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Preferences on cigarette plain packaging among adults who smoke and adults who do not smoke: a discrete choice experiment in Chile

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ABSTRACT

Background Chile has one of the highest smoking prevalence rates in the Americas, particularly among women, yet plain packaging legislation has been repeatedly blocked in Parliament over the past decade.

Methods An online discrete choice experiment (DCE) was conducted with 1029 participants (731 adults who smoke and 298 who do not). Each choice set presented three packages varying in price, packaging design (branded or plain), stick design (branded or with warnings) and origin (licit or illicit), plus an opt-out option. A latent class model was used to identify distinct preference groups.

Results Among adults who smoke, two classes were identified. Class I (40% membership) was price-sensitive for both licit and illicit packages and preferred plain over branded packaging and sticks with health warnings over branded sticks. Class II (60%) was not significantly price-sensitive, preferred branded packaging and branded sticks and showed a negative preference for illicit packages over not smoking. Among adults who do not smoke, two classes were also identified: one preferring branded packaging and sticks, and the other showing no significant preference for design attributes. Combining a 50% price increase with plain packaging and warning sticks reduced predicted package uptake among adults who smoke by 7.7 percentage points (−12.0 for licit and +4.2 for illicit).

Conclusions The study demonstrates that a combination of price-based and packaging-focused policies is crucial for effective tobacco control. Because distinct consumer groups respond differently to interventions, implementing both price increases and design-based warnings is necessary to achieve a broader reduction in tobacco consumption.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The WHO Framework Convention on Tobacco Control recommends cigarette plain packaging as a cost-effective tobacco control measure, and a growing body of international evidence, including studies from countries that have implemented the policy, confirms its effectiveness in reducing the appeal of smoking and increasing the impact of health warnings. However, the implementation of this policy in many low- and middle-income countries, including Chile, has been challenging due to political and industry-related obstacles.

WHAT THIS STUDY ADDS

⇒ This study is the first to use a discrete choice experiment to provide detailed, quantitative evidence from Chile on how different segments of adults who smoke and adults who don't respond to a combination of price, plain packaging and warning sticks. It specifically demonstrates that a one-size-fits-all approach is ineffective, as some individuals are more sensitive to price, while a distinct class responds more to visual cues, such as packaging and stick design.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings provide direct evidence in support of adopting plain packaging legislation in Chile. They suggest that a multifaceted approach combining both price increases and non-price measures, such as plain packaging and warning labels on sticks, is an effective strategy to reduce smoking. The research highlights the importance of a nuanced policy approach that targets diverse consumer motivations to achieve substantial public health benefits.

INTRODUCTION

The global prevalence of tobacco use among individuals aged 15 and older has fallen from 32.7% in 2000 to 20.9% in 2022.[1 2] Despite this decrease, tobacco consumption remains among the leading Level 2 risk factors for deaths worldwide.[3] This reduction aligns with the introduction of tobacco control policies under the WHO Framework Convention on Tobacco Control (FCTC), which are strongly associated with lower smoking rates among youth and increased cessation among adults.[4] In 2007, only 45 countries had implemented at least one measure of the WHO FCTC; by 2024, that number had increased to 155 countries.[2 5]

The WHO FCTC recommends implementing MPOWER measures, which are policies proven to be cost-effective, encompassing taxes, health warning labels, advertising restrictions, designated smoke-free zones, plain packaging and additional initiatives.[6] The mandatory implementation of plain packaging for tobacco products continues to be among the least executed measures.[7] Plain packaging aims to diminish the appeal of tobacco products, augment the visibility and efficacy of health warnings and eradicate tobacco packaging as a

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medium of advertising, promotion and disseminating misleading information.[7 8] Australia was the first country to implement mandatory plain packaging in 2012,[9] and by 2025, 27 countries had approved its implementation.[10]

Although a growing body of evidence supports the effectiveness of plain packaging,[11 12] a gap remains between the evidence and the policies adopted by low- and middle-income countries.[12] Research indicates that plain packaging discourages tobacco use by minimising misleading designs, enhancing the impact of health warnings, preventing packages from serving as promotional tools, increasing warning prominence, raising attempts to quit, diminishing perceived taste and making tobacco products less appealing, particularly to potential individuals considering initiation.[12–15] Studies employing discrete choice experiments (DCE) to evaluate preferences for cigarette packaging have revealed that plain packaging correlates with a lower intent to purchase products, reduced attractiveness and heightened risk perception among adults who smoke and adults who don't.[16–18]

Beyond the package itself, evidence indicates that printing health warnings directly on cigarette sticks reduces their appeal and increases quit intentions among adults who smoke, while decreasing the likelihood of smoking initiation among adolescents and young adults.[19] Canada and Australia were the first countries to require warnings on every individual cigarette, implemented in 2024 and 2025, respectively.[10]

While plain packaging has now been implemented in 27 countries, its adoption in Latin America has been limited: only Uruguay has introduced the measure (in 2019), and bills considered in Brazil, Chile, Panama and Ecuador have not been approved. Ex-ante evidence on the potential impact of these policies is needed in contexts where they are not yet in force. DCEs offer a method to elicit preferences for product configurations that are not yet available in the market, such as plain packaging and health warnings on cigarette sticks, allowing the simulation of their effects before implementation.

The situation in Chile is particularly noteworthy, as tobacco prevalence was recorded at 42.4% in 2006, prior to the ratification of the WHO FCTC, with rates at 45.1% for males and 39.9% for females among those aged 12–64 years. Following the introduction of several MPOWER policies, this prevalence dropped to 28.6%, with 30% in males and 27.2% in females,[20] still ranking among the highest in Latin America.[21] While the concept of plain packaging has been a topic of discussion in Chile, it has yet to be enacted. This study aims to assess the potential effects of plain packaging and health warnings on cigarette sticks, alongside price changes, on cigarette consumption in Chile. To do so, we conducted an online DCE in which participants chose between cigarette packages varying in price, packaging design (branded or plain), stick design (branded or with health warnings) and origin (licit or illicit) or an opt-out option.

METHODS

Participants and recruitment

In June 2022, the experiment questionnaire was distributed to an online panel of adults who smoke and who don't, overseen by NetQuest, a market research firm. The DCE was administered through NetQuest's online panel. Eligible participants were contacted by email and completed the questionnaire online. The inclusion criterion was being aged 18 or older and residing in Chile. Adults who smoke were defined as those who reported having smoked a cigarette in the month before the experiment.

Table 1 Attributes and levels

Attributes	Licit brand (Pall Mall)	Illicit brand (Jaisalmer)
Package design	Branded	Branded
	Plain	
Stick design	Branded (no warning)	Branded (no warning)
	Warning	
Price*	$2.90	$1.81
	$3.20	$3.02
	$3.51	
	$3.87	
	$4.29	
	$5.14	

*Converted from Chilean peso to US dollars using the June 2022 exchange rate of Chilean peso 827 per US dollars.

Survey

An online stated-choice survey comprising four modules was created to gather individual preferences regarding cigarette package features. The survey first included demographic questions such as age, gender, region and whether the participant had smoked any cigarettes in the past 30 days. Then, participants were presented with an example choice set before answering DCE questions; participants were asked to observe the differences in attributes across alternatives. The DCE consisted of seven choice sets, each comprising three cigarette packages and the option to opt out of smoking. Lastly, further demographic (educational attainment and monthly income) and smoking habits questions (favourite brand, time to first cigarette, perceptions of smoking risk, e-cigarette usage and attempts to quit) were asked.

Discrete choice experiment

The selected attributes and their levels are described in table 1. The attributes correspond to policy instruments available for tobacco control: plain packaging, sticks with health warnings and price (through taxation). Cigarette packages could be either licit or illicit (eg, smuggled); the illicit alternative was included because not all participants perceive these packages as available. Licit packages had three attributes: package design (branded or plain), stick design (branded or with a health warning) and price (six levels). The health warning on the pack had printed 'smoking causes cancer'. Illicit cigarettes only had the attribute of price (two levels), as they do not comply with national packaging policies. The price levels for licit cigarette packages were $2.90, $3.20, $3.51, $3.87, $4.29 and $5.14 (at the exchange rate of June 2022). The price levels of illicit cigarette packages were $1.81 and $3.02. The prices were determined based on the actual price at the time of the experiment, and levels were defined to ensure variability in estimating price preferences.

All licit package brands were Pall Mall, the top-selling brand in Chile at the time of the experiment,[22] while illicit packages consisted of Jaisalmer, the most common illicit brand.[23] All packages shown were 20-cigarette packs.

The DCE aimed to measure the intention to purchase (ITP). Adults who smoke were asked, 'If these were the only options available, which one would you choose to smoke? Option A, B, C or none?' In contrast, adults who don't smoke were asked, 'If these were the only options available, which one would most entice someone like you to smoke? Option A, B, C or wouldn't know'.

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Experimental design

The DCE was divided into two unlabelled designs (Design 1 and Design 2). Each choice set included three package alternatives and one opt-out option. In Design 1, two package alternatives were licit packages, while one was an illicit package. In Design 2, all three package alternatives were licit packages. The two designs were constructed to allow some participants to encounter illicit-origin packages while others did not, reflecting the empirical reality that not every individual has access to cigarette packages of illicit origin. Both scenarios were generated using the Ngene software following a Bayesian D-efficient factorial design. All scenarios were restricted to ensure no choice sets were dominant or unrealistic. Design 1 resulted in 12 choice sets, whereas Design 2 produced six. To minimise cognitive burden, Design 1 was divided into two blocks of six choice sets each (Blocks 1 and 2), and Design 2 was designated Block 3. Each participant was randomly assigned to one of the three blocks.

Additionally, of the six choice sets in each design, a dominant choice set was included to measure participants' consistency and attention. The dominant choice set presented an alternative with a branded package and branded sticks at a lower price and another with a plain package and warning sticks at a higher price. Under typical preferences for branded over plain packaging, branded over warning sticks and lower over higher prices, the branded alternative at the lower price strictly dominates. Each block comprised seven choice sets, including the dominant choice set.

Online supplemental figure S1 presents an example of a choice set, first showing the questions asked to participants and then the options available. Option A presents a licit cigarette package with a plain design and a branded stick. Option B presents a licit cigarette package with a branded package design and a stick with a warning. Option C presents an illicit cigarette package.

Statistical analysis

The choice for cigarette packages was modelled based on the random utility maximisation theory,[24] where an individual's utility is determined by a deterministic component based on the characteristics (attributes) of the goods they choose to consume, plus an unobserved random element. It is assumed that when individuals face a choice of multiple alternatives of the same product, they choose the good that reports the highest utility, which depends on its observable attributes and the random component. Additional details on the specification of the utilities of the alternatives are provided in the online supplemental material section I.

A latent class multinomial logit (LC MNL) of two classes[25] was used to estimate the preference parameters for two classes of individuals with different preferences. Specifications with more than two classes were tested but produced convergence issues, particularly in the smaller sample of adults who do not smoke; the two-class solution was selected on this basis and for clearer interpretability of preferences.

To allow preferences for package and sticks design, as well as for licit-illicit origin packages, interactions of demographic characteristics with package attributes were included: age groups (18–24, 25–54 and 55+) and sex (base male) were interacted with branded package, branded sticks and illicit packages. A specification without these interactions is reported in online supplemental table S4. For adults who smoke, the probability of membership in each class was determined by two smoking behaviour variables: (1) if they attempted to quit last year and (2) if their first cigarette was during the first hour of the day. These variables were chosen as proxies for nicotine dependence and motivation to quit, respectively. For adults who don't smoke, the probability of membership in each class was constant.

To evaluate the impact of plain packaging, warning sticks and price on smoking behaviour, the uptake of cigarette packages based on changes in price, packaging and stick design was predicted using the estimated coefficients. The uptake of cigarette packages is defined as the percentage of choices where respondents select any cigarette package over the opt-out alternative. The uptake of cigarette packages was simulated for when all licit packages had branded or plain packaging, branded sticks or health warnings and for price increases of up to 50%. 95% CIs for predicted uptake were estimated using a bootstrap with 1000 repetitions.

All estimates were performed using the Apollo V.0.3.2 package in the R statistical programme.[26] Respondents who chose to opt out of all choice tasks were excluded from the analysis.

RESULTS

Sample characteristics

The survey included 1029 participants: 731 adults who smoke and 298 who don't smoke. Among those who smoke, 714 were used for the ITP analysis, as 17 selected the same opt-out alternative in all purchase intention questions (2.3%). Among adults who don't smoke, 266 participants were included in the ITP analysis, as 32 selected the same alternative in all purchase intention questions.

The main descriptive statistics for adults who smoke and who don't are presented in table 2. In the sample of adults who smoke, 52% were women, 18.7% were aged between 18 and 24 years, 47.7% were aged between 25 and 44 years, 18.1% were aged between 45 and 54 years, and 15.5% were 55 years or older. Additionally, 53.8% reported having tertiary studies, 32.3% had short-cycle tertiary education, and 14% completed secondary school. Regarding the behaviours of adults who smoke, 21.3% indicated having their first cigarette within the first hour of the day, and 66.2% attempted to quit in the last year. In the sample of adults who don't smoke, 44.3% of the respondents were women, 22.5% were aged between 18 and 24 years, 20.1% were aged between 25 and 44 years, 25.8% were aged between 45 and 54 years, and 31.5% were 55 years or older. Adults who smoke report that their favourite brand is illicit in 5.5% of cases.

Adults who don't smoke present a comparable educational level to the ones who smoke. No significant differences are evident between the total samples and the ITP analysis sample. Online supplemental tables S1 and S2 (adults who smoke and who don't, respectively) present the same demographic variables for the total sample, the ITP sample and for individuals who didn't fail the dominant choice set (non-dominant sample), indicating no significant differences with the samples used for analysis.

Online supplemental table S3 presents the percentage of times each option was chosen. Among the sample of adults who smoke, the most selected option was the branded package with branded sticks, chosen 27.8% of the time. This was followed by the plain package with branded sticks (19.8%), the plain package with warning sticks (18.8%), the branded package with warning sticks (18.4%), the opt-out option (8.4%) and the illicit package (6.8%). The illicit option was the most frequently chosen alternative among adults who don't smoke (27.7%), followed by the opt-out option (21.5%), the branded package with branded sticks (16.8%), the plain package with branded sticks (12.3%),

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Table 2 Sample characteristics*

Variable	Adults who smoke		Adults who do not smoke	
	Total sample	Intention to purchase sample	Total sample	Intention to purchase sample
Gender				
Men (%)	48.0%	47.8%	55.7%	54.9%
	0.50	0.50	0.50	0.50
Women (%)	52.0%	52.2%	44.3%	45.1%
	0.50	0.50	0.50	0.50
Age				
18–24 years	18.7%	19.2%	22.5%	24.1%
	0.39	0.39	0.42	0.43
25–34 years	23.8%	24.1%	8.4%	8.3%
	0.43	0.43	0.28	0.28
35–44 years	23.9%	23.7%	11.7%	12.4%
	0.43	0.43	0.32	0.33
45–54 years	18.1%	18.1%	25.8%	25.6%
	0.39	0.39	0.44	0.44
55 years or older	15.5%	15.0%	31.5%	29.7%
	0.36	0.36	0.47	0.46
Education				
Secondary: complete or incomplete	14.0%	14.1%	14.4%	14.3%
	0.35	0.35	0.35	0.35
Short-cycle tertiary: complete or incomplete	32.3%	32.5%	30.9%	31.2%
	0.47	0.47	0.46	0.46
Tertiary: complete or incomplete	53.8%	53.4%	54.7%	54.5%
	0.50	0.50	0.50	0.50
Smoking behaviour				
Favourite brand is an illicit one (%)	5.5%	5.2%	–	–
	0.23	0.22	–	–
Attempted to quit during the last year (%)	66.2%	66.5%	–	–
	0.47	0.47	–	–
First cigarette during the first hour of the day (%)	21.3%	21.6%	–	–
	0.41	0.41	–	–
Number of participants	731	714	298	266

*Mean in the upper value and SD on the lower value.

the branded package with warning sticks (11.3%) and the plain package with warning sticks (10.4%).

ITP attribute preferences

The estimated ITP coefficients of the LC MNL are presented in table 3 for both adults who smoke and those who do not. The model without demographic interactions is presented in online supplemental table S4; the model with interactions provided a better fit for adults who smoke and is preferred. Among adults who smoke, Class I (40% membership) showed a negative and significant price coefficient for both licit and illicit packages, with a larger (in absolute value) coefficient for the licit price, indicating stronger sensitivity to price from licit packages than from illicit ones. Class I also had positive and significant coefficients for licit and illicit packages over the opt-out alternative, reflecting a preference for smoking over the opt-out option, with a higher preference for licit than illicit. Regarding packaging and sticks, Class I displayed negative and significant coefficients for branded packages and branded sticks, suggesting a preference for plain packaging and warning sticks. In contrast, Class II (60% membership) did not exhibit significant price sensitivity for either licit or illicit packages. Its coefficient for licit packages over opt-out was positive ($p=0.10$), and its coefficient for illicit packages was negative and significant, indicating that licit packages are preferred over opt-out, which is preferred over illicit packages. Class II members reported positive and significant coefficients for branded packages and branded sticks over plain packaging and sticks with health warnings, respectively. Interactions of gender (females over males) with illicit packages and branded packs were non-significant and positive and significant with branded sticks. In contrast, age interactions with illicit packages, branded packs and sticks were non-significant.

Among adults who don't smoke, Class I (44% membership) presented a positive and significant coefficient for the licit package, indicating a preference over the opt-out alternative, whereas the illicit package coefficient was positive and non-significant. Class I coefficients for adults who don't smoke for branded packages and sticks compared with plain packaging and warning sticks were positive and significant at the 95% level. Regarding Class II (56% membership) preference parameters for adults who don't smoke, licit and illicit packages over the opt-out alternative are positive and significant, showing higher preferences for illicit packages. Class II preference parameters for branded packages and sticks were non-significant, indicating no effect from plain packaging and warning sticks. Gender and age interactions with illicit packages, branded packs, and sticks were all non-significant.

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Table 3 Intention to purchase latent class multinomial logit estimated coefficients of adults who smoke and adults who do not smoke

	Adults who smoke						Adults who do not smoke					
	Class I (Probability=0.40)			Class II (Probability=0.60)			Class I (Probability=0.44)			Class II (Probability=0.56)		
Variables	Coeff.	t-ratio	P value	Coeff.	t-ratio	P value	Coeff.	t-ratio	P value	Coeff.	t-ratio	P value
Licit package*	6.404	10.93	0.00	0.554	1.62	0.10	2.498	2.96	0.00	1.570	2.50	0.01
Illicit package*	2.467	4.14	0.00	−2.562	−2.78	0.01	1.689	1.52	0.13	2.827	5.14	0.00
Illicit package*×female†	0.430	1.41	0.16	0.430	1.41	0.16	−0.077	−0.22	0.82	−0.077	−0.22	0.82
Illicit package*×(25≤age≤54)‡	0.513	1.41	0.16	0.513	1.41	0.16	−0.357	−0.79	0.43	−0.357	−0.79	0.43
Illicit package*×(55≤age)‡	0.765	1.60	0.11	0.765	1.60	0.11	−0.329	−0.78	0.43	−0.329	−0.78	0.43
Price licit package	−0.809	−8.96	0.00	−0.002	−0.03	0.97	−0.197	−1.84	0.07	−0.490	−3.70	0.00
Price illicit package	−0.311	−2.92	0.00	−0.070	−0.21	0.84	−0.392	−1.00	0.32	−0.388	−3.09	0.00
Branded package§	−0.872	−3.06	0.00	1.137	4.25	0.00	0.868	2.21	0.03	−0.430	−1.04	0.30
Branded package§×female†	0.198	1.32	0.19	0.198	1.32	0.19	−0.064	−0.23	0.82	−0.064	−0.23	0.82
Branded package§×(25≤age ≤54)‡	−0.200	−0.85	0.40	−0.200	−0.85	0.40	0.093	0.24	0.81	0.093	0.24	0.81
Branded package§× (55≤age)‡	−0.379	−1.39	0.17	−0.379	−1.39	0.17	−0.172	−0.40	0.69	−0.172	−0.40	0.69
Branded stick¶	−0.825	−3.10	0.00	0.536	2.35	0.02	0.597	2.26	0.02	0.090	0.25	0.80
Branded stick¶×female†	0.543	4.35	0.00	0.543	4.35	0.00	0.268	1.22	0.22	0.268	1.22	0.22
Branded stick¶×(25≤age≤54)‡	−0.011	−0.05	0.96	−0.011	−0.05	0.96	−0.257	−0.84	0.40	−0.257	−0.84	0.40
Branded stick¶×(55≤age)‡	−0.386	−1.60	0.11	−0.386	−1.60	0.11	−0.489	−1.32	0.19	−0.489	−1.32	0.19
Probability of Class I membership												
Constant	−0.143	−0.69	0.49	–	–	–	−0.236	−1.26	0.21	–	–	–
Quit attempt in the last year	−0.469	−2.57	0.01	–	–	–	–	–	–	–	–	–
First cigarette after 1 hour	0.041	0.23	0.82	–	–	–	–	–	–	–	–	–
Number of individuals	714						266					
Number of choices	4284						1596					
LL(0)	−5939						−2213					
LL	−4463						−1784					
AIC	8974						3611					
BIC	9126						3730					

LL: Log Likelihood; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion
*Base opt-out.
†Base male.
‡Base 18≤age≤24.
§Base plain package.
¶Base warning stick.

Predicted probabilities of cigarette package uptake

The predicted probabilities of each alternative being chosen following price increases were estimated for two policy scenarios: (1) when all licit package alternatives were branded with branded sticks and (2) when all licit package alternatives were plain with warning sticks. Figures 1 and 2 present the predicted probability analyses for adults who smoke and who don't, respectively.

In the sample of adults who smoke, under policy scenario (1) with no price increase (figure 1A), the average predicted probability of choosing the opt-out option (ie, preferring not to smoke) was 6% of all choices, while 94% of choices were for cigarette packages (91% licit packages and 3% illicit ones). When the price increased by 50%, while maintaining policy scenario (1) (figure 1A), the average predicted probability of opt-out choices rose to 10%; predicted probability for packages decreased to 90%, with some substitution occurring between licit and illicit packages (licit packages dropped to 85%, and illicit packages increased to 6%). When the 50% price increase was combined with policy scenario (2) (figure 1B), the predicted probabilities of opt-out choices increased to 13%, and package choices decreased to 87% (79% licit packages and 8% illicit packages).

For adults who don't smoke, under policy scenario (1) (figure 2A), and no price increase was applied, the average predicted probability of choosing the opt-out alternative was 12% and 88% for any package (64% licit packages and 24% illicit packages). When the price increased by 50% (figure 2A), the predicted probability of opting out increased to 18%, while the predicted packaging choices decreased to 82% (49% licit packages and 33% illicit packages). Finally, under policy scenario (2) combined with a 50% price increase (figure 2B), the predicted probability of opting out increased to 20%, and the predicted probabilities for packages decreased to 80% (44% licit packages and 36% illicit packages).

Compared to policy scenario (1) with no price increase, policy scenario (2) with a 50% price increase raises the predicted probabilities of opt-out choices by 7.7 percentage points for those who smoke (significant at 95%) and 8.2 percentage points for those who don't (non-significant).

DISCUSSION

Results indicate that the brand design of cigarette packages and sticks affects individuals' choices. This should not surprise anyone, given the resources tobacco firms spend on marketing, packaging and stick design, knowing the effect it has on initiation, frequency of use, cessation and other smoking behaviours.[27–29] From an economic perspective, brand design and marketing are relevant tools in tobacco markets, which are dominated by a small number of firms.[30 31] Branding allows firms to differentiate products that would otherwise be closer substitutes and to build and

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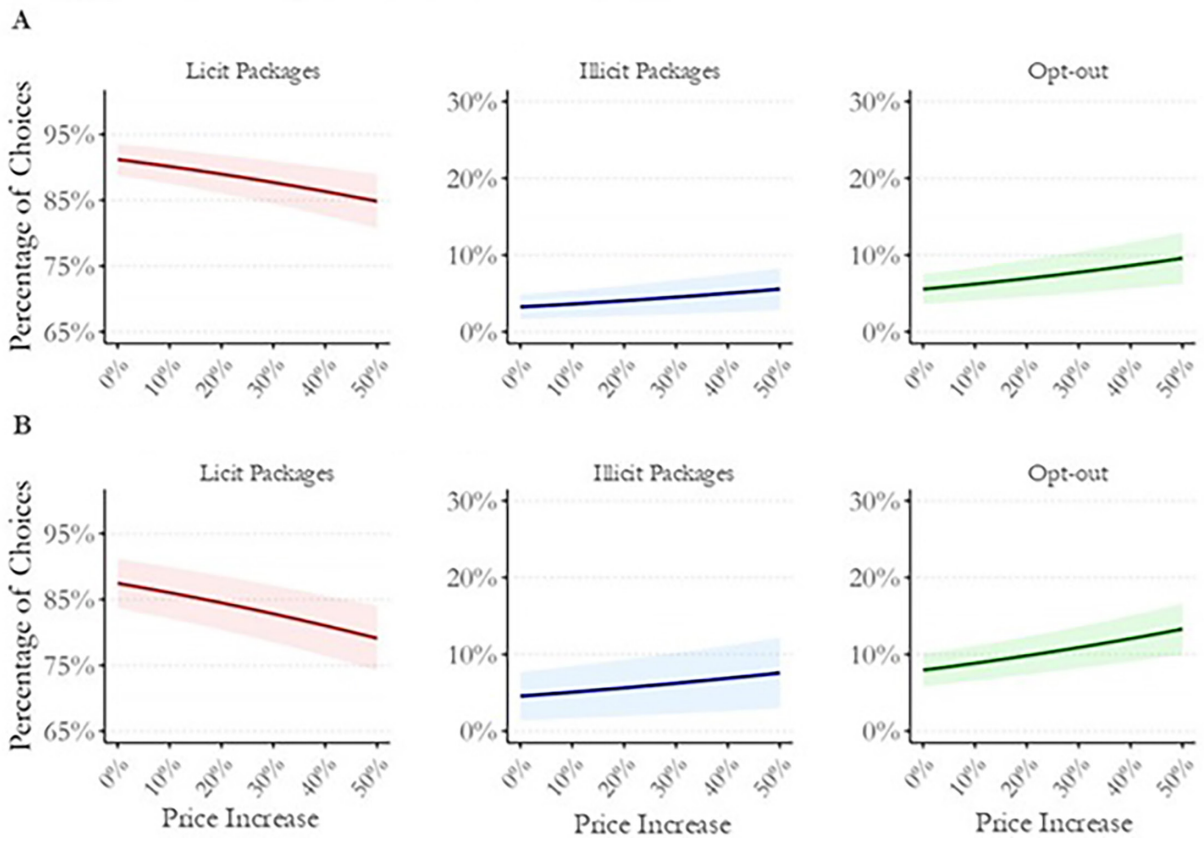


Figure 1 Predicted choices of adults who smoke under price increase and packaging and sticks policies. (A) All licit packages with branded packages and sticks. (B) All licit packages with plain packages and warning sticks. Confidence intervals at 95% confidence level.

sustain market power. From the consumer perspective, branding and visual attributes, such as colours and designs, evoke aesthetic and emotional responses that can trigger impulsive preferences and enhance product appeal. Consequently, when visual attributes are restricted through plain packaging and health warnings on sticks, it can be expected that some adults who smoke will find cigarettes less attractive, potentially reducing consumption and increasing quit attempts. Similarly, adults who don't smoke would be less enticed to initiate.

The present DCE estimated individuals' preferences regarding cigarette attributes such as price, packaging, stick design and package origin (licit or illicit) in Chile. These four attributes can influence choices and are typically regulated by authorities aiming to control tobacco consumption. Taxes and package labelling regulations are among the most cost-effective policies (the 'best buys') to reduce tobacco use.[32]

The results show that for any given package and stick design, cigarette prices are a significant factor in explaining the ITP for both adults who smoke and who do not, as higher prices increase the likelihood of opting out of smoking. This relationship is independent of the design of packages or sticks (ie, it holds for both branded and plain packages and sticks). The negative influence of prices on smoking choices has been well-documented globally and in the Chilean case.[32–36]

The package and stick design also influence choices. The predicted probability results indicate that as prices increase and all options have plain packaging with health warning on sticks, the number of adults who smoke and don't choose any package increases by 7.7 percentage points. Limited substitution is noted between licit and illicit packages; licit choices decline following the simulated tobacco policies, while both illicit and opt-out choices rise. Nevertheless, most adults who smoke express no ITP illicit cigarettes, which raises doubts about the common argument by the tobacco industry and its supporters that regulations push consumers to the illicit market.[34 37 38] The small share reporting an illicit favourite brand is in line with other estimates of illicit trade penetration for the period,[39] although the survey cannot measure it precisely.

The results from the LC model suggest that some adults who smoke are more sensitive to price (Class I), while others place greater importance on branding and 'quality' (Class II). This implies that adults who smoke from Class I are discouraged by pricing policies (eg, tax increases) but not by plain packaging and health warnings on sticks; those from Class II are discouraged by plain packaging and health warnings on sticks but not by price. Thus, isolated pricing or branding policies may not deter all adults who smoke, and comprehensive policies that include pricing, packaging, and stick design may be more effective.

For adults who don't smoke, the LC model showed that both classes prefer the licit package to opting out; Class I does not prefer illicit over opt-out, and Class II prefers illicit packages over licit ones. Also, Class I is less price-sensitive than Class II and prefers branded packages to plain ones. As with people who smoke, some individuals place more weight on price, while others place more weight on branding and design attributes.

Among adults who smoke, preferences for branded sticks over warning sticks were greater in women than in men ($p<0.01$). This is relevant in Chile, where, as in Argentina and Uruguay, female smoking prevalence is particularly high, a pattern linked to women's labour-market participation. Moreover, the tobacco industry has introduced products aimed at women, such as flavoured cigarettes.[40] The stronger female response to stick

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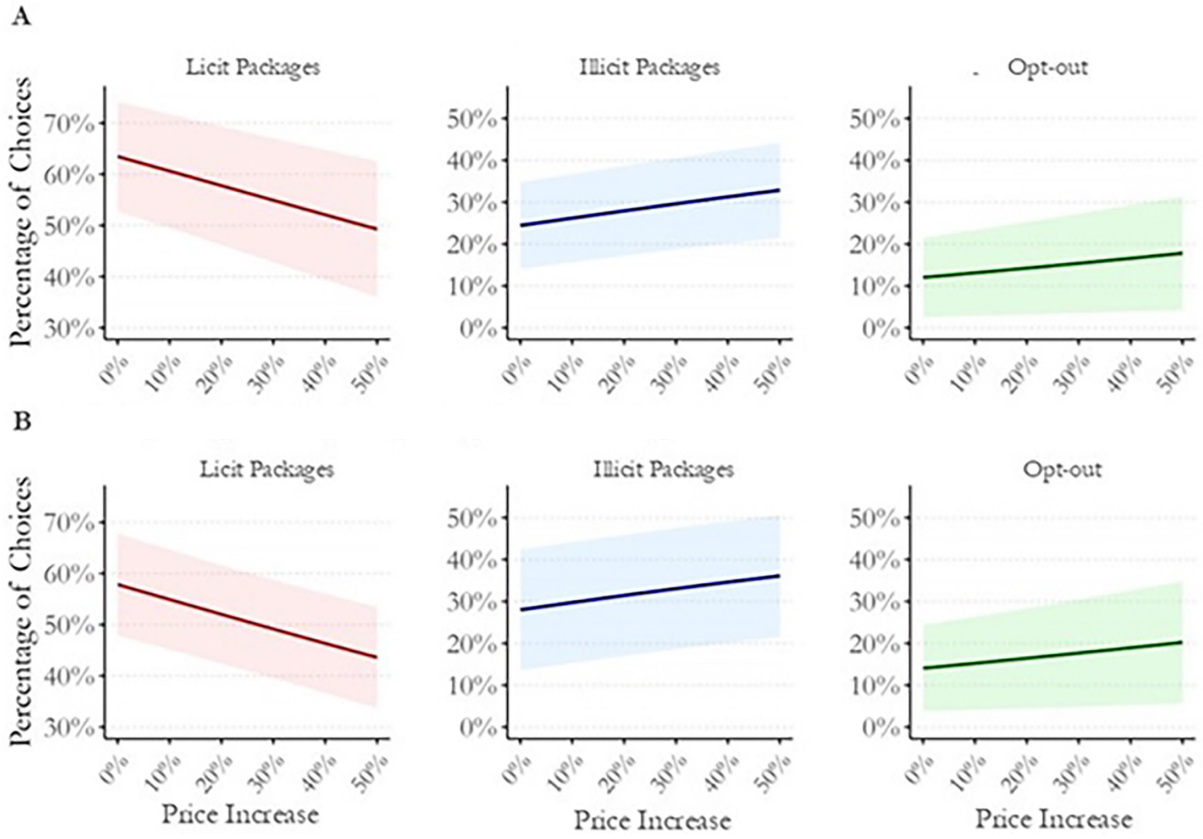


Figure 2 Predicted choices of adults who do not smoke under price increase and packaging and sticks policies. (A) All licit packages with branded packages and sticks. (B) All licit packages with plain packages and warning sticks. Confidence intervals at 95% confidence level.

branding is consistent with this targeting and suggests warning sticks may be a useful lever for this group.

Our results can be compared with DCEs in Colombia and Canada; while the policy and market contexts differ between the countries, some similarities are observed.[16 41] In all three DCEs, ITP falls with price. In Chile and Colombia, adults who smoke also prefer to avoid plain packaging. In Colombia, they valued warning sticks positively rather than being dissuaded by them, similar to the warning-stick preferences of one of our classes. The clearest divergence concerns illicit cigarettes. In Chile and Colombia, adults who smoke avoid illicit packages (in our case, Class II); adults who don't smoke show a stronger preference for illicit packages, possibly explained by unfamiliarity with the illicit market, since adults who do not smoke may not perceive illicit products as riskier. In Canada, by contrast, nearly half of the adults who smoke preferred the contraband option. This reflects price and market structure rather than packaging preferences, since the contraband pack was several times cheaper and Canada's plain packaging was already the law. Across these contexts, ITP consistently responds to price, and in countries without plain packaging, such as Chile and Colombia, plain packaging also determines choices, making price and packaging policies relevant and complementary tools for other countries seeking to reduce tobacco consumption.

Overall, the results support the case for adopting plain tobacco packaging in Chile. Including health warnings on the sticks would also help decrease tobacco consumption, increase cessation and prevent initiation. These effects would be reinforced if tobacco prices/taxes were increased significantly.

Limitations

First, capturing preferences through an online choice experiment implies assuming that individuals elicit their preferences as if they would do it in actual markets. This limitation has been discussed thoroughly in the literature, and it has been found that DCEs tend to provide valid results when participating individuals face decisions in DCEs that are familiar to them.[42] Second, some adults who smoke were asked to select brands they may not prefer (eg, Pall Mall, Jaisalmer), which may influence their choices. In this situation, about 71% of adults who smoke (80% of adults who do not smoke) reported that the brand shown in the experiment did not affect their choices. Third, individuals participating in the DCE may not fully represent populations of adults who smoke and who don't smoke, especially in certain demographic groups that tend to be under-represented in online panels (eg, older adults). The sample composition chosen for the DCE aimed to replicate the distribution of specific attributes in the general population (age, gender and smoking status). However, replicating the distribution of other attributes (educational level, area of residence, etc) proved more challenging.

CONCLUSIONS

The results support Chile's case for adopting plain tobacco packaging, which includes health stick warnings. Rather than competing with other policies, plain packaging would enhance the effect of increasing tobacco prices/taxes on consumption. The existence of illicit cigarettes does not significantly undermine the effectiveness of this policy.

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