

Cigarette Pack Structure Elements in Low- and Middle-Income Countries

Olufemi Erinoso, MPH
Kevin Welding, PhD
Joanna E. Cohen, PhD
Katherine Clegg Smith, PhD

Objectives: The tobacco industry can attract consumers using appealing packaging, including pack structure. We assessed the variety of pack structure elements across select low- and middle-income countries (LMICs). **Methods:** Between 2013 and 2017, we systematically collected 3542 packs from 14 LMICs. The selected countries represented LMICs with the greatest number of smokers. We assessed packs for 4 packaging structure elements: pack-type (hard, soft, or box), pack-shape, pack-edge, and opening-style. We used descriptive statistics to analyze the packaging structure elements by country and tobacco company. **Results:** All 14 countries assessed had predominantly hard packs (88.3% of the total sample). We identified 5 pack-shape variants; the most common pack-shape in all countries was the rectangular non-slim pack-shape (79.2%). Straight right-angled edge packs were the most common in 11 of the 14 countries assessed, but rounded edge packs were the most common in Turkey (58.5%). We found 9 broad categories of pack-opening styles, with the most common being the flip-top (94.5%). **Conclusion:** Although we found common packaging structure elements across the 14 LMICs, we also noted diverse packaging structures. Restrictions on pack structure elements are important as these elements can contribute to the attractiveness of tobacco products.

Key words: tobacco packaging; standardized packaging; low- and middle-income countries; tobacco regulation; tobacco product attractiveness

Tob Regul Sci.™ 2021;7(1):76-86

DOI: doi.org/10.18001/TRS.7.1.6

The physical characteristics of cigarette packaging have been used by the tobacco industry to attract users for over a century.¹ Independent research using industry documents reveals that pack structure is an important part of the industry's marketing efforts.² Evidence from industry documents details the extent of market research conducted to tailor different aspects of cigarette packaging structures to influence perceptions of health among diverse segments of the market.^{2,3} For example, perceived harm has been reported to be lower for a slim pack shape design than the traditional pack designs among young females.⁴ In ad-

dition, a focus group study with females reported a preference for the slim and 'perfume styled' or lipstick packs (narrow or super-slim packs shaped like perfume packaging) because they indirectly communicated reduced harm.⁵

The guidelines for the implementation of WHO FCTC Article 11 recommend that parties should have a thorough understanding of the different styles of tobacco product packaging within their jurisdiction.⁶ This understanding can guide measures to curb innovative and appealing cigarette packaging structures that encourage smoking initiation. Furthermore, growing industry presence

Olufemi Erinoso, Senior Research Program Coordinator, Institute for Global Tobacco Control, Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States. Kevin Welding, Assistant Scientist, Institute for Global Tobacco Control, Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States. Joanna E. Cohen, Professor, Institute for Global Tobacco Control, Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States. Katherine Clegg Smith, Professor, Institute for Global Tobacco Control, Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States.
Correspondence Dr Smith; ksmit103@jhu.edu

in low- and middle-income countries (LMICs) over the past 3 decades⁷ has necessitated proactive measures against common marketing tactics used by the industry. One such measure is plain and standardized packaging for tobacco products, which restricts the use of cigarette packaging as a marketing vehicle. Plain and standardized packaging policies as of February 2020 were currently under legislative or government consideration in 4 middle-income countries – Ecuador, South Africa, Sri Lanka and Ukraine, and had been passed by 4 middle-income countries – Georgia, Romania, Thailand and Turkey, as well as several high-income countries (HICs).^{8,9}

Whereas these policies generally aim to reduce the appeal of tobacco products and reduce misperceptions created by packaging structures about the harms of tobacco use, regulations guiding these policies sometimes differ depending on the local context.¹⁰ Furthermore, the diversity in regulations on pack structures may exist because the focus of plain and standardized packaging has typically been on eliminating promotional aspects of tobacco packaging.^{6,8,10} For example, whereas New Zealand and Australia require straight-edged packs, the UK, France, and Norway permit round or beveled-edge packs. Similar variations are found in adopted pack shapes across countries.¹⁰

This paper focuses on how packaging structure elements differ across select LMICs that have not yet implemented plain and standardized packaging policies that include pack structure. We assessed the range of cigarette packaging structure elements (pack type, pack shape, pack edge and pack opening style) found in 14 LMICs. We compared the results across the countries and tobacco companies by identifying the most prevalent packaging structure elements and describing the variety observed.

METHODS

The Tobacco Pack Surveillance System (TPackSS) fostered collection of samples of cigarettes available for purchase in 14 LMICs (Bangladesh, Brazil, China, Egypt, India, Indonesia, Mexico, Pakistan, Philippines, Russia, Thailand, Turkey, Ukraine, and Vietnam). The selected countries represented the LMICs with the greatest number of smokers during the study design process;¹¹ in 2012, the year of country selection, smokers from the 14 coun-

tries comprised 81.4% of the global adult daily smokers.¹¹⁻¹⁴ For these analyses we used data from the most recent year of collection for each country (Table 1).

Cigarette packs were collected from 3 of the top 10 most populated cities in each country (5 cities in China and 4 cities in India) using a systematic protocol. City selection was based on population, cultural, geographic, religious, and linguistic diversity in each country. For each country's selected cities, we determined socioeconomic status (SES) based on information such as income level or property values to identify 12 neighborhoods across low-, middle-, and high-SES categories. We determined the popular types of vendors using country-specific Global Adult Tobacco Survey (GATS) and Euromonitor data. Packs were purchased with the intention to collect as many "unique" pack presentations as possible. A "unique" tobacco pack means a pack that had at least one difference in an exterior design or feature, including differing stick count, size, brand name presentation, colors, cellophane, and inclusion of a promotional item within each country of collection. Detailed sampling and data collection methods are outlined elsewhere.¹¹

A total of 3542 unique cigarette packs were purchased for inclusion in these analyses. We coded 4 pack structure elements: pack type, pack shape, edge design, and pack opening style (Figure 1). Packaging types were categorized as hard, soft, box, and other. Hard packs have a defined shape constructed from paper or cardboard, which hold their shape when sticks are removed. Soft packs have a malleable shape made of paper, with exposed foil. Other pack types observed included boxes (constructed from tin, other metal, or hard plastic), cylindrical tins, and sachets.

Pack shape (not coded for cylindrical tins or sachets), was categorized as traditional rectangular-non-slim and slim; wide- non-slim and slim; and lipstick packs (sometimes referred to as a perfume packs).⁵ Traditional rectangular non-slim packs were rectangular with a width-to-height ratio of approximately 2:3, and side panels measuring more than 1.3 cm, while the slim variation had side panels measuring 1.3 cm or less. Wide non-slim packs had a wider front and back panel with a width-to-height ratio greater than 2:3, and side panels measuring more than 1.3 cm, while the slim variation

Table 1
Distribution of Pack Type, by Country

Country	Year	Coded Packs	Hard Pack (%)	Soft Pack (%)	Box Pack (%)	Other Pack (%)
Bangladesh	2016	233	230 (98.7)	3 (1.3)	0 (0)	0 (0)
Brazil	2016	147	98 (66.7)	49 (33.3)	0 (0)	0 (0)
China	2017	738	592 (80.2)	141 (19.1)	0 (0)	5 (0.7) ^a
Egypt	2013	58	54 (93.1)	4 (6.9)	0 (0)	0 (0)
India	2016	95	95 (100.0)	0 (0)	0 (0)	0 (0)
Indonesia	2015	252	230 (91.3)	21 (8.3)	0 (0)	1 (0.4) ^a
Mexico	2013	134	121 (90.3)	13 (9.7)	0 (0)	0 (0)
Pakistan	2013	382	367 (96.1)	15 (3.9)	0 (0)	0 (0)
Philippines	2016	108	72 (66.7)	35 (32.4)	0 (0)	1 (0.9) ^b
Russia	2015	502	476 (94.8)	9 (1.8)	17 (3.4)	0 (0)
Thailand	2015	111	62 (55.9)	49 (44.1)	0 (0)	0 (0)
Turkey	2013	308	282 (91.6)	26 (8.4)	0 (0)	0 (0)
Ukraine	2013	324	313 (96.6)	10 (3.1)	1 (0.3)	0 (0)
Vietnam	2015	150	134 (89.3)	11 (7.3)	4 (2.7)	1 (0.7) ^b
Total (%)		3542 (100)	3126 (88.3)	386 (10.9)	22 (0.6)	8 (0.2)

Note.

^a Cylindrical tin pack type.

^b Sachet pack type. (Appendix Table 1)

had side panels measuring 1.3 cm or less. Lipstick packs were slender, with roughly equal width for front/back and side panels; top panels were square.

Pack edge designs (coded only for hard pack types) were categorized as straight (right-angled), beveled, or rounded edges. Pack opening styles, coded only for hard pack and box types, were categorized as flip-top, vertical and horizontal slide, case opening, and other. Flip-top packs were packs with lids hinged at the back of the pack and when opened reveal the upper portion of cigarette sticks. Slide packs were packs that opened by sliding the packaging either vertically or horizontally to reveal the sticks. Case opening styles have a lid hinged on top of the pack and when opened reveal the full length of the cigarette sticks. "Other" opening styles comprised carton and book opening styles, and variations of flip-tops and slide openings. Carton opening styles contained cigarettes in hard cardboard boxes without foil or paper inner packaging, and book opening styles were packs that opened like notebooks (Figure 1).

Information about tobacco companies was cap-

tered from the packs and categorized into 7 groups: British American Tobacco (BAT), China National Tobacco Corporation (CNTC), Imperial Tobacco Company (ITC), Japan Tobacco International (JTI), Philip Morris International (PMI), Korean Tobacco & Ginseng (KT&G), and Other (other tobacco companies).

Each pack was coded by 2 trained, independent coders. All coding discrepancies were reconciled by a third trained reviewer. Coder reliability was assessed with percent agreement and Cohen's kappa. For the variables included in this analysis, the average percent agreement was 97.7% (range: 96.1% to 99.4%), and the average Cohen's kappa was 0.872 (range: 0.801 to 0.941).¹⁵

We used descriptive statistics to analyze the various packaging structure elements by country and tobacco company. Greatest variety refers to the most types observed within a pack structure element.

RESULTS

Pack Type

A total of 3542 packs were assessed for pack type.

Figure 1
Images of Pack Structure Elements



Overall, 88% of the packs (N = 3126) assessed were hard packs. Similarly, all 14 countries had predominantly hard packs (range: 55.9%-100%). Soft packs accounted for 10.9% (N = 386) of packs assessed in our entire sample, and box packs ac-

counted for 0.6% (N = 22); we collected 6 cylindrical tins and 2 sachets.

Soft packs were most common in Thailand, where they accounted for 44.1% of the packs assessed, followed by Brazil (33.3%) and the Philippines

Table 2
Distribution of Pack Shape, by Country

Country	Year	Coded Packs	Traditional		Wide		Lipstick
			Non-slim (%)	Slim (%)	Non-slim (%)	Slim (%)	
Bangladesh	2016	233	201 (86.3)	24 (10.3)	6 (2.6)	0 (0)	2 (0.8)
Brazil	2016	147	127 (86.4)	6 (4.1)	14 (9.5)	0 (0)	0 (0)
China	2017	733	611 (83.4)	100 (13.6)	20 (2.7)	0 (0)	2 (0.3)
Egypt	2013	58	45 (77.6)	10 (17.2)	0 (0)	0 (0)	3 (5.2)
India	2016	95	87 (91.6)	7 (7.4)	1 (1.0)	0 (0)	0 (0)
Indonesia	2015	251	226 (90.0)	14 (5.6)	7 (2.8)	1 (0.4)	3 (1.2)
Mexico	2013	134	124 (92.5)	0 (0)	8 (6.0)	0 (0)	2 (1.5)
Pakistan	2013	382	311 (81.4)	46 (12.0)	22 (5.8)	0 (0)	3 (0.8)
Philippines	2016	107	102 (95.3)	5 (4.7)	0 (0)	0 (0)	0 (0)
Russia	2015	502	313 (62.3)	163 (32.5)	26 (5.2)	0 (0)	0 (0)
Thailand	2015	111	102 (91.9)	9 (8.1)	0 (0)	0 (0)	0 (0)
Turkey	2013	308	262 (85.1)	45 (14.6)	1 (0.3)	0 (0)	0 (0)
Ukraine	2013	324	176 (54.3)	134 (41.4)	9 (2.8)	1 (0.3)	4 (1.2)
Vietnam	2015	149	113 (75.8)	31 (20.8)	5 (3.4)	0 (0)	0 (0)
Total (%)		3,534 (100)	2800 (79.2)	594 (16.8)	119 (3.4)	2 (0.1)	19 (0.5)

Note.

Cylinder tins and sachet packs were not coded for pack shape.

(32.4%). Russia recorded the highest proportion (5%) of box packs. Vietnam featured the greatest variety of pack types (4: hard, soft, box, and sachet type) across the countries assessed. In Bangladesh and India, the samples contained only hard packs (Table 1).

Pack Shape

We assessed a total of 3534 packs for pack shape (sachets and cylindrical tins were not assessed). Traditional non-slim pack shapes accounted for the highest proportion (79.2%, N = 2800) of packs assessed. The next most prevalent pack shapes were traditional slim packs (16.8%, N = 594), wide non-slim packs (3.4%, N = 119), lipstick packs (0.5%, N = 19), and wide slim (wide but shallow) packs (0.1%, N = 2).

The traditional non-slim pack shape was the most common in each of the 14 countries. However, traditional slim packs were relatively common in Ukraine (41.4%) and Russia (32.5%). Furthermore, wide non-slim packs were fairly common in Brazil (9.5%) compared to other countries, and

lipstick packs were relatively common in Egypt (5.2%).

Overall, Indonesia and Ukraine recorded the greatest variety of pack shapes, with all 5 varieties (traditional non-slim and slim, wide non-slim and slim, and lipstick types) present in these countries. The Philippines and Thailand recorded the least variety in pack shape with only traditional non-slim and slim packs found (Table 2).

Pack Edges

A total of 3117 packs (hard packs only) were coded for edge style. Straight edge was the most common (62.7%, N = 1954) edge type observed. Rounded edge was the second most common (26.1%, N = 813) edge style, and beveled edge was the least common (11.2%, N = 350).

Eleven of the 14 countries had predominantly straight edge packs; however, Turkey (58.5%), Russia (56.4%) and Ukraine (46.6%) had predominantly rounded edge packs. India recorded a relatively high proportion of beveled-edge packs (39.0%) compared to other countries. Thirteen

Table 3
Distribution of Pack Edge, by Country

Country	Year	Coded packs	Straight edge (%)	Beveled edge (%)	Rounded edge (%)
Bangladesh	2016	230	182 (79.1)	16 (7.0)	32 (13.9)
Brazil	2016	98	59 (60.2)	17 (17.4)	22 (22.4)
China	2017	592	498 (84.1)	31 (5.2)	63 (10.6)
Egypt	2013	54	32 (59.3)	12 (22.2)	10 (18.5)
India	2016	95	49 (51.6)	37 (39.0)	9 (9.4)
Indonesia	2015	230	202 (87.8)	14 (6.1)	14 (6.1)
Mexico	2013	121	103 (85.1)	14 (11.6)	4 (3.3)
Pakistan	2013	367	275 (74.9)	63 (17.2)	29 (7.9)
Philippines	2016	72	55 (76.4)	0 (0)	17 (23.6)
Russia	2015	468	139 (29.7)	65 (13.9)	264 (56.4)
Thailand	2015	62	49 (79.0)	4 (6.5)	9 (14.5)
Turkey	2013	282	81 (28.7)	36 (12.8)	165 (58.5)
Ukraine	2013	313	131 (41.9)	36 (11.5)	146 (46.6)
Vietnam	2015	133	99 (74.4)	5 (3.8)	29 (21.8)
Total (%)		3117 (100)	1954 (62.7)	350 (11.2)	813 (26.1)

Note.

Only hard packs were coded for edge style.

Table 4
Distribution of Pack Opening Style, by Country

Country	Year	Coded packs	Flip-top (%)	Vertical Slide (%)	Horizontal Slide (%)	Case (%)	Others (%)
Bangladesh	2016	230	220 (95.7)	9 (3.9)	0 (0)	0 (0)	1 (0.4)
Brazil	2016	98	97 (99.0)	0 (0)	0 (0)	0 (0)	1 (1.0)
China	2017	592	553 (93.4)	4 (0.7)	1 (0.2)	23 (3.9)	11 (1.8)
Egypt	2013	54	54 (100)	0 (0)	0 (0)	0 (0)	0 (0)
India	2016	95	91 (95.8)	2 (2.1)	2 (2.1)	0 (0)	0 (0)
Indonesia	2015	230	203 (88.3)	3 (1.3)	1 (0.4)	0 (0)	23 (10.0)
Mexico	2013	121	116 (95.9)	0 (0)	4 (3.3)	0 (0)	1 (0.8)
Pakistan	2013	367	352 (95.9)	3 (0.8)	0 (0)	5 (1.4)	7 (1.9)
Philippines	2016	72	72 (100)	0 (0)	0 (0)	0 (0)	0 (0)
Russia	2015	493	445 (90.3)	5 (1.0)	12 (2.4)	24 (4.9)	7 (1.4)
Thailand	2015	62	62 (100)	0 (0)	0 (0)	0 (0)	0 (0)
Turkey	2013	282	281 (99.6)	0 (0)	0 (0)	0 (0)	1 (0.4)
Ukraine	2013	314	300 (95.5)	0 (0)	4 (1.3)	5 (1.6)	5 (1.6)
Vietnam	2015	138	129 (93.5)	2 (1.45)	2 (1.45)	5 (3.6)	0 (0)
Total (%)		3148 (100)	2975 (94.5)	28 (0.9)	26 (0.8)	62 (2.0)	57 (1.8)

Note.

Other - Variations of flip-top, slide opening styles, as well as carton packs and the book opening style. Only hard and box pack types were included in the analysis for pack opening styles.

Table 5
Pack Structure Elements by Tobacco Company

Pack structure	BAT (%)	CNTC (%)	ITC (%)	JTI (%)	PMI (%)	KT&G (%)	Others (%)
Pack type							
Total	614 (100)	557 (100)	318 (100)	444 (100)	584 (100)	102 (100)	923 (100)
Hard pack	553 (90.5)	423 (76.0)	314 (98.7)	422 (95.0)	499 (85.4)	102 (100)	813 (88.1)
Soft pack	56 (9.1)	130 (23.3)	4 (1.3)	21 (4.7)	84 (14.4)	0 (0)	88 (9.5)
Box pack	1 (0.2)	0 (0)	0 (0.0)	1 (0.2)	0 (0)	0 (0)	20 (2.2)
Others	1 (0.2)	4 (0.7)	0 (0)	0 (0)	1 (0.2)	0 (0)	2 (0.2)
^a Pack shape							
Total	613 (100)	553 (100)	318 (100)	444 (100)	583 (100)	102 (100)	921 (100)
Traditional- NS	500 (81.6)	472 (85.3)	259 (81.4)	362 (81.5)	513 (88.0)	46 (45.1)	648 (70.4)
Traditional- S	80 (13.0)	64 (11.6)	51 (16.0)	75 (16.9)	62 (10.6)	56 (54.9)	206 (22.3)
Wide- NS	30 (4.9)	15 (2.7)	8 (2.6)	6 (1.4)	4 (0.7)	0 (0)	56 (6.1)
Wide- S	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.2)
Lip stick	3 (0.5)	2 (0.4)	0 (0)	1 (0.2)	4 (0.7)	0 (0)	9 (1.0)
^b Pack edge							
Total	556 (100)	423 (100)	313 (100)	420 (100)	499 (100)	102 (100)	807 (100)
Straight edge	272 (48.9)	408 (96.4)	96 (30.7)	145 (34.5)	296 (59.3)	73 (71.6)	667 (82.7)
Beveled edge	120 (21.6)	2 (0.5)	137 (43.8)	35 (8.3)	12 (2.4)	22 (21.6)	22 (2.7)
Round edge	164 (29.5)	13 (3.1)	80 (25.5)	240 (57.1)	191 (38.3)	7 (6.8)	118 (14.6)
^c Opening style							
Total	557 (100)	423 (100)	314 (100)	423 (100)	499 (100)	102 (100)	833 (100)
Flip-top	551 (98.9)	386 (91.3)	304 (96.8)	395 (93.4)	485 (97.2)	100 (98.0)	757 (90.9)
Vertical slide	0 (0)	4 (0.9)	3 (1.0)	0 (0)	3 (0.6)	0 (0)	18 (2.2)
Horizontal slide	0 (0)	0 (0)	1 (0.3)	20 (4.7)	0 (0)	1 (1.0)	5 (0.6)
Case	4 (0.7)	23 (5.4)	0 (0)	7 (1.7)	0 (0)	1 (1.0)	27 (3.2)
Others	2 (0.4)	10 (2.4)	6 (1.9)	1 (0.2)	11 (2.2)	0 (0)	26 (3.1)

Note.^a Pack shape - excludes only 'Other' pack types.^b Pack edge - includes only 'Hard' pack shapes.^c Opening style - includes only 'Hard' and 'Box' pack shapes.

of the 14 countries demonstrated variety in pack edges, with all 3 variants seen, except for the Philippines where no beveled-edge packs were collected (Table 3).

Opening Styles

A total of 3148 packs (hard packs and boxes) were assessed for opening style with 9 opening styles observed (Figure 1). The most common opening style across all countries was the flip-top style, accounting for 94.5% (N = 2975) of the packs. This was followed by case opening style, which made up 2%

(N = 62) of the packs assessed. No other opening style was found on more than 1% of packs.

Five countries (Brazil, Egypt, Philippines, Thailand, and Turkey) had 99% or more flip-top packs in their respective samples. Case opening styles were most common in Russia (4.9%) and China (3.9%), whereas Indonesia had a relatively high proportion (10%) of other opening styles (Table 4).

Russia (7) and China (6) recorded the greatest variety of opening styles. Russia had flip-tops, vertical and horizontal slide opening, case open-

ing, flip-top variations, slide variations, and carton opening styles, and China had flip-tops, vertical and horizontal slide opening, case opening, flip-top variations, and book opening (Figure 1).

Distribution of Pack Structures by Tobacco Company

KT&G had the highest proportion of hard packs (100%, N = 102), and CNTC recorded the highest proportion of soft packs (23%, N = 130) (Table 5). For pack shapes, PMI had the highest proportion of traditional non-slim packs (88%, N = 513), and KT&G had the highest proportion of traditional slim packs (54.9%, N = 56). Wide packs and lip-stick packs were relatively rare across the tobacco companies assessed (Table 5).

All tobacco companies assessed, except for ITC and JTI, had a higher proportion of straight pack edges than beveled or rounded edges. ITC had a relatively high proportion of beveled-edge packs (43.8%, N = 137), and JTI recorded a high proportion of rounded pack edges (57.1%, N = 240) (Table 5).

The flip-top opening style was the most common across all tobacco companies (range 90%-98.9%). However, case opening styles were relatively common among CNTC (5.4%, N = 23) packs (Table 5). Of the 6 major tobacco companies, CNTC and JTI showed more variety in opening styles, with both consistently having flip-top, slide (vertical or horizontal), case and other opening styles (Table 5).

Common Packaging Structure and Designs

The most common package structure elements, accounting for 80% or more across the sample were hard packs and flip-top packs. Compared to other countries, India and Mexico had the fewest variants in pack structure elements; both countries had over 90% of one type of pack type, shape, and opening style. KT&G was the company with the least variety of pack structure elements (Table 5).

DISCUSSION

Our findings indicate that although packaging structures in LMICs include a diverse range of pack structure elements, certain elements dominate across countries. Hard pack types, traditional

non-slim pack shapes and flip-top opening styles were the dominant packaging structures within and across the 14 countries. Of the pack structure elements, pack edges had the greatest variety within and across the countries. Whereas a vast majority of packs assessed were hard packs, soft packs accounted for almost half of the cigarette packs examined in Thailand, one-third in Brazil and the Philippines, and just less than one-fourth of packs in our sample produced by CNTC. These results reinforce the attention industry pays to cigarette packaging, which remains one of the last marketing vehicles in some countries and can potentially encourage susceptibility to tobacco use.¹⁶

A diverse range of pack opening styles also was seen in our sample, with flip-tops (94.5%) being the most common in all countries. Ratings of novel and innovative packaging, with distinctive opening styles, have been reported to have greater appeal than 'regular' packs with standard flip-top opening styles.^{4,16} Furthermore, industry market research has credited increased cigarette sales and intent to try to novel opening styles such as the slide-opening.² A variety of opening styles were seen in most countries reviewed in our study. These opening styles can provide additional branding space for the industry,²³ and communicate innovation, quality, and appeal, which has been found to attract young consumers of tobacco products.^{4,5}

Although there was a predominance of straight-edged packs in 11 of the countries, Turkey, Russia, and Ukraine had predominantly rounded edge packs and one-third of packs in India featured beveled edges. ITC and JTI had predominantly beveled and rounded edge packs, respectively. Studies on the effect of pack edge have reported that straight edge plain packs have potentially less appeal than beveled-edge plain packs.^{20,26} Similarly, a review of tobacco industry consumer research detailed rounded and beveled-edge packs are perceived as sophisticated and classy, and some consumers find beveled-edge packs more aesthetically pleasing than straight-edged packs.²

Pack edges also affect the visibility of health warning labels. For example, health warning labels can end at the beginning of a bevel on a beveled-edge pack, thereby reducing the space for the health warning, while creating additional branding space along the pack edge. Similarly, a rounded

edge can bring the health warning label into the rounded edge and obstruct the direct view of the warning from the front panel. Countries implementing plain and standardized packaging policies differ in regard to what is required vis-à-vis pack edges.¹⁰ Countries looking to restrict the attractiveness of packaging and maximize the visibility of health warning labels should consider adopting the straight edge design. Novel packaging elements keep the cigarette pack effective as a marketing tool^{16,21,23,25} and are associated with perceptions of cigarette quality and harm.²⁰

Plain and standardized packaging can require uniform pack size, shape, texture, method of opening, base color and font; such measures have been found to reduce appeal and uptake of smoking in countries such as Australia.¹⁰ Of the countries assessed, Thailand and Turkey have enacted plain packaging laws which came into effect at the retail level in December 2019 and January 2020, respectively.^{8,17} Thailand requires all “package or container of cigarettes, and box, case or carton of cigarettes must be rectangular in shape.”^{17,18} The policy makes no explicit statements on pack type, edges, and opening styles.¹⁸ On the other hand, the Turkish policy requires a standard structure with cardboard or soft material.¹⁹ In addition, the policy requires that a flip-top be used.¹⁹ In addition, restrictions on opening styles in the Turkish policy state: “The cigarette unit package cannot have features to change the size of any visible space, expand a surface or create new surfaces using the inner panel,”¹⁹ which restricts several variations in slide and case openings. Research shows that cigarette packages with variations to the standard flip-top pack potentially increase attractiveness and perceived product quality among youth.^{20,21}

This study has some limitations. Although the systematic protocol used to obtain the packs aimed to maximize the diversity of packs purchased from each country, we were not able to weight the packs to account for the market share of each brand variant in each country because such detailed data are not available. Therefore, the presented percentages do not reflect the market share of brands and their variants. Moreover, as the sample was collected in major cities, it might not be representative of the range of pack structure elements available in the whole of these countries. In addition, purchase of

unique products within countries means that there could be some duplicates when findings are presented for the full sample. Nonetheless, we report the most comprehensive description to date of cigarette packaging structure elements in LMICs.

We find that the tobacco industry employs a wide variety of designs in cigarette pack construction across a broad range of LMIC countries. This diverse range of packaging structure elements potentially promotes the attractiveness of tobacco products. Furthermore, these findings provide additional justification for LMICs and HICs considering policies to regulate pack type, pack shape, edge and opening style to a standardized form (standardized packaging policy).

IMPLICATIONS FOR TOBACCO REGULATION

Studies using industry documents reveal that companies pay close attention to tobacco pack construction and design;^{2,3} the implementation of the regulation of packaging structures in the countries we assessed also could have been influenced by the tobacco industry. Comprehensive plain and standardized packaging regulations can address tobacco pack attractiveness and appeal. Future regulations could consider hard pack types, as seen in countries implementing plain and standardized packaging policies such as Canada and Turkey.^{19,24} In addition, pack shape could be the traditional non-slim type, as seen in Australia,¹⁰ with flip-top openings, or slide and shell as seen in Canada which allows for public health warnings inside the packs.²⁴ The use of straight edges as seen in Australia allows for more visible health warnings,¹⁰ and less novelty in attractive structure elements.^{2,4,20}

Our description of the various forms of packaging structure elements in LMICs can inform regulators looking to address the range of cigarette packaging structures on the market in LMICs, and interested in regulating pack type, pack shape, edge, and opening style. Evidence-based standardized packaging measures have the potential to reduce the appeal of tobacco product packaging, and ultimately reduce tobacco use in the population.

Human Subjects Approval Statement

This paper did not include human subjects.

Conflict of Interest Disclosure Statement

None declared.

Acknowledgements

We thank Asim Khan at the Institute for Global Tobacco Control who contributed to the design of the figure illustrating the pack structure elements assessed in the study. We also thank the reviewers who provided detailed and constructive feedback.

References

- Slade J. The pack as an advertisement. *Tob Control*. 1997;6:169-170.
- Kotnowski K, Hammond D. The impact of cigarette pack shape, size and opening: evidence from tobacco company documents. *Addiction*. 2013;108:1658-1668.
- Wakefield M, Morley C, Horan J, Cummings KM. The cigarette pack as image: new evidence from tobacco industry documents. *Tob Control*. 2002;11:173-180.
- Kotnowski K, Fong GT, Gallopel-Morvan K, et al. The impact of cigarette packaging design among young females in Canada: findings from a discrete choice experiment. *Nicotine Tob Res*. 2016;18(5):1348-1356.
- Moodie C, Ford A. Young adult smokers' perceptions of cigarette pack innovation, pack color and plain packaging. *Austral Mark J*. 2011;19:174-180.
- World Health Organization (WHO). WHO Framework Convention on Tobacco Control: Guidelines for Implementation Article 11. https://www.who.int/fctc/guidelines/article_11.pdf?ua=1. Accessed March 28, 2019.
- Gilmore AB, Fooks G, Drope NJ, et al. Exposing and addressing tobacco industry conduct in low and middle-income countries. *Lancet*. 2015;385(9972):1029-1043.
- Campaign for Tobacco Free Kids. Standardized or Plain tobacco packaging international developments. https://www.tobaccofreekids.org/assets/global/pdfs/en/standardized_packaging_developments_en.pdf. Accessed September 1, 2020.
- The World Bank. Country Economies. <https://data.worldbank.org/country>. Accessed March 28, 2019.
- Moodie C, Hoek J, Scheffels J, et al. Plain packaging: legislative differences in Australia, France, the UK, New Zealand and Norway, and options for strengthening regulations. *Tob Control*. 2019;28:485-492.
- Smith KC, Washington C, Brown J, et al. The Tobacco Pack Surveillance System (TPackSS): a protocol for assessing health warning compliance, design features and appeals of tobacco packs sold in low-and middle-income countries. *JMIR Public Health Surveill*. 2015;1:e8.
- World Health Organization (WHO). *WHO Report on the Global Tobacco Epidemic, 2013: Enforcing Bans on Tobacco Advertising, Promotion, and Sponsorship*. Geneva, Switzerland: WHO: 2013. http://apps.who.int/iris/bitstream/10665/85380/1/9789241505871_eng.pdf?ua=1. Published 2013. Accessed June 10, 2020.
- Population Reference Bureau. 2012 World Population Data Sheet. https://www.prb.org/wp-content/uploads/2012/07/2012-population-data-sheet_eng.pdf. Published July 2012. Accessed September 1, 2020.
- Ng M, Freeman MK, Fleming TD, et al. Smoking prevalence, and cigarette consumption in 187 countries, 1980-2012. *JAMA*. 2014;311(2):183-192.
- Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33(1):159-174.
- Ford A, MacKintosh AM, Moodie C, et al. Cigarette pack design and adolescent smoking susceptibility: a cross-sectional survey. *BMJ Open*. 2013;3:e003282.
- Canadian Cancer Society. Plain Packaging – International Overview. <http://www.cancer.ca/-/media/cancer.ca/CW/for%20media/Media%20releases/2019/plain-packaging-overview---2019-05-07.pdf?la=en>. Published May 7, 2019. Accessed June 30, 2019.
- Thailand Government Gazette. Notification of the Ministry of Public Health Subject: Criteria, methods and conditions on tobacco product and cigarette packaging. <https://www.tobaccocontrolaws.org/files/live/Thailand/Thailand%20-%20Notif.%20of%20P%26L%20Rules%202018.pdf>. Published December 13, 2018. Accessed June 1, 2019.
- Turkish Official Gazette. Regulation on the procedures and principles related to the production methods, labeling and surveillance of tobacco products: Article 11- the color, shape and content of the package and the properties of the product. <https://www.tobaccocontrolaws.org/files/live/Turkey/Turkey%20-%202019%20Regs.pdf>. Published March 1, 2019. Accessed June 1, 2019.
- Borland R, Savvas S, Sharkie F, Moore K. The impact of structural packaging design on young adult smokers' perceptions of tobacco products. *Tob Control*. 2013;22:97-102.
- Moodie C, Angus K, Ford A. The importance of cigarette packaging in a 'dark' market: the 'silk cut' experience. *Tob Control*. 2014;23:274-278.
- Siahpush M, Farazi PA, Maloney SI, et al. Socioeconomic status, and cigarette expenditure among US households: results from 2010 to 2015 consumer expenditure survey. *BMJ Open*. 2018;8:e020571.
- Neuber D. New shapes, new feel for cigarette packs. *Tobacco Journal*. http://www.tobaccojournal.com/New_shapes_new_feel_for_cigarette_packs.49605.0.htm. Published July 8, 2009. Accessed June 1, 2019.
- Government of Canada. Tobacco Products Regulations (Plain and Standardized Appearance): SOR/2019-107 2019. *Canada Gazette*. Part II. 2019;153(9). <http://www.gazette.gc.ca/rp-pr/p2/2019/2019-05-01/html/sor-dors107-eng.html>. Published April 24, 2019. Accessed June 30, 2019.
- Centre for Tobacco Control Research. The packaging of tobacco products. Stirling, UK: Centre for Tobacco Control Research, University of Stirling; 2012. https://www.cancerresearchuk.org/sites/default/files/execsumcancer_research_uk-funded_report_on_tobacco_packaging_written_by_the_centre_for_tobacco_control_research.pdf. Published March 2012. Accessed July 21, 2020.
- Mucan B, Moodie C. Young adult smokers' perceptions of plain packs, numbered packs and pack inserts in Turkey: a focus group study. *Tob Control*. 2018;27:631-636.

Appendix
Frequency of “Other” Opening Style Categories by Country

Country	Variation of Flip-top	Variation of Slide-opening	Carton Opening	Book Opening
Bangladesh	1	0	0	0
Brazil	1	0	0	0
China	10	0	0	1
Egypt	0	0	0	0
India	0	0	0	0
Indonesia	1	21	0	1
Mexico	0	0	1	0
Pakistan	0	7	0	0
Philippines	0	0	0	0
Russia	3	1	2	0
Thailand	0	0	0	0
Turkey	1	0	0	0
Ukraine	3	0	2	0
Vietnam	0	0	0	0
Total	20	29	5	2