

Original Investigation

# Health Claims, Marketing Appeals, and Warnings on Popular Brands of Waterpipe Tobacco Packaging Sold in the United States

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## Abstract

**Introduction:** Waterpipe tobacco (WT) smoking is associated with misperceptions of harm, especially among users. WT packaging contains imagery, flavor descriptors, and text claims that may contribute to misperceptions. The study goal was to characterize visual and text elements of WT packaging.

**Aims and Methods:** Using data from the U.S. Population Assessment on Tobacco and Health Study Wave 2 (October 2014–October 2015), we identified the 10 most popular WT brands. For each brand, we identified available flavors, including flavor collections with unique packaging elements. We randomly selected 10 flavors per brand for purchase (March–April 2018). We conducted descriptive content analysis to code all textual and visual design elements of each package.

**Results:** Over half (54%) of WT packages had modified risk tobacco product (MRTP) claims prohibited by federal law, including substance-free MRTP claims (43%) and the descriptor “natural” (11%). No MRTP reduced exposure or reduced risk claims were found. Over a quarter (26%) of packaging including one or more of terms that may imply reduced harm including “fresh,” “premium,” “quality,” and “pure.” All packages included a text-only warning, yet none appeared on the primary display panel. Almost all packaging (99%) included imagery, with 72% including flavor imagery. The majority of packages (72%) included a smoking cue. The most popular marketing appeals were “well-made” (57%), “enjoyable” (55%), and “patriotic” (47%).

**Conclusions:** Prohibited MRTP claims, other descriptors, and flavor imagery are common on WT packaging, despite federal law. Future research is needed to evaluate if this marketing contributes to misperceptions of reduced harm.

**Implications:** Tobacco packaging is used to convey health-related messages, both explicitly and implicitly; however, information about WT packaging is virtually nonexistent. We conducted a content analysis of WT packaging from the 10 most popular US brands. Over half (54%) of packages

had prohibited MRTP claims and over a quarter (26%) included one or more descriptors that may be perceived as implying reduced harm. Use of imagery, including smoking cues, was common. The widespread use of prohibited MRTP claims, other descriptors, and imagery on WT packaging may contribute to misperceptions of reduced harm.

## Introduction

Waterpipe tobacco (WT) smoking is popular among young adults.<sup>1</sup> The 2018 Monitoring the Future study indicated the WT smoking in the past 12 months, among those ages 19–28, was 13.3%.<sup>2</sup> WT smoking is associated with significant harms. WT smokers are exposed to high levels of toxicants, including carcinogenic polycyclic aromatic hydrocarbons, carbon monoxide, and heavy metals.<sup>3–5</sup> Exposure to these carcinogens and toxicants, which are often present in higher levels than in cigarette smoke, results in many of the same health harms as cigarette smoking, including lung, oral, head, neck, and esophageal cancers; respiratory illness; chronic obstructive pulmonary disease; cardiovascular disease; and low birth weight.<sup>6–10</sup> Chronic WT smoking has been associated with indicators of immune suppression in mice models.<sup>11</sup> WT smoking is also associated with unique health risks such as carbon monoxide toxicity<sup>12</sup> and spread of communicable diseases.<sup>13</sup> Although WT smoking carries similar health risks as cigarette smoking, many consumers erroneously believe it is less harmful and less addictive,<sup>14–16</sup> and these misperceptions are positively associated with waterpipe use.<sup>17</sup>

WT packaging contains imagery, descriptors, and text-based claims that may be associated with misperceptions of harm. Research has shown several elements of *cigarette packaging* convey health information.<sup>18,19</sup> Cigarette packs convey information about strength, flavor (eg, green denotes menthol), and reduced harm.<sup>20,21</sup> Research on *cigarette advertising* showed imagery depicting nature scenes, were quite common, appearing on 58% of ads.<sup>22</sup> These portrayals may implicitly communicate health information by linking the tobacco product to natural elements.

Research on WT packaging is scarce. To our knowledge, only two studies on WT packaging has been conducted. Ward et al. assessed packaging from 16 WT brands sold in the United States to assess health warnings on the label.<sup>23</sup> Health warnings were common on WT packaging, even before mandated by US federal law. Studying WT packaging purchased in Lebanon, Dubai, Palestine, Syria, Jordan, Bahrain, Canada, Germany, and South Africa, Nakkash and Khalil found that 77% of the packages studied indicated “0% tar.”<sup>24</sup> However, this is misleading because tar is a *smoke* constituent and not a component of the actual *tobacco*. Additionally, descriptors, such as “premium taste” and “ultra lights” were found on 27% of the packs. To our knowledge, no studies have assessed WT packaging for the inclusion of imagery or other descriptors that may communicate health information.

The final Deeming Rule extended the U.S. Food and Drug Administration’s (FDA) authority from the Family Smoking Prevention and Tobacco Control Act (TCA)<sup>25</sup> to regulate WT, including labeling and advertising prohibitions for manufacturers and retailers.<sup>26</sup> As a result, the FDA now regulates WT packaging. Under the final Deeming Rule, beginning November 8, 2017, with a 30-day sell-off period for existing stock, packages of WT were prohibited from making unsubstantiated modified risk tobacco product (MRTP) claims that imply decreased harm. Section 911 of the TCA

includes four distinct prohibitions on unauthorized MRTP claims: (1) reduced risk claims; (2) reduced exposure claims; (3) substance-free claims; and (4) modified risk descriptors including *light*, *mild*, *low* and *other similar descriptors*. The TCA also prohibits claims that a product is approved by the FDA, that the FDA deems a product safe, that the FDA endorses the product, or that the product is safe by virtue of the fact that it is FDA regulated.

While the TCA does not provide guidance for how such *other similar descriptors* are defined, the FDA has issued warning letters to several retailers for using descriptors other than *light*, *mild*, and *low*. For example, Santa Fe Natural Tobacco Company, Inc. received a warning letter stating, “Your product labeling for Natural American Spirit cigarettes, which uses the descriptors ‘Natural’ and ‘Additive Free,’ represents explicitly and/or implicitly that the products or their smoke do not contain or are free of a substance and/or that the products present a lower risk of tobacco-related disease or are less harmful than one or more other commercially marketed tobacco products. As such, these products are modified risk tobacco products.”<sup>27</sup> Based on these warning letters, it is clear the FDA considers “natural” and “additive-free” to be prohibited. Because of the structure of the TCA, if a term is a prohibited descriptor, it is a prohibited descriptor for all tobacco products in all contexts. However, there may be other terms that may convey reduced risk messages that are on WT packaging.

The goal of this study was to characterize visual and text elements of a variety of WT packaging to identify the ways in which the packaging may convey information to consumers that could result in reduced risk perceptions. To do so, we assessed packaging from 10 different flavors from the 10 most popular brands. To our knowledge, this is the first study conducted to assess compliance with FDA’s MRTP prohibitions.

## Methods

### Brand Identification

We identified the 10 most popular US WT brands using publicly available data from the adult and youth Wave 2 (October 2014–October 2015) surveys of the Population Assessment on Tobacco and Health Study (PATH), conducted in the United States. The PATH study asks all participants who reported any WT use in past 12 months, “*What brand of shisha or hookah tobacco did you usually/last smoke?*” We compiled the 10 most endorsed brands of WT for adolescents (12–17), young adults (18–24), and adults (25+). We only included WT that contained nicotine, because herbal shisha is outside the FDA’s authority and not subject to the same regulations. Although there were differences in the rank among adolescents, young adults, and adults, the 10 most popular brands were consistent across the three groups (Table 1). One brand was no longer available at the time of this study, so we replaced Havana with the next most popular brand across the three age groups. The top 10 brands account for the brand preferences identified by 64.5% of adolescents, 61.1% of young adults, and 58.5% of older adults.

**Table 1.** Most Popular Usual WT Brands Reported by Each Age Group From PATH Wave 2

Brand	Adults (25+)	Young adults (18–24)	Youth (12–17)
	N = 2669	N = 1707	N = 120
	Rank (percent) within adults	Rank (percent) within young adults	Rank (percent) within youth
Starbuzz	1 (18.6%)	1 (24.1%)	1 (14.6%)
Fantasia	2 (9.1%)	2 (11.3%)	2 (13.1%)
Al Fakher	3 (6.6%)	3 (6.6%)	7 (5.2%)
Havana <sup>a</sup>	4 (5.7%) <sup>a</sup>	4 (6.2%) <sup>a</sup>	6 (5.8%) <sup>a</sup>
Al Amir	5 (4.7%)	6 (4.1%)	9 (2.6%)
Social Smoke	6 (4.6%)	8 (3.6%)	8 (4.7%)
HookahFina	7 (3.9%)	5 (4.2%)	3 (8.5%)
Inhale	8 (3.2%)	7 (3.6%)	5 (6.2%)
Tonic	9 (2.5%)	9 (3.0%)	4 (6.3%)
Fumari	10 (2.4%)	10 (2.7%)	10 (2.1%)
Tangiers	11 (1.9%)	11 (1.5%)	12 (1.2%) <sup>b</sup>

PATH = Population Assessment on Tobacco and Health Study; WT = waterpipe tobacco.

<sup>a</sup>Havana was no longer available at the time the study was conducted and was replaced by Tangiers.

<sup>b</sup>For youth, Tangiers was ranked 12th (1.2%), below Romman which was ranked 11th (1.3%).

### Flavor Sampling

To select 10 flavors for each brand, we created a sampling frame by conducting comprehensive internet searches. Five of the 10 WT brands had brand-specific websites that listed all flavors. To identify all flavors available for the five brands without websites, we searched five WT retail websites that sell multiple WT brands. These five websites were identified using internet searches on Google and Bing for “buy hookah tobacco” or “buy shisha tobacco.” We reviewed each site from the first two pages of results and selected sites that sold seven or more of the brands identified from the PATH analysis, including [hookah-shisha.com](http://hookah-shisha.com), [southsmoke.com](http://southsmoke.com), [hookahcompany.com](http://hookahcompany.com), [thehookah.com](http://thehookah.com), and [hookahjohn.com](http://hookahjohn.com). For the five WT brands that had their own brand website, we also searched [hookah-shisha.com](http://hookah-shisha.com) and [southsmoke.com](http://southsmoke.com), the two most comprehensive websites, to confirm no flavors were missing. We recorded flavor names, descriptions (if provided), flavor collections, and package size. Half of the brands included distinct flavor collections or product lines (eg, Bold, Exotic) with unique packaging elements. For brands without flavor collections, we randomly sampled 10. For brands with flavor collections, we created strata for each flavor collection and randomly selected proportionate to the number of in each strata for a total of 10 for purchase.

### WT Package Purchase

The 100 WT packages (100 g or the next largest size) were purchased online through the five WT vendors listed above. If after searching these five websites, we were unable to find the specific WT flavor (typically because it was out of stock), a replacement flavor was randomly selected and purchased from the same brand. Purchases were made between March and April 2018.

### Content Analysis

We used descriptive content analytic methods to code all textual and visual design elements of each of the 100 WT packages. We followed best practices developed by Riffe et al.<sup>28</sup> The study team developed a codebook that was pilot tested with a separate sample of WT packages not included in the analytic sample. Three coders were trained on the coding protocol. We assessed inter-reliability on all

variables after the initial training period. Results of average pairwise agreement ranged from 76.19% to 100%. Additionally training was conducted for variables with any disagreement between raters during the initial training period. Once training was complete, the 100 packages were double-coded independently.<sup>29</sup> Where discrepancies arose, the third trained coder served as a judge to make final decisions.

The coding assessed presence of four explicit types of FDA-prohibited MRTP claims, including: (1) reduced risk; (2) reduced exposure; (3) substance-free; (4) modified risk descriptors including *light*, *mild*, *low*, and *natural*. We also assessed whether claims of “pharmaceutical grade,” or any reference to the FDA (eg, FDA-approved) were made. We documented descriptors that may be associated with perceptions of reduced risk, including: “fresh,” “premium,” “quality,” “pure,” and “smooth.” If present, we documented the specific wording and where the descriptor was located: on the primary display (package front), secondary display (back of all packages, as well as top of cylinders), tertiary displays (sides, back, bottom), or in multiple locations including (or not) the primary display.

We documented the presence, location, and content of ingredient list, including whether “tobacco” or “nicotine content” appeared in the ingredient list or elsewhere. We also documented the use of the words “shisha” and “hookah.” We documented the content and placement of all warnings; however, this study was conducted prior to the requirement for WT packaging to carry the nicotine warning.<sup>26</sup> We documented use of Arabic or other languages and American-made claims. We coded package imagery, including flavor imagery, smoking (ie, actual person smoking WT), smoking cues (ie, smoke, waterpipe, charcoal), and whether images were cartoon images.<sup>30–33</sup> Last, we coded the overall marketing appeals used on the packaging based on the holistic presentation of text and images shown. Marketing appeals were not mutually exclusive and included categories for: “well-made” by displaying reference to expensive, special choice, or being superior to a competitive product<sup>34</sup>; “enjoyable” if the packaging conveyed satisfaction, relaxation, or other descriptors of a positive experience<sup>34</sup>; “patriotic” if representations of American or American symbolism were shown; “sociability” if the packaging implied having fun, camaraderie, or being

enjoyed with others<sup>30,34–37</sup>; “fantasy/entertainment” for themes of sci-fiction, psychedelic or other unrealistic representations of life; “sexuality/romance” for displays of romantic symbolism or sexual innuendo<sup>35</sup>; “modern” if technologically advanced, cutting-edge, or state-of-the-art<sup>38</sup>; and “individuality” or any depiction break from the mainstream, independence, or self-sufficiency.<sup>35</sup>

## Analysis

The goal of the analysis was to describe the common elements found on WT packaging and to describe the use of MRTP-prohibited claims overall in the sample. Therefore, we computed frequencies and percentages for all coded data.

## Results

The comprehensive internet search process resulted in 920 flavors across 10 brands (Table 2).

### Prohibited Claims

We examined the presence of four types of prohibited claims: reduced risk; reduced exposure; substance-free; modified risk descriptors including *light*, *mild*, *low*, and *natural*. Over half (54%) of WT packages had one or more FDA-prohibited MRTP claims. There were no claims of reduced risk or reduced exposure. However, 53% of packages contained substance-free MRTP claims, including 38% of packages with a “tar free” claim; this was depicted as “tar 0%” on the top (28%) and back (10%) of packaging. “No additive” claims were present on 15% of packaging, primarily on the back of packages (10%), but also on the front of the package (5%). All “no additive” claims referred to no artificial colors and/or preservatives. No packages had “no nicotine” claims. The only prohibited MRTP descriptor we found was “Natural,” on 11% of packages. This descriptor most often appeared in the phrase, “natural flavors,” in the ingredients on the bottom of the package (10%). The following prohibited descriptors were not found: “light,” “mild,” “low,” and “organic.” Packages from seven of the 10 brands included at least one claim from one of the four prohibited MRTP categories (Table 3). There were no references to “pharmaceutical grade” or any reference to the FDA (eg, FDA-approved) across any of the packaging in the sample.

**Table 2.** Included Brands, Numbers of Flavors per Brand, and Flavor Collections

Brand	Number of flavors	Flavor collection
Starbuzz Tobacco	182	Regular, Serpent, Bold, Acid, Vintage
Tangiers	145	Burque, Noir, Burley, F-Line
Fantasia	110	Regular, Trendsettah, Ice, Formula Series, Castro’s Blend
Al Fakher	94	Standard Range, Golden Range, Special Edition
Tonic	92	NA
HookaFina	91	Gold Leaf, Blak
Social Smoke	74	NA
Al Amir	52	NA
Fumari	41	NA
Inhale	39	NA
Total number of flavors	920	

NA = not applicable.

### Other Reduced Risk Descriptors

Because the law does not document all possible prohibited MRTP descriptors, we assessed other terms that may be associated with perceptions of reduced harm. Over a quarter (26%) of packaging included one or more of these potential MRTP descriptors. The descriptor “fresh” appeared on 12% of packages in multiple locations, including the phrase “strikingly fresh” on the front of 10% of packages. The descriptor “premium” appeared on 11% of packages and was in multiple locations, including with the phrase “premium hookah tobacco” on the front of 10% of packages. The descriptor “quality” appeared on 11% of packages; with most of these on the front of the package (10%) and referring to “quality tobacco since 1997.” The descriptor “pure” appeared on 3% of packages. We did not find use of “smooth” as a descriptor.

### Ingredients, Nicotine Content, and Terminology

Seventy percent of packages included ingredient lists, and “tobacco” was listed as an ingredient on all. Although nicotine is a constituent of the tobacco, it was included in the ingredients list on 38% of packages. In all cases, the nicotine content was listed as 0.05%. An additional 11% referenced “nicotine” somewhere else on the label, but only among packages with tobacco in the ingredient list. Some packages (16%) referenced “tobacco” on the label other than the ingredient list, bringing the total of packages with any reference to “tobacco” to 86%. Many packages (71%) included the word “hookah,” shown on the front of the package in all but one case. Reference to “shisha” was less common (19%) and appeared only on the top or back of cylinder packages. Flavors were explicitly named on 100% of the packages, always on the front and often (38%) shown in more than one location.

### Warnings

All packages (100%) included a text-only warning. No warnings appeared on the primary display (ie, the front of the packaging). Most packages (71%) had a single warning, while some had two (19%) or three (10%) warnings. Notably the warnings varied across brands (Table 4). Twenty percent included a warning required by the State of California under Proposition 65. Eighty percent of packages used the phrase “smoking” followed by health effects. Just under half (49%) used the phrase “this product” somewhere in the warning. No warning included the word “hookah” or “shisha.” The warnings addressed a variety of health effects, including lung cancer, heart disease, emphysema, pregnancy complications, and reproductive harm.

### Arabic Language and Manufacturer Information

A fifth of the packages (20%) included Arabic, with half of those including the Arabic text on the primary display panel. The Arabic text was translated by a native Arabic speaker. One brand included the phrase “Excellent Hookah Tobacco” and the flavor name in Arabic. The second brand had the phrase “Deluxe Hookah Tobacco.” No other languages were shown. Most (87%) included explicit claims that the WT was American-made.

### Package Imagery

Almost all packaging (99%) included imagery. Packages had illustrations only (50%) or a combination of illustrations and photographs (49%). Many packages (72%) had flavor imagery, including images of fruit (45%), sweets or candy (10%), mint leaves (7%), alcohol

**Table 3.** Number of MRTP Claims and Tobacco Information Present by Brand

	<i>n</i> in brand									
	1	2	3	4	5	6	7	8	9	10
Substance-free claims										
“Tar free”	0	0	8	10	0	0	0	10	10	0
“No additive”	5	0	0	0	0	0	0	0	0	10
MRTP descriptors										
“Natural”	0	0	0	10	1	0	0	0	0	0
Other reduced risk descriptors										
“Fresh”	0	10	0	0	0	0	2	0	0	0
“Premium”	0	0	0	10	0	0	1	0	0	0
“Quality”	0	10	0	0	0	0	1	0	0	0
“Pure”	0	0	2	0	0	0	1	0	0	0
Ingredient list										
“Tobacco”	0	0	10	10	10	10	10	10	10	0
“Nicotine content”	0	0	8	10	0	0	0	10	10	0
“Tobacco”	10	10	10	10	10	10	6	10	0	10
“Nicotine”	0	0	2	0	0	9	0	0	0	0
“Hookah”	10	10	10	10	0	1	10	10	0	10
“Shisha”	0	0	0	0	0	0	0	9	10	0

Brand 1 = Social Smoke; Brand 2 = Fumari; Brand 3 = HookaFina; Brand 4 = Inhale; Brand 5 = Al Fakher; Brand 6 = Starbuzz; Brand 7 = Fantasia; Brand 8 = Al Amir; Brand 9 = Tonic; Brand 10 = Tangiers; MRTP = modified risk tobacco product.

(5%), other herbs and spices (3%), or coffee (2%). Most packages (72%) also included a smoking cue, with 35% showing a waterpipe or charcoal, 13% with smoking imagery (ie, using a waterpipe), and 24% including both. Moreover, a fifth (20%) depicted actual WT smoking (vs. smoke or related objects). Notably, 27% of packages included a cartoon character or personified object, while only one package had an image of a real person.

### Marketing Appeals

Thirty-one percent of packages contained a single marketing appeal, 27% included two, 27% included three, and 7% had four or more marketing appeals. The most popular marketing appeal was “well-made” (eg, expensive, special choice, or blend), shown on 57% of packages. Over half (55%) had an “enjoyable” marketing appeal—where the packaging portrayed satisfaction, relaxation, or pleasure. Almost half (47%) had a “patriotic” marketing appeal with representations of American or American symbolism shown (eg, flag). Some packages (17%) included “sociability” appeals, conveying being carefree, playful, or that the product should be enjoyed with others. Less common were marketing appeals included themes of fantasy or entertainment (8%), sexuality or romance (5%), being modern or state-of-the-art (5%), or depicting a break from the mainstream for individuality (3%).

### Discussion

WT smoking is associated with many of the same health risks as cigarette smoking; however, consumers often erroneously believe WT smoking is less harmful.<sup>14–16</sup> Research shows tobacco companies intentionally use product packaging to create product appeal and convey information related to health risks.<sup>39,40</sup> We found many popular WT brands continue to use appealing packing elements. We also found that most package designs, with the exception of the associated flavor imagery, were consistent across the 10 flavors within a brand, but variation between brands was substantial.

Prohibited MRTP claims were found on 54% of WT packages across seven out of the 10 brands. While packaging did not make claims of reduced risk or reduced exposure, 43% included substance-free claims. These included tar-free or 0% tar claims. Not only do these claims violate the prohibition on substance-free claims, these claims are deceiving in that tar is the byproduct of combustion and not a component of the tobacco itself.<sup>41</sup> Moreover, these claims are reminiscent of light and low-tar cigarettes introduced in the late 1960s. These cigarettes had more ventilation holes in the filters to dilute the smoke leading to lower tar levels using smoking machines to assess yield. However, actual smokers changed their smoking behavior by covering the holes and increasing puff volume and duration.<sup>42</sup> Marketing strategies led to beliefs that these cigarettes were safer, yet there is no evidence of any health benefits at the population level.<sup>42,43</sup> As a result, Congress prohibited the use of light, mild, and low on cigarettes packages and advertisements in the TCA.<sup>25</sup> Similarly, the TCA prohibits claims that a “tobacco product or its smoke does not contain or is free of a substance.” There is a narrow exemption for smokeless tobacco products but there is little question that calling any product “tar-free” would violate the statute.

We also found additive-free claims on 15% of packages, referring to no artificial colors and/or preservatives. These are prohibited MRTP claims because they claim that the product is “free of a substance.” Additionally, the descriptor “natural” was found on 11% of packages. In all cases, the term was used to refer to flavors. Whether the FDA considers that a violation of prohibited descriptors in this context is unclear.

Other descriptors, not specifically prohibited by the law were also somewhat common. Descriptors including “fresh,” “premium,” “quality,” and “pure” were found on 26% of packages. These terms were used to denote the superiority of the tobacco and may contribute to perceptions of reduced harm. Research on whether such claims mislead consumers regarding modified risks can inform potential regulatory measures to prohibit them.

Most packages (70%) had an ingredient list and in all cases, tobacco was listed as an ingredient. Nicotine content was included



**Table 4.** Text of Warnings on WT Packaging

Warning text	% of packages
Surgeon General Warning: Smoking causes lung cancer, heart disease, emphysema, and may complicate pregnancy.	21
DISCLAIMER: Smoking is bad. Well, it's better than hitting someone with an ax... This product contains chemicals known by the State of California to cause cancer, birth defects, or reproductive harm. Underage sale is prohibited.	10
PROPOSITION 65 WARNING: This product contains chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm.	10
SURGEON GENERAL WARNING: Smoking is main cause of cancer & hazardous to health.	10
SURGEON GENERAL WARNING: Smoking causes lung cancer, emphysema, and may complicate pregnancy.	10
SURGEON GENERAL'S WARNING: Quitting Smoking Now, Greatly Reduces Serious Risks to Your Health.	10
Warning: This product contains tobacco. Many tobacco products have been shown to cause cancer, lung disease, birth defects in pregnant women, arterial disease and many other diseases that will shorten your life. This blend of ingredients and tobacco may inadvertently have some negative health effects that are completely unforeseen by the manufacturer. Tangiers Special blends are made in different ways to enhance the enjoyment of you, the smoker. These are not safer than regular Tangiers Tobacco and may be more addictive or hazardous to your health. They are not intended to be safer alternatives.	10
Warning! This product contains tobacco. Many tobacco products have been shown to cause cancer, lung disease, birth defects in pregnant women, arterial disease and many other maladies that will shorten your life. This blend of ingredients and tobacco may inadvertently have some negative health effects that are completely unforeseen by the manufacturer.	10
Warning: This Product Is Not A Safe Alternative To Cigarettes Or Smokeless Tobacco Products.	10
Warning: Smoking regularly poses risks of cancer of the mouth, throat, Larynx, and esophagus similar to smoking cigarettes. This product contains chemicals known to the State of California to cause cancer and birth defects and other reproductive harm.	10
SURGEON GENERAL WARNING: Tobacco Use Increases The Risk Of Infertility, Stillbirth, And Low Birth Weight.	10
WARNING: This product contains nicotine. Nicotine is an addictive chemical.	9
SURGEON GENERAL WARNING: Smoking causes lung cancer, heart disease, emphysema, and may complicate pregnancy.	9

WT = waterpipe tobacco.

in the ingredient list on 38% of packages and was found outside of the ingredient list on 11% of packages. Only 16% of packages used the word “tobacco” outside of the ingredient list. The lack of the word “tobacco” or “nicotine” outside of the ingredients list raises questions about transparency of the product. It is unclear whether common misperceptions of reduced likelihood of nicotine addiction may be, at least in part, attributed to the lack of prominence of the words “tobacco” and “nicotine” on the product packaging. Although the word “hookah” was commonly found on packages, that word may not imply to consumers that the product is a tobacco product. Future research should assess whether the lack of the words “tobacco” and “nicotine” prominently displayed on the packaging contributes to consumers’ misperceptions.

Similar to Ward et al., we found that although the FDA-mandated WT warnings were not required on packaging when the study was conducted, all packages did contain warnings.<sup>23</sup> The only requirement for warnings came from California Proposition 65, which was found on 20% of packages. No warnings appeared on the front of the packages. No warnings used the phrase “smoking hookah” to precede any of the health effects, but most used the phrase “smoking.” Warnings that fail to directly tie the tobacco product to the health effects may be less effective because they may appear to be less relevant to the tobacco product. No warnings included pictorial representations of the health effects despite substantial evidence that for cigarettes pictorial warnings are more effective than text-only.<sup>44</sup> The requirement of WT packages to include the FDA-mandated nicotine warning will likely impact the inclusion of voluntary warnings. Future research should assess how warnings on the primary display panel changes packaging elements.

Use of Arabic text was found on 20% of packaging. Use of such text could indicate country of origin, found to be associated with authenticity and perceived quality.<sup>45</sup> The Arabic text included descriptions of the tobacco as either “excellent” or “deluxe.” Research on

consumer perceptions of packages containing Arabic text is needed to fully understand the impact.

Imagery was ubiquitous on packaging, mostly depicting flavors, but also showing waterpipes and the act of smoking. Although other tobacco products use color to communicate flavor, we found WT is more akin to food products in its use of food imagery to reinforce flavoring. The presence of food imagery on food packaging leads to greater purchase intentions, more consumption and increased perceptions of healthfulness,<sup>46-48</sup> and likely functions similarly on WT packaging. Indeed, research indicates that WT is highly flavored<sup>49</sup> and users overwhelmingly prefer flavored to unflavored WT.<sup>50,51</sup> Users rely on both explicit and implicit claims communicated through branding and imagery to assess brand image (eg, sociable), quality (eg, well-made), and sensory attributes (eg, taste).<sup>45,52-54</sup> Moreover, smoking cues (eg, hookahs, smoking) may increase consumption; smoking cues for other tobacco products (eg, cigarettes, vaping) have been shown to increase smoking urges.<sup>32,55</sup>

### Limitations

This study is limited in the inclusion of just 10 brands. With the exception of flavor imagery, packaging elements were quite similar *within* a brand, but substantially different between brands. Additionally, several of the brands included flavor collections with unique packaging elements. Therefore, a larger sample of brands would provide a more comprehensive understanding of claims. Identification of brands using PATH data were not control for the possibility of nesting of adolescents and adults from the same household. However, the public use dataset does not allow for linking respondents within households. It is possible that the top 10 brands could have shifted if we were able to adjust for nesting. This study was conducted before the requirement of the FDA-mandated nicotine warning to be placed on the two principal display panels. Because of this requirement, some packaging elements may shift. However, branding is a critically important

aspect of marketing and companies are resistant to changes that may impact branding.<sup>56</sup> For example, a recent study demonstrated that most design elements assessed on Instagram e-liquid promotional posts did not change after the implementation of the FDA-mandated nicotine warning.<sup>57</sup> It will be critical to understand whether and how manufacturers change packaging to accommodate this warning requirement.

The widespread use of flavor imagery, MRTP claims, and other descriptors on WT packaging may contribute to misperceptions of reduced harm of WT smoking. Extensive tobacco industry package design testing and marketing research for cigarettes has shown that text claims and imagery are critical to consumers' willingness to try a product by increasing product appeal and reducing harm perceptions.<sup>19,58,59</sup> Consumers rely on both text and visual claims to assess product appeal, which includes perceptions of the quality and sensory attributes (eg, taste).<sup>52-54</sup> Text and visual claims may mislead consumers by implying products are less strong or have lower health risks.<sup>19,58</sup> The FDA should take swift action against violators of MRTP prohibitions and should also consider whether other descriptors may convey reduced harm information to consumers.

## Supplementary Material

A Contributorship Form detailing each author's specific involvement with this content, as well as any supplementary data, are available online at <https://academic.oup.com/ntr>.

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## Declaration of Interests

None declared.

## References

- Soulakova JN, Pham T, Owens VL, Crockett LJ. Prevalence and factors associated with use of hookah tobacco among young adults in the U.S. *Addict Behav.* 2018;85:21–25.
- Schulenberg JE, Johnston LD, O'Malley PM, Bachman JG, Miech RA, Patrick ME. *Monitoring the Future National Survey Results on Drug Use, 1975–2018: Volume II, College Students and Adults Ages 19–60*. Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2019.
- Shihadeh A, Schubert J, Klaiany J, El Sabban M, Luch A, Saliba NA. Toxicant content, physical properties and biological activity of waterpipe tobacco smoke and its tobacco-free alternatives. *Tob Control.* 2015;24(suppl 1):i22–i30.
- Al Rashidi M, Shihadeh A, Saliba NA. Volatile aldehydes in the mainstream smoke of the narghile waterpipe. *Food Chem Toxicol.* 2008;46(11):3546–3549.
- Daher N, Saleh R, Jaroudi E, et al. Comparison of carcinogen, carbon monoxide, and ultrafine particle emissions from narghile waterpipe and cigarette smoking: sidestream smoke measurements and assessment of second-hand smoke emission factors. *Atmos Environ (1994).* 2010;44(1):8–14.
- Montazeri Z, Nyiraneza C, El-Katerji H, Little J. Waterpipe smoking and cancer: systematic review and meta-analysis. *Tob Control.* 2017;26(1):92–97.
- Waziry R, Jawad M, Ballout RA, Al Akel M, Akl EA. The effects of waterpipe tobacco smoking on health outcomes: an updated systematic review and meta-analysis. *Int J Epidemiol.* 2017;46(1):32–43.
- Mamtani R, Cheema S, Sheikh J, Al Mulla A, Lowenfels A, Maisonneuve P. Cancer risk in waterpipe smokers: a meta-analysis. *Int J Public Health.* 2017;62(1):73–83.
- Raad D, Gaddam S, Schunemann HJ, et al. Effects of water-pipe smoking on lung function: a systematic review and meta-analysis. *Chest.* 2011;139(4):764–774.
- Rezk-Hanna M, Benowitz NL. Cardiovascular effects of hookah smoking: potential implications for cardiovascular risk. *Nicotine Tob Res.* 2019;21(9):1151–1161.
- Reyes-Caballero H, Park B, Loube J, et al. Immune modulation by chronic exposure to waterpipe smoke and immediate-early gene regulation in murine lungs. *Tob Control.* 2020;29(suppl 2):s80–s89.
- El-Zaatari ZM, Chami HA, Zaatari GS. Health effects associated with waterpipe smoking. *Tob Control.* 2015;24(suppl 1):i31–i43.
- Soule EK, Lipato T, Eissenberg T. Waterpipe tobacco smoking: a new smoking epidemic among the young? *Curr Pulmonol Rep.* 2015;4(4):163–172.
- Akl EA, Jawad M, Lam WY, Co CN, Obeid R, Irani J. Motives, beliefs and attitudes towards waterpipe tobacco smoking: a systematic review. *Harm Reduct J.* 2013;10(1):12.
- Aljarrah K, Ababneh ZQ, Al-Delaimy WK. Perceptions of hookah smoking harmfulness: predictors and characteristics among current hookah users. *Tob Induc Dis.* 2009;5(1):16.
- Smith-Simone S, Maziak W, Ward KD, Eissenberg T. Waterpipe tobacco smoking: knowledge, attitudes, beliefs, and behavior in two U.S. samples. *Nicotine Tob Res.* 2008;10(2):393–398.
- Sutfin EL, McCoy TP, Reboussin BA, Wagoner KG, Spangler J, Wolfson M. Prevalence and correlates of waterpipe tobacco smoking by college students in North Carolina. *Drug Alcohol Depend.* 2011;115(1–2):131–136.
- Wakefield M, Morley C, Horan JK, Cummings KM. The cigarette pack as image: new evidence from tobacco industry documents. *Tob Control.* 2002;11(suppl 1):I73–I80.
- Bansal-Travers M, Hammond D, Smith P, Cummings KM. The impact of cigarette pack design, descriptors, and warning labels on risk perception in the U.S. *Am J Prev Med.* 2011;40(6):674–682.
- Moodie C, Ford A, Mackintosh AM, Hastings G. Young people's perceptions of cigarette packaging and plain packaging: an online survey. *Nicotine Tob Res.* 2012;14(1):98–105.
- Bansal-Travers M, O'Connor R, Fix BV, Cummings KM. What do cigarette pack colors communicate to smokers in the U.S.? *Am J Prev Med.* 2011;40(6):683–689.
- Paek HJ, Reid LN, Choi H, Jeong HJ. Promoting health (implicitly)? A longitudinal content analysis of implicit health information in cigarette advertising, 1954–2003. *J Health Commun.* 2010;15(7):769–787.
- Ward KD, Kumar J, Khan Z, Jiang Y. Characteristics of waterpipe health warning labels in the United States. *Am J Health Behav.* 2019;43(4):858–865.
- Nakkash R, Khalil J. Health warning labelling practices on narghile (shisha, hookah) waterpipe tobacco products and related accessories. *Tob Control.* 2010;19(3):235–239.
- Family Smoking Prevention and Tobacco Control Act. *Pub. L. 111-31, 123 Stat. 1776*. 2009 (codified at 21 U.S.C § 387 et seq).
- U.S. Food and Drug Administration. Final rule: deeming tobacco products to be subject to the Federal Food, Drug, and Cosmetic Act, as amended by the Family Smoking Prevention and Tobacco Control Act; restrictions on

- the sale and distribution of tobacco products and required warning statements for tobacco products. *Fed Regist.* 2016;81(90):28973–29106.
27. U.S. Food and Drug Administration. *Warning Letter: Santa Fe Natural Tobacco Company, Inc.* 2015. <https://www.fda.gov/inspections-compliance-enforcement-and-criminal-investigations/warning-letters/santa-fe-natural-tobacco-company-inc-08272015>. Accessed September 3, 2020.
  28. Riffe D, Lacy S, Fico F. *Analyzing Media Messages: Using Quantitative Content Analysis in Research.* New York, NY: Routledge; 2014.
  29. Hayes AF, Krippendorff K. Answering the call for a standard reliability measure for coding data. *Commun Methods Meas.* 2007;1(1):77–89.
  30. Beaudoin CE. Exploring antismoking ads: appeals, themes, and consequences. *J Health Commun.* 2002;7(2):123–137.
  31. Kelly KJ, Slater MD, Karan D, Hunn L. The use of human models and cartoon characters in magazine advertisements for cigarettes, beer, and nonalcoholic beverages. *J Public Policy Mark.* 2000;19(2):189–200.
  32. Maloney EK, Cappella JN. Does Vaping in e-cigarette advertisements affect tobacco smoking urge, intentions, and perceptions in daily, intermittent, and former smokers? *Health Commun.* 2016;31(1):129–138.
  33. Sanders-Jackson AN, Cappella JN, Linebarger DL, Piotrowski JT, O’Keeffe M, Strasser AA. Visual attention to antismoking PSAs: smoking cues versus other attention-grabbing features. *Hum Commun Res.* 2011;37(2):275–292.
  34. Haddock CK, Hoffman K, Taylor JE, Schwab L, Poston WS, Lando HA. An analysis of messages about tobacco in the Military Times magazines. *Nicotine Tob Res.* 2008;10(7):1191–1197.
  35. Curry LE, Pederson LL, Stryker JE. The changing marketing of smokeless tobacco in magazine advertisements. *Nicotine Tob Res.* 2011;13(7):540–547.
  36. Greenman J, Jones DA. Comparison of advertising strategies between the indoor tanning and tobacco industries. *J Am Acad Dermatol.* 2010;62(4):685.e1–685.18.
  37. Ling PM, Glantz SA. Why and how the tobacco industry sells cigarettes to young adults: evidence from industry documents. *Am J Public Health.* 2002;92(6):908–916.
  38. Grana RA, Ling PM. “Smoking revolution”: a content analysis of electronic cigarette retail websites. *Am J Prev Med.* 2014;46(4):395–403.
  39. Lempert LK, Glantz S. Packaging colour research by tobacco companies: the pack as a product characteristic. *Tob Control.* 2017;26(3):307–315.
  40. Cummings KM, Morley CP, Horan JK, Steger C, Leavell NR. Marketing to America’s youth: evidence from corporate documents. *Tob Control.* 2002;11(suppl 1):I5–I17.
  41. Sutfin EL, Soule EK, McKelvey K, Jenson D. Implications and challenges for implementation of the FDA’s final deeming rule for waterpipe tobacco. *Tob Control.* 2018;27(3):347–351.
  42. National Cancer Institute. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine.* Tobacco Control Monograph No. 13. Bethesda, MD: US Department of Health and Human Services, National Institutes of Health, National Cancer Institute; NIH Pub. No. 02-5047:2001.
  43. Harris JE, Thun MJ, Mondul AM, Calle EE. Cigarette tar yields in relation to mortality from lung cancer in the cancer prevention study II prospective cohort, 1982–8. *BMJ.* 2004;328(7431):72.
  44. Noar SM, Hall MG, Francis DB, Ribisl KM, Pepper JK, Brewer NT. Pictorial cigarette pack warnings: a meta-analysis of experimental studies. *Tob Control.* 2016;25(3):341–354.
  45. Wall M, Liefeld J, Heslop LA. Impact of country-of-origin cues on consumer judgments in multi-cue situations: a covariance analysis. *J Acad Mark Sci.* 1991;19(2):105–113.
  46. Machiels CJA, Karnal N. See how tasty it is? Effects of symbolic cues on product evaluation and taste. *Food Qual Prefer.* 2016;52:195–202.
  47. Simmonds G, Woods AT, Spence C. “Show me the goods”: assessing the effectiveness of transparent packaging vs. product imagery on product evaluation. *Food Qual Prefer.* 2018;63(2018):18–27.
  48. Madzharov AV, Block LG. Effects of product unit image on consumption of snack foods. *J Consum Psychol.* 2010;20(4):398–409.
  49. Erythropel HC, Garcia Torres DS, Woodrow JG, et al. Quantification of flavorants and nicotine in waterpipe tobacco and mainstream smoke and comparison to e-cigarette aerosol. *Nicotine Tob Res.* 2021;23(3):600–604.
  50. Owens VL, Ha T, Soulakova JN. Widespread use of flavored e-cigarettes and hookah tobacco in the United States. *Prev Med Rep.* 2019;14:100854.
  51. Ambrose BK, Day HR, Rostron B, et al. Flavored tobacco product use among US youth aged 12–17 years, 2013–2014. *JAMA.* 2015;314(17):1871–1873.
  52. Wakefield MA, Germain D, Durkin SJ. How does increasingly plainer cigarette packaging influence adult smokers’ perceptions about brand image? An experimental study. *Tob Control.* 2008;17(6):416–421.
  53. Teas RK, Agarwal S. The effects of extrinsic product cues on consumers’ perceptions of quality, sacrifice, and value. *J Acad Mark Sci.* 2000;28(2):278–290.
  54. Meernik C, Ranney LM, Lazard AJ, et al. The effect of cigarillo packaging elements on young adult perceptions of product flavor, taste, smell, and appeal. *PLoS One.* 2018;13(4):e0196236.
  55. Kang Y, Cappella JN, Strasser AA, Lerman C. The effect of smoking cues in antismoking advertisements on smoking urge and psychophysiological reactions. *Nicotine Tob Res.* 2009;11(3):254–261.
  56. Kyriakos CN, Driezen P, Girvalaki C, et al. Awareness and correlates of noticing changes to cigarette packaging design after implementation of the European Tobacco Products Directive: findings from the EUREST-PLUS ITC Europe Surveys. *Eur J Public Health.* 2020;30(suppl 3):iii98–iii107.
  57. Laestadius LI, Wahl MM, Vassey J, Cho YI. Compliance with FDA nicotine warning statement provisions in e-liquid promotion posts on Instagram. *Nicotine Tob Res.* 2020;22(10):1823–1830.
  58. Baig SA, Byron MJ, Lazard AJ, Brewer NT. “Organic,” “natural,” and “additive-free” cigarettes: comparing the effects of advertising claims and disclaimers on perceptions of harm. *Nicotine Tob Res.* 2019;21(7):933–939.
  59. Hammond D, Parkinson C. The impact of cigarette package design on perceptions of risk. *J Public Health (Oxf).* 2009;31(3):345–353.