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Tobacco industry pricing strategies for single cigarettes and multistick packs after excise tax increases in Colombia

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► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/tobaccocontrol-2022-057333>).

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Received 11 February 2022
Accepted 10 May 2022

ABSTRACT

Introduction Taxes on tobacco products are an efficient way of reducing consumption. However, they are only effective if passed on to consumers with higher prices. This study aims to examine tobacco industry (TI) pricing strategies in response to tax increases, and whether they differ by price segments or presentation (packs or individual sticks) in Colombia. This is the first such academic study in Latin America and the first anywhere to include the market for single sticks.

Methods Using data on cigarette pricing/taxation from a survey of smokers (2016–2017) and official government data on pricing (2007–2019), the TI's pricing strategies were examined, split by brand, price segments, different sized packs and single cigarettes.

Results The TI employed targeted pricing strategies in Colombia: differentially shifting taxes; and launching new brands/brand variants. The industry overshifted taxes when increases were smaller and predictable, but used undershifting more when there was a larger increase in 2017, after which it mostly overshifted on budget and premium (but undershifted mid-priced) brands. The prices for single sticks increased more than the tax increase in 2017 when their consumption also increased.

Conclusion The pricing strategies identified suggest excise taxes can be increased further, particularly the specific component, to reduce the price gap between brand segments. Brands should be restricted to a single variant along with prohibitions on launching new brands/brand variants. Lastly, since the pricing of single sticks does not match the pattern of packs, more monitoring of their sales and distribution is required, especially since they promote consumption and hinder effective implementation of tobacco tax policies.

INTRODUCTION

Higher prices as a consequence of increased tobacco tax are one of the most effective and cost-effective measures available to curb the tobacco epidemic. It has an even greater effect on reducing consumption in low and middle-income countries (LMIC) and among youth.^{1–4} The WHO Framework Convention for Tobacco Control (FCTC) calls for higher taxes and prices for tobacco products in order to reduce tobacco-related morbidity and mortality.⁵ However, it is a relatively underused tobacco control measure,^{6,7} with, as of 2021, only 13% of the world's population living in the 40 countries that meet the WHO's recommendation of taxing at 75% or greater of the retail price of the most popular cigarette brands.^{8–10}

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Tobacco companies use price-based strategies in high-income countries to minimise the impact of taxation, but it is unclear what they do in low and middle-income countries (LMIC), particularly with single sticks.

WHAT THIS STUDY ADDS

⇒ We explore how cigarette prices in Colombia changed between 2007 and 2019, covering both packs and single sticks.
⇒ Taxes were differentially shifted for different price tiers of cigarettes and with the quantity of cigarettes purchased.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE AND/OR POLICY

⇒ The results suggest more work is needed to understand and address tobacco pricing in LMIC contexts, particularly of single cigarettes.

Colombia is one such country where excise taxes on tobacco products fall short of the 75% benchmark.⁹ It scored 3.38 out of 5 on the 2021 Tobacco Economics cigarette tax scorecard which assesses countries' cigarette tax policies in relation to widely accepted best practices.¹¹ This score represents a considerable increase on the 2016 score, 2.38,¹² but shows there is still room for substantial improvement, particularly in cigarette prices and the tax share of price. Indeed, despite several reforms with limited tax increases between 1997 and 2010,¹³ taxation on tobacco remained one of the lowest in Latin America in 2016, while the smoking prevalence was one of the highest at 32.2%, particularly among children aged 13–15 years.^{14–17} In 2016, the nominal price of 20 Marlboro cigarettes was 3872 Colombian pesos (COP\$) (then US\$0.97).^{18,19}

In 2017, as part of a larger fiscal reform, a major excise tax increase on tobacco products was introduced along with an increase in the general value-added tax (VAT).²⁰ The reform doubled the specific component of the excise tax from COP\$700 (US\$0.23) to COP\$1400 (US\$0.47) per 20-stick pack (the ad valorem tax remained unchanged at 10% of the retail price charged to the public), while VAT was increased from 16% to 19% of the base price. The specific tax increased to COP\$2100 (US\$0.74) in 2018, and from 2019, an annual tax escalator was implemented where the specific tax is increased by the country's annual rate of inflation



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To cite: Sheikh ZD, Branston JR, Llorente BA, et al. *Tob Control* Epub ahead of print: [please include Day Month Year]. doi:10.1136/tobaccocontrol-2022-057333

plus four percentage points each year.^{21 22} These changes in tax were expected to substantially decrease tobacco consumption by increasing the retail price of tobacco. However, retail prices are established by the tobacco industry (TI) who do not have to pass on the increased taxes (as it may not align with their profit-making strategies) and hence can (somewhat) mitigate the impact on consumption. In Colombia, the market is essentially contested between the two transnationals, British American Tobacco (BAT; 55% market share according to Euromonitor) and Philip Morris International (PMI; 43%),²³ giving each considerable market, and hence pricing power. Previous research highlights that the TI employs a variety of pricing strategies to undermine tax increases in many countries.^{24–26}

TI pricing tactics are an area of increasing concern worldwide as they weaken the effectiveness of tobacco tax policies. However, relatively few studies have examined the TI's price-based responses to taxation, with the majority from high-income countries (HIC)^{27–30} such as the UK^{31–34} and USA,^{35–41} and a smaller number exploring LMICs.²⁴ In particular, six broad pricing strategies have been identified that are consistently used across different countries: differential tax shifting (both overshifting and undershifting); launching new brand variants/products; product promotions; smoothing prices after a tax increase (ie, avoiding quit-inducing jump in prices via smaller, incremental more frequent adjustments to prices); disguising price increases by reducing the number of sticks per pack (where legally allowed); and changing product attributes or production processes.^{24 31} These TI approaches have not been prominent in taxation discussions in LMICs, where tobacco taxes are relatively low compared with HICs and cigarette affordability is often increasing as a result of income growth. In addition, one particular aspect of concern regarding industry's price-based responses to taxation that has been ignored thus far is around the pricing of single cigarette sticks which is a significant issue in LMICs (although not necessarily entirely controlled by the TI). By obviating the need to buy a pack, the sale of single sticks makes tobacco more affordable, hindering effective taxation policies⁴² while also providing distribution channels for illicit cigarettes. It might therefore provide the TI with an additional avenue to react to, and undermine, taxation.^{43–45} Although it is illegal to sell loose cigarettes in Colombia since it adopted the FCTC's Article 16 in 2009 (which prohibits the sale of loose cigarettes or in small packages), they continue to be sold, especially by a large volume of street vendors. Moreover, there is some anecdotal evidence from Colombia that the TI works closely with retailers, and that they take advantage of and encourage the informal market (where single sticks are sold). Consequently, Colombia represents an interesting market to explore the TI's price-based responses to tax increases with potentially many lessons to learn, especially since no academic study to date (that we are aware of) has considered a Latin American country.

The aim of this study is therefore to address these gaps in knowledge by exploring tobacco pricing in Colombia, including single sticks. To triangulate our analysis, we use two data sources: a survey of the smokers (2016–2017) and official government data on prices (2007–2019). Given the limited studies on the TI's tax pass-through in LMICs and the lack of research on pricing of single sticks (despite their growing rate of sales in multiple countries),^{46–48} this study will be relevant globally.

METHODS

Data sources

The first data source analysed is 'the Demand for Illicit Cigarettes Survey for Colombia' (DEICS-COL), which is a nationally

representative cross-sectional survey of smokers aged 12–65 years carried out in two waves (2016 and 2017) by Fundación Anáas (an independent civil society organisation promoting public health). The 2016 survey was carried out 4 months before a major tax increase in Colombia while the 2017 wave was collected 8 months after. Details of the study enrolment and protocols have been described previously.^{43 49 50} The interviewer-administered survey involved a mix of two methods: smoker's self-report on consumption pattern, brand and last purchase information including pack size, price paid and place of purchase; and interviewer's direct observation of cigarette packs/sticks to validate self-reporting. Each wave contained 1697 respondents.

The second source is national-level average cigarette prices issued twice annually (semester I in December and semester II in June each year) by the National Administrative Department of Statistics (DANE). DANE publishes, for the purposes of identifying the price levels on which the excise duties due, the retail prices for all cigarette brands/brand variants (henceforth brands for simplicity) available in supermarkets,¹⁸ which represents approximately half of the total market. (The remainder of the market is dominated by the informal sector where retail prices will vary more.) For simplicity and consistency, we analysed the semester II data for each year between 2007 and 2019.

Analysis

We explored cigarette pricing from both data sources separately to understand whether tax changes were entirely translated into price changes or they were shifted differentially, that is, undershifted or overshifted or both. We also explored changes to the brands that were available/used. Since our data cover retail prices, we are unable to distinguish between the wholesale pricing behaviours of the TI and any impact that retailers/distributors had with their own pricing decisions. Furthermore, for simplicity, we treated all sales of loose sticks as if they were duty-paid sales because a significant part of this market is the resale of legal, duty-paid cigarettes bought in multistick packs, and which would therefore be impacted by the tax change. Moreover, such an impact would likely also affect the selling price of illicit products via such channels. All prices are reported in COP and were adjusted to real prices by removing the impact of inflation using the World Bank's consumer price index⁵¹ measure of inflation in Colombia, with 2017 chosen as the base year (as the second year of the survey).

DEICS-COL survey

Univariate descriptive analysis was used to characterise trends in cigarette prices, tax changes and, hence, net prices (the industry's earnings from sales once all taxes have been paid). The analyses were conducted using SPSS V.26. Packs were categorised by their number of cigarettes (10, 14, 18 and 20). Cigarette brands were segmented into three hierarchical price categories (economy, mid-priced and premium) by the authors based on the price points in the market over the whole period of the study, following the WHO approach of weighted-average price tertiles.^{52 53}

In order to compare packs of different sizes we used price per stick as the key measure. Where it was not provided in the data, we calculated price per stick by dividing the reported per-pack price by the number of sticks in the pack. The taxes paid per individual cigarette were then calculated for each brand based on its selling price. The net price per stick for each price segment was calculated by subtracting the total tax (excise (specific and ad valorem) plus VAT) from the total price per stick. Tobacco

tax pass-through for each segment was calculated by calculating the changes in net price per stick. The percentage change in price attributable to government tax was calculated by dividing the total tax increase by the total price increase and then multiplying by 100, while the percentage change due to TI revenue was calculated by dividing the increase in net revenue by the price increase and then multiplying by 100. We also calculated the frequency of smokers reporting using brands in the different market segments and how these changed between the two survey waves. Such changes were tested for significance using χ^2 tests.

DANE data

The data from DANE contained information on the price of packs of 20 cigarettes between 2007 and 2019 (based on data availability). The tax paid per pack (excise and VAT) was calculated based on the price for each brand. Average net price per pack for each brand was then calculated by subtracting the total tax paid from the average price. This was used to track how taxes were shifted to price. We calculated changes in net price by subtracting the net price of the previous year from the net price of the current year.

BACKGROUND RESULTS

The DEICS-COL survey has been used before; we present a summary of it here as appropriate background to enable our results to be put into context. For more details, please see the previous publications,^{43 49 50} and the online supplemental appendix for a summary table.

After the tax increase in 2017, the average self-reported price for cigarettes increased for all price categories (online supplemental table 1) and more smokers purchased cigarettes from street vendors.⁴³ As observed in both years, more smokers bought singles at their last purchase as compared with packs and cartons, and the frequency increased from 61.8% in 2016 to 73% in 2017 which was statistically significant.⁵⁰ In regard to the sale of packs, a pack of 10 sticks is more commonly purchased as compared with packs of 20, 18 or 14 (a single observation in 2017). After the tax increase, the frequency of purchasing all varieties of packs also decreased by 11% (significant at 1% confidence level).⁴³

RESULTS

Comparison of DEICS-COL survey prices with DANE prices

A comparison of the survey prices with those from DANE for brands that were present in both the sources revealed that they were broadly consistent. However, the survey prices were generally slightly higher than DANE's, and these variations were more noticeable in 2017 (figure 1).

DEICS-COL survey

Tax pass-through analysis

An analysis of the changes in the retail price and tax component of survey data between 2016 and 2017 (table 1) showed that for loose sticks the price for all segments increased more than the tax increase, with economy having a greater relative increase in net price followed by mid-priced and premium brands. Similarly, economy packs of 10 and 20 cigarettes were also slightly overshifted. However, taxes on mid-priced and premium packs of 10, 18 and 20 sticks were absorbed to some extent by the industry with their net prices decreasing during the year, signifying undershifting of taxes. These results suggest that the TI has differentially shifted taxes during 2017 for different presentations and pack sizes of cigarettes.

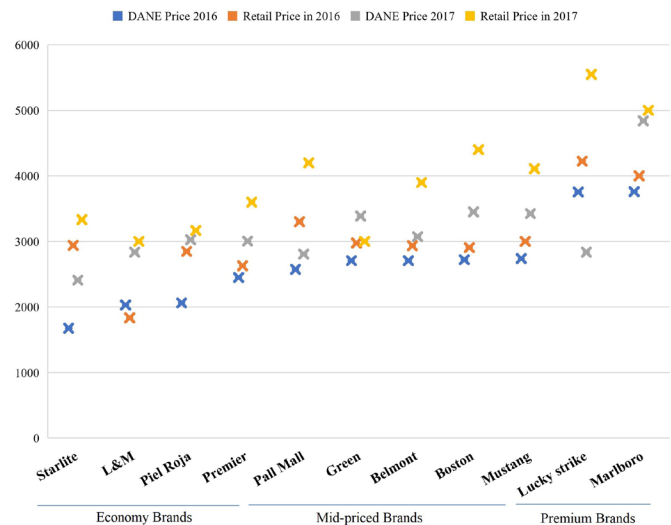


Figure 1 Consistency of Demand for Illicit Cigarettes Survey for Colombia (DEICS-COL) survey retail prices with National Administrative Department of Statistics (DANE) prices for packs of 20 (2016–2017). Source: Authors' own calculations using the database of DANE and DEICS-COL survey.

The unit cost of a loose stick is almost double that of a stick purchased in packs of 10, 18 or 20 sticks (figure 2). For cigarettes bought in packs, the highest priced were sold as packs of 10, and the lowest in packs of 18 cigarettes.

An analysis of the popularity of the different market segments (online supplemental table 2) showed that mid-priced cigarettes were most popular in 2016 (51%), but in 2017 it was premium (50%). The frequency of mid-priced brands decreased between the 2 years with a statistically significant shift to economy and premium brands. Additionally, taxes on some brands were more absorbed than others in the same price categories (online supplemental table 3). For example, Marlboro was more undershifted than Lucky Strike (premium) and Belmont more than Mustang (mid-price) and D&J more than Starlite (economy). The reasons for this are unclear but it was consistently PMI brands that were more undershifted, so it likely relates to the different profit-maximising strategies of the tobacco companies and the competition that exists between their brands.

DANE data

Descriptive

DANE data analysis revealed that between 2007 and 2019, the industry launched new variants of several existing brands (L&M, Lucky Strike, Marlboro), and this happened throughout the period under analysis, particularly during the most recent years. Furthermore, international brands Chesterfield and Rothmans were introduced as replacements for existing brands (Boston and Mustang, respectively) in 2017–2018 (packs featured both names for a time). Similarly, other new flavour variants with mint/menthol, fruit and/or beverage flavourings were also launched (eg, Lucky Strike Mojito) as were strength variants (eg, L&M Red).

Tax pass-through analysis

Examination of the changes in the price and tax components of DANE data revealed that the TI increased prices beyond the tax increase for most brands between 2007 and 2016, although there were a few exceptions in different price categories throughout this period (table 2 and online supplemental table

Table 1 Changes in the real price and tax for different presentation of cigarettes between 2016 and 2017 (prices per stick; all monetary figures in COP)

Presentation*	Brand categories	Year	Unit price	Price per stick	Specific tax	Ad valorem tax	VAT	Total tax	Net price	Total price increase	Total tax increase	Net price increase	% Price change that is government tax	% Price change that is TI revenue†
Loose sticks‡	Economy	2016	215	215	38	22	30	89	126	85	59	26	70	30
		2017	300	300	70	30	48	148	152					
	Mid-price	2016	323	323	38	32	44	114	208	77	59	18	77	23
		2017	400	400	70	40	64	174	226					
	Premium	2016	430	430	38	43	59	140	290	70	60	10	86	14
		2017	500	500	70	50	80	200	300					
Box of 10	Economy	2016	1075	108	38	11	15	64	44	48	47	1	98	2
		2017	1550	155	70	16	25	111	45					
	Mid-price	2016	1935	194	38	19	27	84	110	37	46	-10	124	-24
		2017	2300	230	70	23	37	130	100					
	Premium	2016	2473	247	38	25	34	97	151	33	47	-14	142	-42
		2017	2800	280	70	28	45	143	137					
Box of 18§	Mid-price	2016	2688	149	38	15	21	74	76	45	46	-2	102	-2
		2017	3500	194	70	19	31	120	74					
	Economy	2016	2150	108	38	11	15	64	44	55	49	6	89	11
		2017	3250	163	70	16	26	112	50					
	Mid-price	2016	3440	172	38	17	24	79	93	23	42	-19	183	-83
		2017	3900	195	70	20	31	121	74					
Box of 20	Premium	2016	4301	215	38	22	30	90	126	40	47	-7	118	-18
		2017	5100	255	70	26	41	137	119					

Source: Authors' own calculations using the data from the DEICS-COL survey.

* Survey did not find sufficient data on purchase of packs of 14 sticks in 2016, therefore they were removed from the analysis.

† We cannot tell if that is the tobacco industry changing their recommended prices or if that is simply the retailers independently increasing their prices.

We treated loose sticks as if they were all subject to taxation.

§ Survey only contained data on mid-priced segments of packs of 18 sticks.

|| COP, Colombian peso; DEICS-COL, Demand for Illicit Cigarettes Survey for Colombia; TI, tobacco industry; VAT, value-added tax.

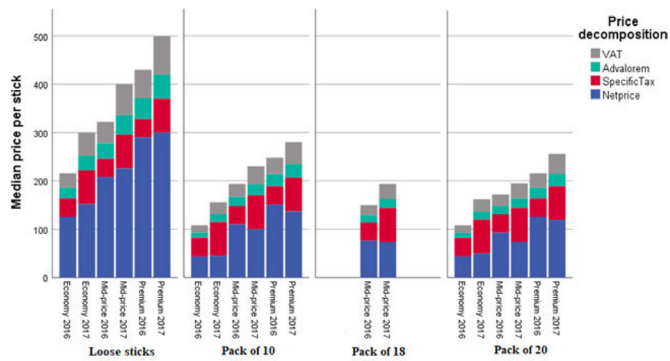


Figure 2 Changes in median price per stick for different presentation of cigarettes, 2016–2017. Source: Authors' own calculations using the data from the Demand for Illicit Cigarettes Survey for Colombia (DEICS-COL) survey. VAT, value-added tax.

4). The major tax increase in 2017 brought about a change in the industry pricing strategy from overshifting to undershifting, as seen by the drop in net prices for all brands. However, the price changes between brands that were withdrawn, and new replacement brands/brand variants showed that the prices were notably increased for both Rothmans and Chesterfield beyond that required by the tax increase alone (change in net price between COP\$392 and COP\$541). Overall, the tax changes in 2018 and 2019 were largely overshifted except for a few mid-priced

varieties, including prices for brands that were replaced in the market (Mustang and Boston).

DISCUSSION

This study provides a comprehensive overview of the TI's pricing strategies in Colombia, including single-stick sales, and therefore contributes to the evidence base on TI's tax pass-through to consumers in LMICs. Between 2007 and 2016, while tax increases were small, the industry was consistently overshifting taxes, thereby increasing its profitability. This seemed to change following the large tax increase in 2017, when a more complex pattern emerged where taxes on loose cigarettes and economy segments of packs of 10 and 20 were overshifted while they were partially absorbed on packs of mid-priced and premium. That taxes were not shifted equally between packs and single sticks suggests that the pricing of single sticks moves slightly differently from that for packs. From 2017, there is some disagreement between the DANE pricing information and that identified in the survey of smokers as the former showed a substantial amount of undershifting. This difference could be because DANE only records prices of 20-stick packs in the supermarkets, thereby potentially missing out an important part of the market. Given this discrepancy, it would suggest that DANE needs to broaden the scope of their data to capture the informal market, including single-stick prices. Furthermore, since DANE are reporting prices for some brands that have been withdrawn, it seems as if they might also need to improve their technical accuracy and/or

Table 2 Year-to-year change in real net price for different brands and brand variants of cigarettes between 2008 and 2019 (adjusted to 2017 COP)

Brand categories	Brands*	Brand variants	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Economy	President	Con Filtro	203	90	155	112	24	10	5	-12	28	-287	289	270
	American Gold	Con Filtro	-19	-68	135	-78	89	20	71	24	110	-394	-616	-318
	Starlite	Con Filtro	128	46	224	168	209	-493	-8	9	63	-252	266	351
	Caribe	Caja Blanda	61	70	154	-102	88	20	74	-11	17	-35	172	300
	Caribe	Caja Dura	43	151	225	-189	45	-18	110	-20	65	-257	226	506
	Premier	Azul	161	114	166	110	192	126	137	5	101	-324	314	-388
	Premier	Menthol	152	94	187	184	50	200	140	82	24	-703	-354	-291
	Premier	Rojo	108	135	160	193	36	201	134	11	70	-194	137	-245
	Pielroja	Sin Filtro	-70	-40	240	82	200	40	60	45	104	-116	119	490
Mid-price	Pall Mall	Kristal Frost	122	-35	198	527	-166	156	297	31	75	-506	-607	N/A
	Green	Mentolado	19	117	118	100	189	65	108	104	97	-376	-395	-46
	Derby	Caja Blanda	29	45	334	35	43	54	205	-91	180	-209	-25	547
	Boston	Azul	N/A	N/A	N/A	N/A	N/A	55	110	88	108	-166	-206	516
	Boston	Plata	N/A	N/A	N/A	N/A	N/A	68	82	163	94	-357	-230	-109
	Mustang	Rojo	308	108	55	310	23	64	102	73	127	-412	-441	66
	Mustang	Azul	239	94	97	200	93	52	128	48	166	-200	-404	144
Premium	Rothmans†	Azul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	506
	Rothmans†	Gris	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	527
	Chesterfield†	Capsula	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	88
	Chesterfield†	Menthol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	91
	Chesterfield†	White	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	77
	Kent	Blue	-185	-66	172	367	-152	-25	170	-4	33	-720	-610	-147
	Marlboro	Rojo	-294	396	259	203	-46	121	166	62	101	-106	170	761
	Lucky Strike	Red	-36	36	208	210	-517	134	394	16	179	-310	279	878

Brands are categorised into three price categories based on the price points in the market.

Prices adjusted to real prices with 2017 chosen as the base year.

Source: Authors' own calculations using the database of Colombia's National Administrative Department of Statistics (DANE).

*Only brands for which pricing information was available for all the years between 2007 and 2019 were included in the analysis.

†These brands were introduced in 2017 and replaced the existing brands.

COP, Colombian peso; N/A, data not available.

their data collection methodologies. After such improvements, the nature of the data might offer future possibilities for further research exploring causal behaviours in this area.

Whenever the TI overshifts taxation it signifies a missed opportunity for government as the higher prices could have been caused by tax increases instead of enhanced industry margins. Since overshifting has continued to be observed in some brands/segments in the years after the large tax increase in 2017, this implies there is further scope for larger tax increases, especially since there was no meaningful increase in illicit sales following the larger increases from 2017.⁴³

The tax shifting patterns in Colombia are in concordance with other studies on pricing tactics from other parts of the world, where the industry has been shown to either overshift^{29 33 37 54–56} or undershift^{57–62} taxes, or practise selective overshifting and undershifting on different price segments. For example, in most HICs,^{32 34 38 56} and some LMICs,^{63 64} in response to tax increases, the industry ensures smaller price increases for budget and mid-priced brands while setting relatively higher prices for premium brands. However, in the Colombian cigarette market, taxes on mid-priced (since 2017) and premium (in 2017) brands were largely absorbed which might reflect the different stages of the tobacco epidemic and the particular structure of the markets. Smoking prevalence has reduced in Colombia from 12.9% in 2013 to 8.7% in 2018,⁶⁵ accompanied by a consumption shift towards smoking fewer sticks per day since 2013.⁶⁶ Furthermore, like the survey results herein, Euromonitor data suggest there has been a shift away from mid-priced cigarettes in favour of economy and (to a lesser extent) premium brands.⁶⁷ The pricing of mid-priced brands might therefore be an industry strategy to mitigate these trends away from the middle of the market, and hence a different tactic to demand maximisation that is practised in other LMICs.

The availability of single sticks and their high prevalence among smokers complicates the Colombian market and the TI may be using the informal channels to obscure their pricing tactics, since their prices there are not visible. Furthermore, the existence of such informal channels encourages loose-cigarette sales, thereby weakening the impact of tax increases. From a retailer's perspective, the profit margins on selling single sticks are substantially more than on packs,⁶⁸ therefore making compliance with the existing law that bans such sales harder to achieve.^{48 69} Indeed, the proportion of smokers who bought singles increased after the 2017 tax increase. Such sales may potentially cause a loss of government revenues as it becomes difficult to assess whether taxes have been paid on single sticks (some will have where legal purchases of multistick packs have been resold as single sticks). These findings indicate the weak governance of the national and subnational enforcement authorities who are in charge of regulating and controlling the distribution of cigarettes in the informal market.^{17 48 70} Considering the structural governance obstacles that perpetuate informal vendors, it is very difficult to eliminate these practices as they require interinstitutional interventions, beyond tobacco control measures. This requires exploring ways to make the tobacco companies accountable for their distribution chain, in combination with interventions directed to retailers that go beyond enforcement.

There was also evidence of the TI using the tactic of introducing new brands/brand variants in the market. This has been observed in other countries such as the UK,^{32 34} Spain,⁷¹ Bangladesh⁵⁸ and Thailand.⁷² However, unlike these other markets where variants were often cheaper substitutes to appeal to price-sensitive consumers, in Colombia new variants were often flavour/strength related.³⁴ Colombia is one of 18 countries across the globe that

have a large market share for flavoured cigarettes,²³ suggested to have exceeded 20% in 2019,⁷³ in line with the DEICS-COL survey results that suggest consumers choose brands based more on flavour and less on the price.⁴⁹ The introduction of flavours could be related to efforts to attract and maintain smokers in a declining market, and to offer consumers additional features to justify the increasingly higher prices for cigarettes.

Strengths and limitations

The limitations of this paper relevant to the survey data are the cross-sectional nature of it, which means determination of causality and hence generalisability is unclear. Furthermore, the timing of the survey waves in 2016 and 2017 means they are now several years old and that we were unable to explore the impact of the tax increase beyond the year immediately after its introduction. The survey data were therefore triangulated with government data on all price segments of cigarettes rendering greater confidence in the broad validity of the results. It should, however, be noted that the DANE data cover the prices on which taxes are to be paid, akin to recommended retail prices, and not the actual prices that were actually charged to consumers, which may differ between retailers. In regard to the evaluation of the tax pass-through, we cannot say for certain if their prices were overshifted by the retailers or the TI, and this is especially true with the informal sector selling single sticks where the industry is likely to have less influence. We also treated all loose sticks as if they were duty-paid sales (even though single-stick sales are not legal) but previous work has reported that in 2016/2017, 3.5% of the tobacco market consists of smuggled cigarettes⁴⁹ so the true impact of the tax increase may not have been fully considered. We also did not evaluate the rate of tax pass-through for other forms of tobacco such as roll-your-own, or next-generation products as the analysed data sets only contained pricing information for cigarettes, although this is unlikely a serious issue as their use is low in Colombia (eg, heated tobacco product sales made up only 1.2% of Colombia's tobacco market in 2020).^{74 75} Similarly, we did not explore all six strategies previously identified as being used by the TI to respond to tax increases (eg, price smoothing), as our data sources did not allow us to do so, so we cannot conclude whether the strategies not examined are present, or not, in the market.

Despite these limitations, this study has several strengths. It is the first academic study we are aware of from Latin America that assess the impact of taxation on the TI pricing strategies, and also the first to examine changes in the price of single cigarettes following a major excise tax increase. Furthermore, the findings of the study augment the evidence base on TI pricing strategies especially in an under-researched context of an LMIC.

Policy recommendations

Tobacco taxes are still relatively low in Colombia so these should continue to be increased, particularly the specific component so that cheaper economy brands do not have a tax advantage, and hence price differentials between brands narrow. Restrictions on limiting brands to one variant, prohibiting the introduction of new brands/variants, along with a ban on flavours would also likely be effective strategies to adopt.

CONCLUSION

In this study we have explored how the industry responds to tax increases in Colombia and have identified the pricing strategies employed by the TI to undermine tax increases. Although Colombia is an LMIC, it still exhibits a lot of the trends we have

observed in HICs in terms of the industry tactics. Moreover, we have explored single-stick sales and found that their pricing does not exactly follow the same pattern as packs, suggesting their sales and pricing need to be monitored more carefully. Indeed, it suggests further analysis of single cigarette pricing and its influence on tobacco control policies in LMICs, and thereby on cessation behaviours, is an essential area for future research.

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Contributors All authors contributed to the original idea for the paper. All data were sourced by ZDS, BAL and NM. ZDS designed the study, performed data analysis and interpretation and wrote the first draft of the paper with significant input from JRB, who also provided expertise on taxation and pricing, along with ABG providing critical feedback. All authors contributed to the editing of the final version of the paper. The responsibility for any errors remains entirely with the authors. The corresponding author, JRB, stands as guarantor, accepting full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Funding ZDS is funded by Cancer Research UK (grant number A29421), and JRB and ABG acknowledge the support of Bloomberg Philanthropies Stopping Tobacco Organizations and Products project funding (www.bloomberg.org).

Competing interests JRB owns 10 shares in Imperial Brands for research purposes. The shares were a gift from a public health campaigner and are not held for financial gain or benefit. All dividends received are donated to health-related charities, and proceeds from any future share sale or takeover will be similarly donated.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement The DANE data are freely available from the listed online sources. The DEICS-COL survey data can be shared with researchers who meet the relevant criteria for access—help and information can be obtained directly from Fundación Anáas.

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Appendix Table I: Descriptive results of the Survey

Variables	2016		2017		P-value
	Frequency	Percent	Frequency	Percent	
Do you smoke Daily?					0.12
No	284	16.7	319	18.8	
Yes	1413	83.3	1378	81.2	
Total	1697	100.0	1697	100.0	
Place of last purchase					0.001
Bar, restaurant, cafeteria	14	0.8	6	0.4	
Cigar store, liquor store	602	35.5	140	8.2	
Duty Free	2	0.1	2	0.1	
Large departmental stores	99	5.8	63	3.7	
Neighbourhood shop	31	1.8	462	27.2	
San Andresitos	2	0.1	3	0.2	
Service station	5	0.3	3	0.2	
Street vendor	915	53.9	1007	59.3	
Don't remember/Don't know	27	1.6	11	0.6	
Total	1697	100.0	1697	100.0	
Presentation* of last purchase?					0.0005
Loose sticks	1048	61.8	1239	73.0	
Pack	639	37.7	450	26.5	
Carton	10	0.6	8	0.5	
Total	1697	100.0	1697	100.0	
Pack size/ Number of cigarettes per pack?					0.001
10	395	23.3	298	17.6	

14	0	0	1	0.1	
18	12	0.7	5	0.3	
20	229	13.5	141	8.3	
Total	636	37.5	450	26.5	
What did you think of while purchasing your last cigarette?					0.028
Less harmful	78	4.6	49	2.9	
Price	171	10.1	165	9.7	
Taste	1448	85.3	1483	87.4	
Total	1697	100.0	1697	100.0	
<ul style="list-style-type: none"> ➤ *Quantity of cigarettes purchased such as single stick or multi-stick packs or cartons ➤ Categorical data compared between groups with the use of Pearson chi-square tests. 					

Source: Authors' own calculations, using the data from the DEICS-COL survey

Appendix Table II: Frequency of Smoking with respect to Brands (2016- 2017)

Year	2016	2017	Total
Win	5	9	14
D&J	42	65	107
Gold City	0	1	1
Djarum	1	0	1
Brass	0	3	3
Consul	0	4	4
Empire	0	1	1
Golden Deer	11	7	18
Golden Seal	1	1	2

Fly	3	0	3
Jaisalmer	2	0	2
Modern	3	0	3
American Gold	1	0	1
Ibiza	1	1	2
Piel Roja	37	40	77
Belfort	0	2	2
Starlite	63	57	120
Tropical	1	0	1
Ruby	0	2	2
Total Economy*	171	193	364
Green	84	95	179
Pall Mall	1	5	6
Premier	10	5	15
Fortuna	4	0	4
Belmont	240	198	438
Meridiano	0	2	2
Motana	0	1	1
Boston	283	128	411
Mustang	232	173	405
Rothmans	0	21	2
L&M	11	17	28
Royal	3	0	3
Total Mid-priced*	868	645	1513
Jet	14	6	20
Chesterfield	0	169	169

Kool	44	7	51
Camel	1	1	2
Lucky Strike	187	368	555
Marlboro	410	307	717
Montreal	1	1	2
Nat Sherman	1	0	1
Total Premium*	658	859	1517
Total	1697	1697	3394
*Pearson chi-square tests significant at the 1% level (p-value = 0.000)			

Source: Authors' own calculations, using the database of Colombia's National Administrative Department of Statistics (DANE).

Appendix Table III: Changes in the real price and tax for different presentation of cigarette Brands between 2016-2017 (all monetary figures in COP)

Brands	No. of cigarettes	Total price 2016	Total price 2017	Specific Tax 2016	Ad valor em 2016	Excise tax 2016	VAT 2016	Total tax 2016	Net price 2016	Specific Tax 2017	Ad valor em 2017	Excise tax 2017	VAT 2017	Total tax 2017	Net price 2017	Total price increase	Total tax increase	Tobacco industry revenue increase	% of price change that is government tax	% of price change that is tobacco industry revenue
Win	Loose	100	200	35	10	45	14	59	41	70	20	90	32	122	78	92	59	34	63	37
D&J	Loose	175	200	35	17.5	52.5	24	77	98	70	20	90	32	122	78	12	40	-28	334	-234
Starlite	Loose	200	300	35	20	55	28	83	117	70	30	100	48	148	152	85	59	26	70	30
Piel Roja	Loose	200	300	35	20	55	28	83	117	70	30	100	48	148	152	85	59	26	70	30
Premier	Loose	200	300	35	20	55	28	83	117	70	30	100	48	148	152	85	59	26	70	30
L&M	Loose	300	300	35	30	65	41	106	194	70	30	100	48	148	152	-23	34	-56	-149	249
Mustang	Loose	300	400	35	30	65	41	106	194	70	40	110	64	174	226	77	59	18	77	23
Belmont	Loose	300	400	35	30	65	41	106	194	70	40	110	64	174	226	77	59	18	77	23

Boston	Loose	300	400	35	30	65	41	106	194	70	40	110	64	174	226	77	59	18	77	23
Green	Loose	300	400	35	30	65	41	106	194	70	40	110	64	174	226	77	59	18	77	23
Marlboro	Loose	400	500	35	40	75	55	130	270	70	50	120	80	200	300	70	60	10	86	14
Kool	Loose	400	500	35	40	75	55	130	270	70	50	120	80	200	300	70	60	10	86	14
Lucky Strike	Loose	500	500	35	50	85	69	154	346	70	50	120	80	200	300	-38	34	-72	-91	191
Pall Mall	10	1000	2200	350	100	450	138	588	412	700	220	920	351	1271	929	1125	639	486	57	43
Starlite	10	1000	1550	350	100	450	138	588	412	700	155	855	247	1102	448	475	470	4	99	1
L&M	10	1200	1800	350	120	470	166	636	564	700	180	880	287	1167	633	510	484	26	95	5
Premier	10	1450	2000	350	145	495	200	695	755	700	200	900	319	1219	781	441	472	-31	107	-7
Mustang	10	1800	2500	350	180	530	248	778	1022	700	250	950	399	1349	1151	565	512	52	91	9
Green	10	1800	2500	350	180	530	248	778	1022	700	250	950	399	1349	1151	565	512	52	91	9
Belmont	10	1800	2300	350	180	530	248	778	1022	700	230	930	367	1297	1003	365	460	-96	126	-26
Boston	10	1800	2400	350	180	530	248	778	1022	700	240	940	383	1323	1077	465	486	-22	105	-5
Marlboro	10	2300	2800	350	230	580	317	897	1403	700	280	980	447	1427	1373	327	462	-135	141	-41
Lucky Strike	10	2400	3000	350	240	590	331	921	1479	700	300	1000	479	1479	1521	420	489	-69	116	-16
Boston	18	2000	4400	630	200	830	276	1106	894	1260	440	1700	703	2403	1997	2250	1214	1036	54	46
Piel Roja	18	2500	3500	630	250	880	345	1225	1275	1260	350	1610	559	2169	1331	812	852	-40	105	-5
Montreal	20	1000	4000	700	100	800	138	938	62	1400	400	1800	639	2439	1561	2925	1430	1495	49	51
Golden Seal	20	1300	3000	700	130	830	179	1009	291	1400	300	1700	479	2179	821	1602	1094	508	68	32
Golden Deer	20	1500	2150	700	150	850	207	1057	443	1400	215	1615	343	1958	192	537	822	-285	153	-53
D&J	20	1600	2000	700	160	860	221	1081	519	1400	200	1600	319	1919	81	280	757	-478	271	-171
Starlite	20	2000	3250	700	200	900	276	1176	824	1400	325	1725	519	2244	1006	1100	980	120	89	11
Win	20	2000	1800	700	200	900	276	1176	824	1400	180	1580	287	1867	-67	-350	603	-953	-172	272
Piel Roja	20	2050	3500	700	205	905	283	1188	862	1400	350	1750	559	2309	1191	1296	1032	264	80	20

L&M	20	2100	3000	700	210	910	290	1200	900	1400	300	1700	479	2179	821	742	889	-147	120	-20
Premier	20	2500	3600	700	250	950	345	1295	1205	1400	360	1760	575	2335	1265	912	943	-31	103	-3
Green	20	2900	3000	700	290	990	400	1390	1510	1400	300	1700	479	2179	821	-118	685	-802	-581	681
Mustang	20	3200	4800	700	320	1020	441	1461	1739	1400	480	1880	766	2646	2154	1360	1075	284	79	21
Belmont	20	3200	3900	700	320	1020	441	1461	1739	1400	390	1790	623	2413	1487	460	842	-382	183	-83
Pall Mall	20	3300	4200	700	330	1030	455	1485	1815	1400	420	1820	671	2491	1709	652	894	-242	137	-37
Jet	20	3400	8000	700	340	1040	469	1509	1891	1400	800	2200	1277	3477	4523	4345	1855	2490	43	57
Marlboro	20	4000	5100	700	400	1100	552	1652	2348	1400	510	1910	814	2724	2376	799	948	-149	119	-19
Lucky Strike	20	4200	5550	700	420	1120	579	1699	2501	1400	555	1955	886	2841	2709	1034	1014	20	98	2

Source: Authors' own calculations, using the database of Colombia's National Administrative Department of Statistics (DANE).

Appendix Table IV: Tax pass through for cigarette brands between 2007-2019 (all monetary figures in COP)

Year	Price Decomposition	President Con Filtro	Caribe Caja Blanda	Caribe Caja Dura	Premier Azul	Premier Menthol	Premier Rojo	Starlite Con Filtro	Pielroja Sin filtro	American Gold Con Filtro	Derby Caja Blanda	Pall Mall Kristal Frost	Mustang Rojo	Mustang Azul	Boston Azul	Boston Plata	Green Mento lado	Kent Blue	Marlboro Rojo	Lucky Strike Red
2007	Unit price	1407	1652	1671	1849	1884	1946	1960	1975	2399	2637	2294	2241	2323	N/A	N/A	2550	4800	4034	4565
	Total tax	1237	1293	1297	1338	1346	1360	1364	1367	1464	1519	1440	1428	1447	N/A	N/A	1499	2014	1838	1960
	Net price	170	359	373	511	538	586	596	608	608	935	1118	854	813	877	N/A	N/A	1051	2787	2195
2008	Unit price	1616	1664	1658	1984	2005	2007	2047	1802	2275	2566	2360	2553	2541	N/A	N/A	2469	4359	3481	4329
	Total tax	1251	1263	1261	1339	1344	1344	1354	1296	1408	1477	1428	1474	1472	N/A	N/A	1454	1904	1695	1897
	Net price	365	401	397	645	661	662	693	506	867	1089	932	1079	1070	N/A	N/A	1015	2455	1786	2432

	Change in net price	203	61	43	161	152	108	128	-70	-19	29	122	308	239	N/A	N/A	19	-185	-294	-36
2009	Unit price	1657	1675	1776	2032	2026	2080	2002	1660	2065	2486	2188	2556	2527	N/A	N/A	2490	4016	3802	4121
	Total tax	1226	1230	1254	1315	1314	1327	1308	1227	1323	1423	1352	1440	1433	N/A	N/A	1424	1787	1736	1812
	Net price	431	445	522	717	713	754	694	433	742	1063	836	1116	1094	N/A	N/A	1066	2229	2066	2309
	Change in net price	90	70	151	114	94	135	46	-40	-68	45	-35	108	94	N/A	N/A	117	-66	396	36
2010	Unit price	1713	1729	1919	2087	2110	2126	2135	1827	2079	2744	2279	2445	2472	N/A	N/A	2464	4000	3909	4148
	Total tax	1145	1148	1194	1234	1239	1243	1245	1172	1232	1390	1279	1319	1325	N/A	N/A	1323	1689	1667	1724
	Net price	569	580	725	853	871	883	890	655	847	1354	1000	1126	1147	N/A	N/A	1141	2312	2242	2424
	Change in net price	155	154	225	166	187	160	224	240	135	334	198	55	97	N/A	N/A	118	172	259	208
2011	Unit price	1847	1580	1652	2210	2329	2357	2333	1918	1955	2754	2944	2822	2704	N/A	N/A	2565	4417	4113	4355
	Total tax	1179	1115	1132	1265	1293	1300	1294	1196	1204	1394	1440	1411	1383	N/A	N/A	1350	1790	1718	1776
	Net price	668	465	520	945	1035	1057	1038	722	750	1359	1505	1411	1322	N/A	N/A	1216	2627	2395	2580
	Change in net price	112	-102	-189	110	184	193	168	82	-78	35	527	310	200	N/A	N/A	100	367	203	210
2012	Unit price	1854	1681	1694	2425	2354	2363	2567	2154	2044	2755	2666	2796	2774	2804	2791	2765	4109	3953	3570
	Total tax	1184	1143	1146	1320	1303	1305	1354	1256	1229	1399	1378	1408	1403	1411	1407	1401	1721	1684	1592
	Net price	670	538	548	1105	1051	1058	1213	898	814	1357	1289	1387	1371	1394	1384	1364	2388	2270	1977
	Change in net price	24	88	45	192	50	36	209	200	89	43	-166	23	93	N/A	N/A	189	-152	-46	-517
2013	Unit price	1837	1681	1645	2543	2571	2581	1867	2166	2033	2768	2815	2820	2783	2817	2820	2792	3975	4017	3661

	Total tax	1177	1140	1132	1345	1352	1354	1185	1256	1224	1399	1410	1411	1403	1410	1411	1405	1686	1696	1611
	Net price	659	541	513	1198	1219	1226	683	910	809	1369	1405	1409	1381	1407	1409	1387	2289	2321	2050
	Change in net price	10	20	-18	126	200	201	-493	40	20	54	156	64	52	55	68	65	-25	121	134
2014	Unit price	1782	1720	1731	2647	2678	2680	1795	2177	2061	2956	3124	2872	2871	2881	2847	2853	4094	4130	4080
	Total tax	1130	1115	1118	1336	1343	1344	1133	1224	1196	1409	1449	1390	1389	1391	1383	1385	1680	1689	1677
	Net price	652	605	613	1311	1335	1336	661	953	864	1547	1675	1483	1482	1489	1463	1468	2414	2441	2403
	Change in net price	5	74	110	137	140	134	-8	60	71	205	297	102	128	110	82	108	170	166	394
2015	Unit price	1791	1733	1732	2655	2786	2694	1832	2250	2110	2829	3153	2963	2929	2990	3056	2985	4049	4171	4063
	Total tax	1170	1156	1156	1376	1407	1385	1180	1279	1246	1417	1494	1449	1441	1455	1471	1454	1707	1736	1710
	Net price	621	577	576	1279	1379	1309	652	971	864	1412	1659	1514	1488	1535	1585	1531	2342	2435	2352
	Change in net price	-12	-11	-20	5	82	11	9	45	24	-91	31	73	48	88	163	104	-4	62	16
2016	Unit price	1801	1730	1792	2719	2743	2716	1886	2337	2212	2989	3159	3047	3065	3047	3092	3028	3958	4163	4162
	Total tax	1181	1164	1179	1400	1405	1399	1201	1309	1279	1464	1504	1478	1482	1477	1488	1473	1694	1743	1743
	Net price	620	566	613	1319	1338	1317	685	1029	933	1525	1655	1569	1583	1570	1604	1555	2263	2420	2419
	Change in net price	28	17	65	101	24	70	63	104	110	180	75	127	166	108	94	97	33	101	179
2017	Unit price	2282	2554	2314	3111	2622	3283	2410	3026	2531	3525	3286	3306	3610	3639	3424	3336	3762	4788	4512
	Total tax	1993	2063	2001	2208	2081	2252	2026	2186	2057	2315	2253	2258	2337	2345	2289	2266	2377	2643	2572
	Net price	289	491	313	903	541	1031	384	840	474	1210	1033	1048	1273	1294	1135	1070	1385	2145	1940

	Change in net price	-287	-35	-257	-324	-703	-194	-252	-116	-394	-209	-506	-412	-200	-166	-357	-376	-720	-106	-310
2018	Unit price	3516	3622	3463	4353	2978	4280	3609	4008	2536	4297	3279	3523	3867	4162	3923	3614	3736	5784	5663
	Total tax	2947	2975	2933	3164	2807	3146	2971	3075	2693	3150	2885	2949	3038	3115	3053	2972	3004	3536	3504
	Net price	569	647	530	1189	170	1135	638	933	-157	1147	393	574	829	1047	870	641	732	2248	2158
	Change in net price	289	172	226	314	-354	137	266	119	-616	-25	-607	-441	-404	-206	-230	-395	-610	170	279
2019	Unit price	3992	4132	4256	3917	2706	4040	4190	4766	2239	5125	N/A	3720	4162	4951	3874	3658	3640	6865	6904
	Total tax	3165	3202	3234	3146	2831	3178	3217	3366	2710	3459	N/A	3095	3209	3413	3135	3078	3074	3911	3921
	Net price	827	931	1022	771	-125	862	973	1400	-471	1666	N/A	626	952	1537	740	580	566	2954	2983
	Change in net price	272	300	506	-388	-291	-245	351	490	-318	547	N/A	66	144	516	-109	-46	-147	761	878
*Only brands for which pricing information was available for all the years between 2007-2019 were included in the analysis																				
**N/A: Data not available																				
Economy Brands, Mid-Priced Brands, Premium Brands																				

Source: Authors' own calculations, using the database of Colombia's National Administrative Department of Statistics (DANE).