree law. It has also failed to increase the cigarette tax in 23 years (last cigarette tax increase was $0.10 per pack in 1993), despite evidence-based research that supports tobacco tax increases to deter youth initiation and minimize consumption.[209-211]

While the AUMA initiative mandates that products will be required to be contained in childproof containers, there is the potential that marijuana companies would take advantage of the weak language for product regulations. The requirement for marijuana and marijuana products states that products may not be "designed to be appealing to children or be easily confused with commercially sold candy or foods that do not contain marijuana." Because the intent of design is hard to determine and prove, an enforceable public health standard would replace "designed to" with "have the effect of" or "is known to be" appealing to children or easily confused with non-marijuana candy or food products.

As discussed above, the CDPH will be required to develop product and testing standards consistent with voluntary codes set by industry organizations, which are unlikely to be strong enough to protect public health. Marijuana companies will be permitted to increase marijuana's potency and addictiveness through other addictive substances (nicotine, alcohol, or caffeine) or other additives that would make marijuana more toxic when inhaled, or palatable through flavors. From experience in tobacco and alcohol control,[16, 28, 113, 212] flavoring agents that enhance palatability create products that largely appeal to youth and young adults.[213] New age products, such as e-cigarettes, also use flavoring agents in liquid nicotine that are attracting youth and young adults to these products.[214, 215] The initiative also fails to prohibit the use of other additives or ingredients that would mislead consumers into perceiving marijuana products as less harmful or beneficial (e.g., by adding vitamins or nutrients) or address fire safety.

The initiative's marijuana labeling requirements will not deter underage persons from initiating marijuana or fully inform adults

The AUMA initiative requires marijuana to include the following warning label, in bold and capitalized print:

> "GOVERNMENT WARNING: THIS PACKAGE CONTAINS MARIJUANA, A SCHEDULE I CONTROLLED SUBSTANCE. KEEP OUT OF REACH OF CHILDREN AND ANIMALS. MARIJUANA MAY ONLY BE POSSESSED OR CONSUMED BY PERSONS 21 YEARS OF AGE OR OLDER UNLESS THE PERSON IS A QUALIFIED PATIENT. MARIJUANA USE WHILE PREGNANT OR BREASTFEEDING MAY BE HARMFUL. CONSUMPTION OF MARIJUANA IMPAIRS YOUR ABILITY TO DRIVE AND OPERATE MACHINERY. PLEASE USE EXTREME CAUTION."

For concentrates, edibles, or topical products containing marijuana or marijuana concentrates and other ingredients, the warning label adds the statement: "THE INTOXICATING EFFECTS OF MARIJUANA PRODUCTS MAY BE DELAYED UP TO TWO HOURS."

Requirements, including for label placement or font size, will be established by the Bureau of Marijuana Control or the California Department of Public Health. Both the Bureau and the CDPH will have authority over developing standards for child resistant packaging, and over requirements for labels to include information on serving size and amount of THC per serving size. The warning label is required to be included on all marijuana and marijuana products, and packaging, including inserts. It is not clear which regulatory agency will establish these regulations or how the standards will be developed.

The warning label under the AUMA initiative is modeled on the warning label for alcohol products, which has been found to be ineffective at communicating health messages on the specific health risks of alcohol consumption to the public.[216-219] There are at least six specific problems with this warning label.

1) The language is written at a very high reading level not familiar to the general public[220] (e.g. marijuana is a "Schedule 1 controlled substance" and "Qualified patient"), and is not presented in terms that will communicate effectively to low literate adults.[221, 222] Based on the Flesch-Kincaid readability test, the AUMA warning label is on the reading level of high school graduates (Flesch-Kincaid Grade Level: 10.1) and the average grade level across several tests for the AUMA warning is 9.8. Health information directed toward the general public should aim for a grade level of around 6-7 as per National Institutes of Health recommendations.[223]
2) The presence of "GOVERNMENT WARNING" at the beginning of the warning label is likely to weaken or effectively communicate the health message to the public. Tobacco companies strongly oppose unattributed warnings as they may strengthen the anti-smoking message on their products.[224] Further, the use of all text and capital letters reduces readability.[225, 226]

3) At 65 words long, it includes too much information, and is six times longer than the NIH recommended word limit (10-15 words) for health-related materials for the general public.[223, 227]
4) The warning only mentions one (i.e., harmful for pregnant and breastfeeding women) of several already-known adverse health effects associated with marijuana use, including cardiovascular impairment,[37, 41, 42] respiratory problems,[42] long-lasting detrimental changes in brain function, and elevated risks of mental health disorders (e.g., anxiety, mood, and psychotic).[42]
5) The warning does not include positive messaging (e.g. health or economic benefits) to encourage marijuana users to quit.[228]

While the AUMA initiative requires the warning label be included on all marijuana and marijuana products, and packaging, including inserts, it fails to require warning labels be prominently displayed on all advertisements and marketing materials.

Large graphic warnings and plain packaging are proven strategies to reduce tobacco use, discourage nonsmokers from initiating, and encourage smokers to quit,[229-232] and have become the global standard adopted widely outside the United States.[232-236] While federal law preempts the authority of states and localities to implement these policies for tobacco (and the FDA has not successfully issued regulations to do so), there are no statutory restrictions on California implementing such policies for marijuana.

A public health framework for retail marijuana would ensure that health warning labels follow state of the art packaging requirements for tobacco products used in other countries around the world, including Canada, Australia, Brazil, and Uruguay.[232-235] A public health framework for marijuana regulations would require warning labels on marijuana and marijuana products be large, prominently featured, and contain imagery in addition to text. Warning labels would provide clear, direct, and accurate information to the user of health risks associated with marijuana use and with exposure to secondhand marijuana smoke. Public health messages would include increased risk for addiction,[42] cancer, reproductive toxicity, cardiovascular disease, [37, 41, 42] respiratory,[42] and neurological problems (long-lasting detrimental changes in brain function[42]) and would warn against driving a vehicle or operating equipment. The labels would be large (at least 50% of packaging) on front and back, and not limited to just the sides.[237]

The language in the labels would be simple, at a reading level appropriate for the audience, including low literacy adults who are at greatest risk. Warning labels would include graphic images that provide factual information on the health risks associated with using marijuana as an intervention to prevent initiation and promote quitting. There would be several rotating warning labels that would be updated regularly, as new scientific evidence becomes available, to prevent “burn out” of stale warning labels.

The California Department of Public Health should have complete authority over packaging of marijuana and marijuana products. This authority should explicitly include, which the initiative does not, the option of requiring plain packaging. Plain packaging could contain graphic images of the specific health risks of marijuana use similar to those required for cigarettes in Australia and other countries,[235, 238] or could also be required to have a plain color

(i.e. such as the color of a brown paper bag), a standardized small and simple font for the brand name, and no graphics.

Given the extensive research on the effectiveness of plain packaging, or packaging with graphic health warning labels to reduce and prevent tobacco use,[229-232] it is unlikely that the warning labels under AUMA will protect the public by preventing underage initiation, overconsumption in adults, or accidental ingestion.

The regulatory commission that ReformCA establishes is dominated by industry representatives who will likely prioritize protecting business over protecting health

Although the AUMA and ReformCA initiatives share many of the same provisions for regulating retail marijuana in California, there are some important differences. (AUMA is more prescriptive but the general provisions are similar.) Rather than granting existing public agencies jurisdiction over marijuana, ReformCA creates a new California Cannabis Commission as the single rulemaking body to develop marijuana regulations for health education programs, research, licensing, marketing and advertising, products, packaging, and labeling standards. Five of the seven appointed members of the 13-member Commission are required to be from the marijuana industry and one from organized labor; public health is not represented (Table 2). Such industry domination of the California Cannabis Commission would almost certainly prioritize business development over protecting public health.

The California Cannabis Commission would have authority over regulations for retail marijuana licensees, including time, place, and manner restrictions, and over restrictions on the number and types of licensees.

Given its membership, it is unlikely that it would establish strong product regulations or state of the art packaging and labeling requirements similar to tobacco products to discourage and prevent marijuana use. Indeed, there is nothing preventing the Commission from establishing regulations that would permit highly potent or products designed, like modern cigarettes, to maximize addictive potential.

ReformCA does not include dedicated funds to any specific health program and, most important, there are no earmarked funds for marijuana prevention and control programs. It is unlikely that the Commission would create a robust, anti-marijuana campaign to counter marijuana company advertisements and marketing on television, radio, and the internet.

The ReformCA initiative allows marijuana consumption in most public places, including indoors in restaurants, bars, and marijuana retail stores.

Although ReformCA permits local governments to adopt regulations on public consumption, and location and operating hours for marijuana retailers stronger than the state, local governments are preempted from other important aspects of regulating marijuana commercial activity.

A local government would not be able to prohibit cultivation, production, testing, distribution, or retail licenses unless the action was approved by a majority of voters in an election.[239] Requiring a direct popular vote creates a substantial economic and political barrier that will discourage local jurisdictions from quickly addressing new problems and issues with legal marijuana marketing, sales and use as they arise. It also imposes substantial costs on local governments or citizens to hold an election and mount a campaign to assert local control, something that will almost certainly be opposed by moneyed marijuana interests.

RECOMMENDATIONS

The BRC and TEROC recommendations, combined with this analysis, define a framework for legalizing marijuana in a way that ends the criminal justice problem that the War on Drugs created, while simultaneously creating a policy and social environment that will prevent initiation, reduce consumption, and preserve the hard-fought gains of tobacco control. The following are broad recommendations, some included in the AUMA initiative, for regulating marijuana within a public health framework for California, and other jurisdictions considering legalizing its sale and use.

Regulatory Agencies

- The goal of the lead regulatory agency should be to develop regulations for marijuana in a public health rather than business framework to reduce the impact of marijuana on public health by preventing initiation, reducing consumption, and encouraging marijuana users to quit.
- The California Department of Public Health should be the lead regulatory agency of the retail marijuana market, with the Department of Food and Agriculture, Department of Consumer Affairs, and the Board of Equalization playing subsidiary roles in their specialty areas.
- The CDPH should develop regulatory language for manufacturing, marketing and distribution of marijuana and marijuana products, establish product standards appropriate to protecting public health, including requiring marijuana companies to submit detailed applications prior to marketing or selling new marijuana products.

Marijuana Advisory Committee

- The priority for the advisory committee should be to guide marijuana regulation and education to protect public health.
- The independent advisory board should be similar in structure to the Tobacco Education Research and Oversight Committee, and consist of public health practitioners and researchers specializing in marijuana prevention and control.
- The committee should not contain any industry representatives; there should be strong conflict of interest standards for committee membership to prevent the creation of an industry similar to the tobacco industry.

Licensing

- The licensing system should be an integral part of enforcing public health regulations, including prohibitions on underage sales and regulations regarding product characteristics and purity.
- Licensing requirements should prohibit private license transfers, and prohibit entities from holding more than one license.
- Licensing fees should be established and periodically reviewed to ensure that they are adequate to cover administration and enforcement costs.

Sales to People Under 21

- The goal of the retail sales laws should be to reduce the appeal and prevent initiation of marijuana and marijuana products in underage persons.
- The initiatives should maintain the requirement that the minimum-age to purchase or sell marijuana be 21 years old or above.
- No one under minimum age should be allowed in any store that sells marijuana, including the staff.
- Retailers should be held to a strict standard for requesting and inspecting age identifications, and specify that government-issued photo ID is required for age verification.
- Compliance checks should be routinely conducted, and retailers who provide marijuana to minors should be subject to license sanctions that include license suspensions and revocations.
- Licensing restrictions should control retailer density and require licensed facilities to be prohibited within 1,000 feet of schools, parks, libraries, pharmacies or health care facilities. and other young adult and vulnerable population-sensitive locations, and be required to be at least 1,000 feet from other retail licensed locations.
- The definition of a “school” should be extended to include educational establishments where at least 75% of the population are younger than 21 to include colleges and universities.
- Marijuana should not be sold in pharmacies or health care facilities.
- Marijuana should not be sold where tobacco or alcohol products are sold.
- Vending machines, self-service displays, coupons including digital coupons, promotions, discounts, sale of flavored products and other offers that would encourage underage initiation should be prohibited.
- Electronic commerce such as internet, mail order, text messaging, and social media sales should be prohibited.
- Only face-to-face transactions with robust age-verification should be allowed.
- Local governments should not be preempted from adopting stronger regulations than state law, including additional annual licensing fees and penalties for noncompliance.

Unitary Marijuana Market

- To simplify regulation and education and protect against marijuana industry manipulation of inconsistency between medical and retail markets, the medical market should be eliminated.
- All legal marijuana sales should be through the unified retail market.

Health Education and Prevention

- The goal of the marijuana prevention and control program should be to create a social and legal environment in which people do not consider marijuana use socially acceptable, and should be modeled on the California Tobacco Control Program.
- Both the new California Marijuana Control Program and the existing California Tobacco Control Program should coordinate efforts to address and reduce high levels of dual and crossover use of the two products.
- Local governments and health agencies should be given wide authority to implement marijuana prevention and control efforts, with technical training and assistance provided by the state.
- There should be an adequately funded and aggressive media educational campaign (paid radio, television, billboard, print advertising, internet and social media) that includes an advertising campaign to counter marijuana advertising, as well as public relations for general market and population-specific communities, with the goals of preventing initiation and minimizing marijuana consumption.
- The marijuana prevention and control program should be supported with earmarked funds of at least $340 million annually (adjusted annually for inflation) from marijuana tax revenues.

Marijuana Tax

- The marijuana tax should be set at a level that is at least high enough to cover (together with annual licensing fees) the costs of administration, enforcement, the marijuana prevention and control program, and the marijuana education and research program.
- The tax (and licensing fees) should be reviewed and increased annually to, at a minimum, adjust for inflation based on the Consumer Price Index of the Bureau of Labor Statistics.
- Additional tax increases should be permitted (with funds going to the General Fund after the costs of running the marijuana-related programs) if doing so is determined to be in the public interest, including using tax as a way of reducing marijuana initiation and promoting cessation.

Smokefree Laws

- Inhaled marijuana should be included in all state and local smokefree laws, including marijuana consumed using e-cigarettes and marijuana aerosolizers, and other similar devices.
- All marijuana retail stores and marijuana clubs should comply with smokefree legislation.

Research Program

- Research priorities should include reducing the prevalence and social acceptability of marijuana use, investigating the health risks and benefits of marijuana use, and monitoring marijuana industry activities.
- The research program should begin prior to legalization or retail sales to allow collecting surveillance data to establish baseline data with which to measure regulatory effort successes or failures, and to adjust future policy to protect the public health.
- Research should include monitoring, surveillance, and evaluation of the marijuana prevention and control program.
- An independent oversight committee without industry representatives should develop research priorities and evaluate priorities based on the changing marijuana prevention and control and marijuana-related disease research environment.
- Initial research priorities should include but not be limited to marijuana use rates (poly-product use), secondhand smoke exposure, and other safety and health risks; potential adverse effects; taxation policies; identifying and countering industry efforts to undermine marijuana prevention and control; and marijuana market research data.
- Research should be supported with earmarked funds of at least $85 million annually (adjusted for inflation) from marijuana tax revenues.

Marketing and Advertising

- The goal should be to minimize exposure to marijuana marketing and advertising among the general population in order to decrease the number of nonusers or former users from initiating use, and to increase the number of current users to quit.
- Advertising should be limited to the interior of licensed, adult-only marijuana retail stores.
- The threshold for underage audience composition data should be no greater than 15% for any pro-marijuana advertising on television, internet, radio, or print.
- Sponsorships, coupons, giveaways, discounted offers, and promotional items with marijuana brands or logos (hats or t-shirts) should be prohibited.
- Advertising on TV, radio, internet, social media, text messaging, and other digital platforms should be prohibited.
- Tax deductions for advertising and marketing should not be allowed.
- Sunshine disclosure policies should be in place, in which marijuana companies are required to report price discounting and incentives, promotional allowances, payments to retailers and wholesalers, and contributions to elected officials.
- Marijuana companies should be prohibited from marketing their products as “natural” or “less harmful” than other marijuana, tobacco, or alcohol products.
- Marijuana and marijuana products with a “certified organic designation” should be required to include an additional warning statement that informs the consumer that the product is not safe or safer than other marijuana and marijuana products because it is “certified organic designated.”
- Advertising and marketing statements and claims should be evidence-based and approved by the Department of Public Health.

- Marketing claims about the product improving sex, energy, sleep, weight reduction, vitamin supplements, among other health-related claims that would increase product appeal should be prohibited.

Product Regulations

- Product standards should be set by the California Department of Public Health with a specific mandate to protect public health.
- The California Department of Public Health should set a maximum THC level per serving and per package based on evidence-based research supportive of public health and review this standard periodically in light of accumulating scientific evidence.
- No marijuana sales should be permitted until such standards are issued.
- Marijuana companies should be prohibited from adding any addictive and psychoactive substances such as nicotine, alcohol, and caffeine to marijuana and marijuana products.
- Marijuana companies should be prohibited from adding other additives that would make marijuana more toxic when inhaled.
- Marijuana companies should be prohibited from using flavorants, palatability enhancers, vitamins, or additives that increase underage appeal.
- The initiative should set deadlines for when regulations that deal with implementation of the law need to be promulgated.

Marijuana Warning Label and Packaging Requirements

- The California Department of Public Health should develop warning labels based on international best practices for warning labels on tobacco products.
- The goal of the warning label should be to inform consumers of the potential harms of using marijuana and marijuana products.
- Warning labels on marijuana and marijuana products should be large (at least 50% of packaging) and on both front and back, prominently featured, and contain imagery in addition to text.
- Warnings should reflect current and emerging evidence on the adverse health risks of marijuana use and secondhand exposure risks including cancer, reproductive toxicity, cardiovascular disease, and neurological problems (i.e., long-lasting detrimental changes in brain function).
- The language in warning labels should be simple and appropriate for low literacy readers.
- There should be several different warnings that rotate.
- Warnings should be updated periodically to reflect the latest scientific knowledge of health effects and to prevent warning “burn out.”
- The California Department of Public Health should have authority over packaging of marijuana, marijuana products, and marijuana accessories including the option of requiring plain packaging.
- Packaging should be childproof to prevent accidental ingestion.
- Marijuana product labels should contain serving size and the amount of THC per serving.

Local Control

- There should be no preemption of local authority in any area of marijuana regulation.
- Local governments should be allowed to exercise, within their jurisdictions, as much additional control as they desire over regulating the retail marijuana industry, including cultivation, production, distribution, licensing (including not licensing) marijuana businesses, sales, use (including smokefree laws), and marketing/advertising.
- Local governments should be preempted from adopting less stringent laws than the state.

These proposed changes to the two marijuana legalization initiatives would not only reduce public health harms and risks from the passage of either initiative, but would also still allow for the legalized market to out-compete the illicit market. The recommended changes would not increase government costs and would likely provide savings to taxpayers who otherwise would have to pay for the adverse consequences and health-related costs of a less regulated marijuana market.

CONCLUSION

California has been a global leader in tobacco control, and this leadership has resulted in hard won lessons regarding the importance of strong and comprehensive regulation to protect public health. Any marijuana regulatory framework that is approved for California should not only create policies that are consistent with and support California's tobacco control efforts, but also should incorporate the lessons from tobacco and alcohol control successes and failures, to proactively create sensible and necessary regulations, oversight, and enforcement, related to the production, sale, taxation, and marketing of retail marijuana, to minimize underage initiation and reduce population prevalence. One of the most important lessons from the California tobacco control experience is that, to minimize the likelihood that California will exchange a criminal justice failure for a public health failure, a robust marijuana prevention and control program modeled on the evidence-based California Tobacco Control Program, must be established at the same time. Such a program would be able to successfully counter the activities of a burgeoning marijuana industry that may work to thwart public health regulations in order to protect and increase its profits.

Table 1: Comparison of Recommendations in the *Blue Ribbon Commission's Pathways Report: Policy Options for Regulating Marijuana in California*[1] *and the Tobacco Education and Research Oversight Committee's Public Comment on Marijuana Regulation in California*[2] with the *Control, Regulate, and Tax Adult Use of Marijuana Act of 2016 (AUMA)*[3] *and the Marijuana Legalization. Initiative Statute 2016 Ballot Initiative (ReformCA)*[4]

Recommendation	BRC	TEROC	AUMA	ReformCA
Regulatory Agencies				
Primary regulatory agency in charge of controlling the industry and overseeing implementation	Mentioned† (p.20)	Department of Public Health	Department of Consumer Affairs	Department of Consumer Affairs
Marijuana Advisory Committee				
Independent board appointed by Governor or Legislature	Mentioned† (p.21)	Yes**	No***	No
Public health researchers and academics with experience in marijuana prevention and control	No	Yes	No	No
Marijuana industry or organized labor affiliation?	No	No	Yes	Yes
Licensing Requirements				
Requires licenses for each part of the supply chain	Yes	Yes	Yes	Mentioned (p.13)
Prohibits private license transfers	No	No	No	No
Prohibits entities from holding more than one license	No	No	No	No
Prevention of Sales to People Under 21				
Protect local control	Yes (p. 23)	Yes	Yes	No
Require retailers be licensed with fees that cover costs of administration and enforcement	Yes (p. 88)	Yes	Mentioned[5] (p. 37)	Yes (p.16)
Restrict sales to 21 and older	Yes (p. 25)	Yes	Yes	Yes (p.5)
Require ID verification at point of sale	Yes (p. 25)	Yes	No	No
Require marijuana retailers be prohibited within 1,000 feet from underage-sensitive areas		Yes	No[6]	No[6]
Prohibit vending machine sales, self-service displays, with vendor assisted only sale	No	Yes	No	No
Unitary Marijuana Market				
Maintain dual systems	Mentioned † (p.34)	No	Yes[7]	Yes[7]
Health Education and Prevention				
Media campaign	Yes	Yes	Limited[8] (p.40)	No
Aimed at general population?	Yes (p. 68)	Yes	No	No
Harms of marijuana	Yes (p. 68)	Yes	Mentioned (p. 40)	No
Reducing secondhand smoke exposure	No	Yes	No	No
Countermarketing highlighting marijuana industry marketing tactics	No	Yes	No	No
Motivating marijuana users to quit and providing free services	No	Yes	No	No
Harms and consequences of driving while under the influence of marijuana	Yes (p. 68)	Yes	Yes (p. 40)	No
Potency education	Yes	No	No	No
Adverse effects on environment	Mentioned† (p. 70)	Yes	No	No
Community-based education				
Reflects cultural and ethnic diversity	Mentioned† (p.10, 68)	Yes	No	No
Tailored to specific populations (LGBT, African American, young adults) to address health disparities	Mentioned† (p.10)	Yes	No	No
School-based education				
Emphasized?	Yes (p. 27)	No[9]	Yes (p. 48, 49)	Yes (p.10, 11)
Treatment	Yes (p. 27)	Yes	No	No
Surveillance				
Underage and adult prevalence	Yes (p. 26)	Yes	Mentioned	No

			(p. 47)	
Dual use	Yes (p. 26)	Yes	No	No
Underage sales	Yes (p. 64)	Yes	No	No
Marijuana Tax				
Tax based on THC level and not based on weight	Mentioned† (p. 51)	Yes	No	No
Dedicate portion of tax to prevention, surveillance, and research	Yes (p. 26)	Yes	No	No
Smokefree Laws				
Protect local control	Yes(p. 18)	Yes	Yes (p.38)	Yes (p. 18)
Prohibit marijuana use wherever tobacco smoking is prohibited	Yes(p. 25)	Yes	Yes (p. 6-7) [10, 11]	No
Wherever e-cigarettes are prohibited	Yes	No	Yes (p.7)	No
Research Program				
Related to marijuana use, both occasional and frequent, and with other substances (tobacco, alcohol, and other drugs)	Yes (p.64)	Yes	Mentioned[12] (p. 47)	No
Safety and health risks (poison control center calls, cardiovascular, respiratory and brain development)	Yes (p.65)	Mentioned †	Yes	No
Market research on resulting marijuana industry	Yes (p.64)	Yes	Mentioned[12] (p. 47)	No
Marketing and Advertising				
Prohibit advertising appealing to underage persons	Yes (p. 74)	Yes	Yes (p.34, 35)	Mentioned[14] (p. 15)
Prohibit advertising on billboards, television, radio	Yes	No	No[13]	Mentioned[14] \(p. 15)
Prohibit marketing to minors	Yes	Yes (p. 36)	Yes	No
Prohibit cartoon characters	Yes (p. 42)	Yes	Yes (p. 35)	No
Prohibit marketing within 1,000 feet of underage-sensitive areas	No	Yes	No[6]	No[6]
Prohibit free sampling, sport and cultural event sponsorship	Mentioned† (p. 46)	Yes	No	No
Prohibit coupons	Mentioned† (p. 46)	Yes	No	No
Prohibit payments to promote marijuana in movies	No	Yes	No	No
Product Standards				
Require 5mg maximum THC level per serving size	No[15]	No	No	No
Require 50mg maximum THC level per package	No[15]	No	No	No
Marijuana Labeling and Packaging				
Child resistant packaging	Yes (p. 25)	Yes	Yes (p. 32)	Mentioned (p. 15)
State of the art health warning labels based on tobacco	Mentioned † (p. 25)	Yes	No[16]	No
Local Control				
Cultivation/Production	Yes	Yes	Yes	No[17]
Taxation	Yes	Yes	Yes	No
Sales	Yes	Yes	Yes	No
Marketing and Advertising	Yes	Yes	Yes	No
Smokefree	Yes	Yes	Yes	No[10]
May prohibit any licensed marijuana business	Yes	Yes	Yes	No[17]

[1] Newsom G, Soltani A, Humphreys K. Pathways Report: Policy Options for Regulating Marijuana in California. Blue Ribbon Commission on Marijuana Policy: July 22, 2015. https://www.safeandsmartpolicy.org/wp-content/uploads/2015/07/BRCPathwaysReport.pdf.
[2]Tobacco Education Research Oversight Committee. Public Comment on Marijuana Regulation in California: July 17, 2015. https://tobacco.ucsf.edu/sites/tobacco.ucsf.edu/files/u9/TEROC%20Letter%20to%20Blue%20Ribbon%20Commission.pdf
[3]Sutton, M. The Control, Regulate, and Tax Adult Use of Marijuana Act of 2016: November 2, 2015. https://oag.ca.gov/system/files/initiatives/pdfs/15-0103%20%28Marijuana%29_1.pdf? Also known as the Adult Use of Marijuana Act or AUMA.
[4]Jones, D. Huffman, A. The Marijuana Legalization. Initiative Statute: October 5, 2015. https://oag.ca.gov/system/files/initiatives/pdfs/15-0075%20%28Marijuana%29.pdf? We are defining this initiative as the ReformCA initiative.
† Mentioned in report, but not recommended.
**Yes indicates provision or recommendation was included
***No may indicate that provision or recommendation was considered and rejected, or not addressed at all
[5]Fees established by the regulatory authority shall set an amount that will fairly and proportionately generate sufficient total revenue to cover costs
[6]Both initiatives require licensees shall operate businesses within 600 feet of a school. AUMA initiative prohibits advertising of marijuana within 1,000 feet of schools but not marketing and does not prohibit point-of-sale advertising
[7]Marijuana businesses with both a medical and retail license may permit persons 18 years or old with a valid identification card and a government-issued identification card on premises and may sell marijuana products and accessories to a person 18 years or older
[8]The initiative does not include a mass media campaign to educate the public on the adverse effects of marijuana legalization, use, or secondhand exposure. The Controller shall disperse the 60% of the leftover tax revenue into the Youth Education, Prevention, Early Intervention and Treatment Account to fund peer-run outreach and education to reduce stigma, anti-stigma campaigns, and community recovery networks
[9]For further information on TEROC's recommendations on engaging youth and young adults in tobacco control education and activities appropriate for their age, interests, and skills see Objective 5: Prevent Youth and Young Adults from Beginning to Use Tobacco in *Changing Landscapes: Countering New Threats. The 2015-17 Master Plan of the Tobacco Education Research Oversight Committee for California* (p. 61-64). California Department of Public Health: January 2015. http://cdph.ca.gov/services/boards/teroc.
[10]A local jurisdiction may permit indoor use of marijuana (combustible, aerosol, or edible) in licensed facilities (retailers or microbusinesses) if it is restricted to 21 years and older, not visible to the public, and prohibits sale of alcohol or tobacco. Food or non-alcoholic beverages not included in this provision
[11]By March 1, 2018 the Division of Occupational Safety and Health shall convene an advisory committee to evaluate whether there is need to develop industry-specific regulations, including but not limited to, whether specific requirements are needed to address exposure to second-hand marijuana smoke by employees at facilities where on-site consumption of marijuana is permitted and shall present its findings to the Bureau of Marijuana Control by October 1, 2018 for the Bureau to take specific action, if any.
[12]The Controller shall distribute an annual sum of $10,000,000 to public and private universities in California selected by the Bureau on Marijuana Control to fund research for the purpose of: Impact on public health, increase or decrease in alcohol or other drug use; impact of treatment for maladaptive marijuana use or effectiveness of treatment programs; public safety issues related to marijuana use; marijuana prevalence, maladaptive use among youth and adults, and prevalence of marijuana use disorders; marijuana market prices, illicit market prices, tax structures and rate, economic impact analyses including job creation, workplace safety, revenues, taxes generated for state and local budgets, and criminal justice impacts; analyzing regulatory authority of agencies in charge of enforcing the Act and whether other agencies may be more effective; environmental impact; geographic and demographic data of marijuana businesses
[13]Prohibits advertising on billboards that does not cross a state or interstate highway but does not on broadcast, cable, radio, print and digital communications as long as 71.6% of the audience is reasonably expected to be 21 years or older as determined by reliable, up-to-date audience composition data
[14]ReformCA initiative grants the California Cannabis Commission authority to place reasonable controls on advertising, safety restrictions, testing requirements, labeling, child-proof packaging, limits on dosage strengths
[15]TEROC does not address maximum THC requirements per serving or per package in its recommendations but the State of Oregon Department of Public Health's Retail Marijuana Scientific Advisory Committee recommended this standard based on the experiences of Colorado and Washington where maximum THC levels are 10 mg per serving and 100 mg per package as a more appropriate public health standard[208]
[16]Warning label does not include information on the health risks of firsthand or secondhand smoke, or that secondhand marijuana smoke contains chemicals known to the State of California to cause cancer
[17]Local governments may prohibit any type of marijuana business only through majority vote through initiative, may not prohibit indoor cultivation for personal use, or prohibit transportation of marijuana through jurisdiction

Table 2: Comparison of the Tobacco Oversight Committee to AUMA Advisory Committee and ReformCA Regulatory Body			
	Tobacco	**AUMA**	**ReformCA**
Name	Tobacco Education Research Oversight Committee	Determined by the Director of the Department of Consumer Affairs	California Cannabis Commission
Type	Advisory	Advisory	Regulatory Body
Specific Mandate	Advises the Legislature and Administration on the effectiveness and priorities of California's tobacco control program and tobacco policy	Guides the Bureau and the licensing authorities in developing standards and regulations that would protect public health while not imposing "unreasonably impracticable" regulations to perpetuate the black market.	Adopts, amends and rescinds rules and regulations over entire marijuana regulatory system
Agency Oversight	Department of Education and Department of Public Health, University of California Tobacco Related Disease Research Program	Department of Consumer Affairs Bureau of Marijuana Control, and Department of Food and Agriculture and Department Public Health	Office of Cannabis Regulation
Number of members	13	Determined by the Director of Department of Consumer Affairs	13
Determination of membership	Appointed by the Governor (8), Speaker of the Assembly (2), Senate Rules Committee (2), and Superintendent of Public Instruction (1)	Appointed by the Director of the Department of Consumer Affairs (all members)	Appointed by the Governor (3), the Speaker of the Assembly (2), Senate Rules Committee (2), and Ex Officio/Designated (6)
Membership requirements	Dedicated to reducing tobacco use or tobacco-related disease, and/or must be from professional education or from local health department	No specific requirements; members may include but not be limited to marijuana industry representatives, labor organizations, public health experts, state and local agencies, and the Department of Alcoholic Beverage Control	Substantial experience in public health and medical marijuana (1), public policy and medical marijuana (1), environmental best practices for marijuana cultivation (1), medical cannabis patient or advocate (1), producing or providing medical marijuana (1), organized labor (1), law enforcement (1)
Defined public health representation?	Yes	No	No
Industry representation?	No	Yes	Yes; at least five required

Table 3: The AUMA Initiative Licensing Classification System		
Type	**Specific Requirements**	**Specific Restrictions**
Cultivation		
Type 1	Specialty outdoor; Small	Outdoor cultivation using no artificial lighting of less than or equal to 5,000 square feet of total canopy size on one premises, or up to 50 mature plants on noncontiguous plots
Type 1A	Specialty indoor; Small	Indoor cultivation using exclusively artificial lighting of less than or equal to 5,000 square feet of total canopy size on one premises
Type 1B	Specialty mixed-light; Small	Combination of natural and supplemental artificial lighting at a maximum threshold to be determined by the licensing authority, of less than or equal to 5,000 square feet of total canopy size on one premises
Type 2	Outdoor; Small	Outdoor cultivation using no artificial lighting between 5,001 and 10,000 square feet, inclusive, of total canopy size on one premises
Type 2A	Indoor; Small	Indoor cultivation using exclusively artificial lighting between 5,001 and 10,000 square feet, inclusive, of total canopy size on one premises
Type 2B	Mixed-light; Small	Combination of natural and supplemental artificial lighting at a maximum threshold to be determined by the licensing authority, between 5,001 and 10,000 square feet, inclusive, of total canopy size on one premises
Type 3	Outdoor; Medium	No artificial lighting from 10,001 square feet to one acre, inclusive, of total canopy size on one premises
Type 3A	Indoor; Medium	Indoor cultivation using exclusively artificial lighting between 10,001 and 22,000 square feet, inclusive, of total canopy size on one premises
Type 3B	Mixed-light; Medium	Combination of natural and supplemental artificial lighting at a maximum threshold to be determined by the licensing authority, between 10,001 and 22,000 square feet, inclusive, of total canopy size on one premises
Type 4	Nursery	Cultivation of retail marijuana only; size not specified
Type 5	Outdoor; Large	Outdoor cultivation using no artificial lighting greater than one acre, inclusive of total canopy size. Cannot be issued before January 1, 2023; after that date may apply for a Type 6, 7, 10 license; cannot hold a Type 8, 11, or 12 license
Type 5A	Indoor; Large	Indoor cultivation using exclusively artificial lighting greater than 22,000 square feet, inclusive, of total canopy size on one premise. Cannot be issued before January 1, 2023; after that date may apply for a Type 6, 7, 10 license; cannot hold a Type 8, 11, or 12 license
Type 5B	Mixed-light; Large	Combination of natural and supplemental artificial lighting at a maximum threshold to be determined by the licensing authority, greater than 22,000 square feet, inclusive, of total canopy size on one premise. Cannot be issued before January 1, 2023; after that date may apply for a Type 6, 7, 10 license; cannot hold a Type 8, 11, or 12 license
Manufacturer		
Type 6	**Level 1:** Production using nonvolatile solvents, or no solvents	After January 1, 2023 may apply for a Type 5, 5A, or 5B license
Type 7	**Level 2:** Production using Volatile solvents	After January 1, 2023 may apply for a Type 5, 5A, or 5B license
Testing		
Type 8	Test marijuana products for chemical composition compared to labeled content and for contaminants	Cannot hold licenses in any other stage of production
Retailer		
Type 10	Retail sale and delivery of marijuana products	May not hold a Type 5, 5A, or 5B license
Distributor		
Type 11	Distribution of marijuana and marijuana products	After January 1, 2023 may apply for a Type 5, 5A, or 5B license
Microbusiness		
Type 12	Cultivation, level 1 manufacturer, distributor, and retailer	Cultivation of marijuana on less than 10,000 square feet; may not hold a Type 5, 5A, or 5B license

Table 4 Dedicated Funds, Amounts, and Purpose for Programs under AUMA	
Account	Amount (millions)
Health Education	
Youth Education, Prevention, Early Intervention, Treatment Account to fund youth and school-based interventions for substance use disorder education and treatment	60% of leftover revenue
Business Development	
Governor Office of Business and Economic Development to fund programs to invest in economic development and job placement	$10 million annually, increasing each year by $10 million until 2023 when it is $50 million annually
Research	
University of California, San Diego Center for Medicinal Cannabis Research to fund research on the benefits and adverse effects of marijuana as a pharmacological agent	$2 million annually
Public universities or universities in California to fund research and evaluate implementation and effect of AUMA	$10 million until 2029 (for ten years)
Medical Services	
No dedicated funds	$0
Public Safety	
Department of California Highway Patrol to provide funding to develop field sobriety protocols for marijuana-related intoxication	$3 million until 2023 (for five years)
State and Local Government Law and Enforcement Account to fund training, prevention, and education programs for driving while under the influence of alcohol and other drugs	20% of leftover revenue
Public Resources	
Environmental Restoration and Protection Account to fund cleanup and restoration of environmental damages in watersheds affected by cultivation, including damage that occurred prior to legalization	20% of leftover revenue
Regulation and Implementation	
To cover administrative and enforcement costs, and costs incurred for performing duties imposed by AUMA	Unknown
To cover administrative costs of tax collection	Unknown but no greater than 4% total annual taxes received

Table 5: Marijuana tax revenue needed to cover costs associated with marijuana legalization	
Purpose of the Program	Amount (millions)
Health Education	
Marijuana prevention and control program to fund media campaign and community-based initiatives	$258 million
Research	
University of California (for grant making to eligible organizations) to fund marijuana-related disease research and education	$82 million
Medical Services	
To fund medical services associated with increased consumption of marijuana and marijuana products	Unknown
Public Resources	
To fund environmental restoration and protection programs associated with cultivation	Unknown
Regulation and Implementation	
To fund administration, enforcement, licensing, and operating costs associated with legalization	Unknown
Total Estimated Costs	At least $340 million
[1]Based on funding to the Health Education and Research Accounts of the 1988 Proposition 99 Tobacco Tax and Health Protection Act in 2015 dollars[173]	

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