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## Brief Report

# Smoke and Scan: A Content Analysis of QR Code-Directed Websites Found on Cigarette Packs in China

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## Abstract

**Introduction:** Quick Response codes, or “QR” codes, are used widely in China—for mobile payment, marketing, public transportation, and various other applications. In this study, we examined the content of websites linked from QR codes on cigarette packs collected in China.

**Aims and Methods:** In February 2017, 738 unique cigarette packs were collected from five Chinese cities (Beijing, Guangzhou, Shanghai, Kunming, and Chengdu) using a systematic protocol. Cigarette packs were coded for presence of QR codes on packaging. Packs containing QR codes were then scanned using the WeChat app. Websites sourced from QR codes were coded for required verification, website type, age- and health-related statements, engagement strategies, and marketing appeals.

**Results:** From the sample of 738 unique packs, 109 packs (14.8%) had a QR code on the packaging. The QR codes were linked to 24 unique websites of which 23 could be analyzed. All 23 unique websites were either brand-specific or social media websites; none focused on health or quit information. Of the 23 websites, only three (13.0%) websites had age-restricted site access and just six (26.1%) had any mention of health-related risks associated with product usage. Engagement strategies and/or marketing appeals were found on 20 (87.0%) websites.

**Conclusions:** The Chinese tobacco industry uses QR codes on cigarette packaging to link to web-based marketing content including social media recruitment, contests and giveaways, and product advertisement. It is important to understand where packs send consumers online and what messages they receive, and to consider QR codes on packaging when drafting policy.

**Implications:** Scanning QR codes in China is a commonplace activity. The authors are aware of no published studies on the role QR codes play on the marketing of cigarette packs, in China or elsewhere. This study demonstrates QR codes on cigarette packs can expose users and nonusers to cigarette marketing on interactive websites and protobacco social media pages, mostly without restrictive access or health warnings. This is an area that health authorities can consider regulating, given that this is a channel through which the tobacco industry can communicate with current and potential consumers.

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## Introduction

Quick Response codes, commonly known as “QR” codes, are two-dimensional barcodes often found on or near a commercial item (or

an image of the item) that provide information about the item once scanned using the camera of a smartphone, which could be in some way persuasive or useful to a potential purchaser.<sup>1</sup> One example can be seen on food wrappers with SmartLabel in Canada, where the QR

codes are linked to information that goes beyond what is found on the nutrition label, such as ingredients, allergens, or company/brand information.<sup>3</sup> QR codes are found in print media, social media, online, and in real-world commercial spaces.

The first reported instance of QR codes on cigarette packaging was in 2011 in Croatia on Ronhill brand cigarettes, indicating nearby smoke-friendly areas following a smoke-free law prohibiting smoking in public areas.<sup>3</sup> As of March 2020, we are unaware of any jurisdictions explicitly restricting QR codes on cigarette packaging, except for more than a dozen countries with plain packaging laws, most of which only allow a Universal Product Code barcode and/or which allow one QR code for anti-counterfeit purposes only.<sup>4,5</sup> In China, the existing cigarette pack labeling requirements include a text warning covering 35% of the front and back of the package in Chinese; tar, nicotine, and carbon monoxide levels printed on the pack; and no misleading language about ingredient efficacy (eg, “health-promoting,” “safe,” “low-harm,” “light,” “low tar”). Chinese law does not restrict QR codes.<sup>6</sup>

China is home to the largest population of smokers and produces more cigarettes than any other country.<sup>7</sup> In China, 27.3% of adults and 5.9% of youth (ages 13–15) smoke cigarettes.<sup>8</sup> China has a high disease burden caused by smoking, with an estimated 2 197 653 annual deaths (21% of all deaths).<sup>9</sup> All tobacco operations in China are overseen by the China National Tobacco Corporation—a state-owned monopoly, permitted to operate all dimensions of China’s tobacco industry.<sup>10</sup> With such high prevalence of smoking and state-operated tobacco production, tobacco sales contribute 7% of the Chinese government revenue.<sup>10</sup> This stable and significant source of revenue presents challenges for implementing effective tobacco control interventions in China.<sup>10</sup>

China also has one of the largest populations of QR scanners in the world, as QR codes are used daily by millions for mobile payment, marketing, public transportation, and other applications.<sup>11</sup> The lack of regulation on cigarette packaging related to QR codes allows tobacco companies to direct people to online marketing, which has been associated with uptake of smoking, specifically by youth.<sup>12</sup>

Prior research has established the importance of tobacco packs as a marketing tool.<sup>13</sup> For example, cigarette packs use colors to suggest lower tar or nicotine levels, as well as targeted appeals to specific groups including women and children.<sup>14</sup> No studies as yet have examined online marketing tools used on cigarette packaging such as QR codes. With the rise of online marketing, it is important to examine the content to which consumers are exposed in such spaces. This study examined the content of the websites linked from QR codes found on cigarette packs collected in China to inform possible policy responses.

## Materials and Methods

As part of the Tobacco Pack Surveillance System (TPackSS) study, cigarette packs were collected in February 2017 from five of the top 10 most populated cities in China (Beijing, Guangzhou, Shanghai, Kunming, and Chengdu) using an existing systematic data collection protocol. The cities were chosen based on population size, as well as to reflect cultural, geographic, religious, and linguistic diversity with a goal of capturing the variety of cigarette packs on the market.<sup>15</sup> Unique cigarette packs, defined as any pack with at least one difference in an exterior feature of the pack including stick count, size, brand name, colors, cellophane, and inclusion of a promotional item, were purchased from vendors in high-, middle-, and low-income neighborhoods in each city. Vendors were selected using a systematic walking

protocol in each neighborhood.<sup>15</sup> Four vendor types were predetermined from the top tobacco retailers based on global monitoring data from the China Global Adult Tobacco Survey (GATS), a nationally representative tobacco use survey,<sup>16</sup> and Euromonitor,<sup>17</sup> a source of global market research, as well as consultation with in-country partners. Data collectors visited 12 neighborhoods in each city, collecting tobacco packs from one of the four vendor types in each neighborhood.<sup>15</sup> Vendor types included convenience stores, supermarkets, tobacco and alcohol specialty shops, and “mom papa shops” (small-scale retail business owned and run by individual person/family).<sup>15</sup> Following this protocol, 738 unique cigarette packs were purchased.

Packs were assessed by two independent coders for presence of QR codes on packaging; 109 packs (14.8%) containing QR codes were identified and subsequently scanned (Figure 1) using the WeChat app—China’s most popular app capable of scanning QR codes.<sup>18</sup>

Coders followed a protocol to capture content on each website from the scanned QR codes. For websites containing multiple pages in a slideshow format, coding included all pages. Each coder carefully read through the website for up to 2 minutes (per page, if applicable) to code engagement strategies, and then scrolled through the website again to code website marketing appeals. A 2-minute timeframe was used to establish a uniform coding exposure, maximize efficiency for the needs of the study, and limit the time that a coder would spend on a single page given that the sites often included multiple pages.

A website codebook was constructed based on codes previously developed for content analyses of Russian e-cigarette websites<sup>19</sup> and tobacco company websites<sup>20</sup> (see [Supplementary material](#) for the QR codebook). Website types included corporate, brand specific, and social media. Age-related statements included age-restricted website access and/or text about the legal smoking age (must be 18 years or older to buy tobacco products in China<sup>21</sup>). The presence of health-related statements regarding health risks associated with tobacco use was coded. We categorized engagement strategies to see how cigarette companies were engaging with users including: authenticity verification, contests/giveaways, prompt to follow on social media, new or existing product advertisement, promotions/coupons, brand/manufacturer events, option to download an app, and sign-up on brand website for news, events, etc. The codebook also included the presence of the following marketing appeals: national, annual holidays and events, youth/fun, masculine, feminine, sex appeal, luxury/quality, sociability, international appeal, product popularity, taste/sensation, regional news, United States, trendsetter, stocks, referencing a long history of business for the brand, and/or video appeals (see [Table 1](#) for variable descriptions).

All websites were double coded by the same set of coders. Data reliability was assessed using percent agreement and prevalence and bias adjusted kappa (PABAK) calculations. Across all 48 variables, there was a 93.3 average percent agreement and average PABAK was 0.87. Generally, a kappa value greater than 0.80 represents excellent agreement.<sup>22</sup>

Descriptive analysis was performed on the information on unique websites using frequencies and percentages to identify the most prominent features on all coded websites.

## Results

From the 738 unique cigarette packs collected, 109 (14.8%) had a QR code displayed. The primary location of a QR code was on a pack’s left or right side panel in relation to the front where the



**Figure 1.** Mobile device scan of Quick Response (QR) code on Chinese cigarette packs.

package opens (87.2%,  $n = 95$ ). Once scanned, we found 81 of the pack QR codes (74.3%) were associated with active websites and 28 (25.7%) with inactive websites. Many of the QR codes were linked to the same websites: there were 24 unique, active websites. Due to a legal statement on one of the unique websites stating “non-consumers prohibited to visit website,” the final sample for analysis was 23 websites.

Once scanned, we found 18 (78.3%) of the 23 unique websites to be brand focused, and five (21.7%) were social media sites that directed the scanner to the brand’s WeChat profile; there were no corporate websites present. Only three (13.0%) had age-restricted access to view the website, and less than half (43.5%,  $n = 10$ ) had any text outlining the legal smoking age. Thirteen (56.5%) websites required personal verification about the individual accessing the website such as phone number, location service enablement, permission to view WeChat profile, or name. Only six websites (26.1%) mentioned any health-related risks associated with the use of their products. Currently, there is no health warning requirement on tobacco company websites in China, but there are regulations to include age-related statements to deny website visitors under the age of 18.<sup>23</sup>

Regarding engagement strategies on the sites, we found nine (39.1%) websites had authenticity verification, six (26.1%) had a prompt to follow the brand on social media (namely, WeChat), six (26.1%) mentioned contests or giveaways for various products, four (17.4%) had advertisements for new or existing tobacco products, and two (8.7%) offered promotions or coupons for their products. There were also three (13.0%) websites that employed other engagement strategies, including one with brand/manufacturer events, one with the option to download an app, and one with a sign-up on the brand website for news, events, etc. There were four (17.4%) websites that did not include any engagement strategies. No websites navigated customers to point of sale or designated smoking areas and no websites were used for corporate social responsibility advertisements. Nine websites (39.1%) contained multiple of the

mentioned engagement strategies and therefore the percentages do not add up to 100.

Approximately half (56.5%,  $n = 13$ ) included nationalistic or patriotic marketing appeals specific to China. There were also three (13.0%) websites with youth/fun marketing appeals, two (8.7%) with masculine marketing appeals, two (8.7%) with marketing appeals referencing a long history of business for the brand, and two (8.7%) with marketing appeals for annual events and holidays. Each of the appeals including sex, luxury/quality, sociability, international, product popularity, taste/sensation, and regional news were only seen on one website per appeal. There were five (21.7%) websites that did not utilize any marketing appeal outlined in the codebook. No websites contained feminine, United States, trendsetter, stocks, or video appeals. Several websites contained multiple marketing appeals.

## Discussion

Engagement strategies and/or marketing appeals were found on almost all (87%) of the websites linked from QR codes. The numerous engagement strategies and marketing appeals found on the websites linked from QR codes on cigarette packs in this study demonstrates how Chinese cigarette companies use QR codes to send their consumers to websites that expand the available space for marketing. The widespread use of QR codes in China for daily applications may explain why so many QR codes were found on cigarette packs. Currently, China’s market for mobile payment via QR code is the largest and fastest growing in the world, and the majority of vendors and retailers accept mobile payment.<sup>24</sup> WeChat Pay and AliPay are two of the top mobile payment apps in China, and are ubiquitous in urban China.<sup>25</sup> The shift to cashless payments can be seen by the consistent increase in mobile payment over the past few years, with a current population of 577.4 million mobile payment users in China, a 10% increase from the previous year.<sup>25</sup> The multiple uses of QR codes and consistent dominance in mobile payment suggests QR

**Table 1.** Website Characteristics

	<i>n</i>	%
<b>Website type</b>		
Corporate (represented the company as a formal business and presented their corporate image to the public)	0	0.0
Brand specific (unique to a particular brand and had prominent interactivity and engagement)	18	78.3
Social media (the company or brand's social media page)	5	21.7
<b>Age and health statements</b>		
Age-restricted site access	3	13.0
Age-related product usage statement	10	43.5
Health-related product usage statement	6	26.1
<b>Personal verification</b>	13	56.5
<b>Engagement strategies</b>		
Authenticity verification (prompt to enter a code printed on the pack to confirm the pack purchased was an authentic pack)	9	39.1
Contests/giveaways	6	26.1
Prompt to follow on social media	6	26.1
New or existing product advertisement	4	17.4
Promotions/coupons	2	8.7
Brand/manufacturer events	1	4.3
Option to download an app	1	4.3
Sign-up on brand website (for news, events, etc.)	1	4.3
Websites with more than one of the listed engagement strategies	9	39.1
<b>Marketing appeals</b>		
National (Chinese-specific appeals such as famous monuments, architecture, and landscapes, and items with Chinese symbolism including specific flowers, animals, and mythical creatures such as dragons)	13	56.5
Youth/fun (included cartoons or characters and youth activities)	3	13.0
Masculine (descriptions or depictions of sports, cars, male business attire, and nonsexualized images of men)	2	8.7
Reference of long history of business for brand	2	8.7
Annual holidays and events	2	8.7
Sex appeal (describes or depicts ability to find/keep a romantic partner; imagery of models in sexy clothing; pictures of intimate interactions [kissing, hugging, etc.])	1	4.3
Luxury/quality (describes or depicts as a high quality, high-status, luxury product)	1	4.3
Sociability (indicates/implies one will be more popular; setting/images of social scene)	1	4.3
International appeal (reference to global sales/identity, world leader, etc.)	1	4.3
Product popularity (indicates/implies that product is popular or a market leader)	1	4.3
Taste/sensation (reference to taste, aroma, or sensation of product)	1	4.3
Regional news	1	4.3
Feminine (describes or depicts product in association with feminine ideals [eg, flowers, butterflies, non-sexualized images of women, etc.])	0	0.0
United States (identification of product with American symbols [American flag, bald eagle, etc.], or images of famous locations such as US cities, national monuments, famous buildings, landscapes, or famous US residents)	0	0.0
Trendsetter (looking "cool," being a "trendsetter," or not conforming to status quo)	0	0.0
Stocks (reference to or reporting of company's stocks)	0	0.0
Video appeals (any video on website)	0	0.0

codes will continue to be an important part of Chinese everyday life in the forthcoming years.

Through social media recruitment, contests and giveaways, promotions and coupons, and product advertisement as found on cigarette packs in this sample, these Chinese cigarette brands can expand their marketing beyond the product's packaging, via a QR code on the pack. These websites provide a larger platform for marketing that do not face the same restrictions as the packages themselves. Another area of concern is the minimal use of age restrictions, the lack of any health warning statements about smoking and the lack of cessation resources or strategies on the linked websites.

This study contains a few potential limitations. Although coders scanned the same QR code on the same date, we noticed some websites would be updated weeks after the initial scan. It is possible some website content changed between the time of purchase and coding. In addition to changing websites, there were also many websites that were not working at the time of coding, which could be

functioning properly now. Additionally, there may be some engagement strategies or website appeals that were missed because content can change over time and only 2 minutes were spent coding each web page. We were also unable to report data from the one website containing a legal statement prohibiting use by nonconsumers.

It is important to understand where the QR codes on packs send consumers online and to what marketing messages and tactics consumers will be exposed. As seen in the results of this study, the QR codes directed to all protobacco social media and marketing websites, and concerning only a minority included health warnings and age restrictions. Overall, China has minimal tobacco packaging and labeling requirements, and QR codes could serve to circumvent packaging and labeling requirements, unless explicitly prohibited. Alternatively, QR codes on cigarette packs could potentially be used to link consumers to quitting guides and resources.<sup>26</sup> Although this study was only conducted on Chinese cigarette packs, future research can examine QR codes on cigarette packaging in other

countries to determine possible implications on a global scale. This study serves to fill the gap in literature on cigarette QR code content and demonstrates the need for policy makers to consider QR codes on packaging when drafting policy.

## 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

- QR Code Generator. *The Purpose of QR Codes*. <https://www.qr-code-generator.com/qr-code-marketing/why-should-i-use-qr-codes/>. Accessed July 12, 2019.
- SmartLabel. *About Us*. <http://www.smartlabel.org/about/about-us>. Accessed November 12, 2019.
- Tobacco Labelling Resource Centre. *Interactive Cigarette Packaging With QR Code*. 2011. <https://tobaccolabels.ca/interactive-cigarette-packaging-with-qr-code/>. Accessed November 12, 2019.
- Campaign for Tobacco Free Kids. *Each Clause of the Law Explained*. Plain Packaging Toolkit. 2019. <https://www.tobaccofreekids.org/plainpackaging/tools-resources/legal/each-clause-of-the-law-explained>. Accessed April 22, 2019.
- Campaign for Tobacco Free Kids. *Standardization or Plain Tobacco Packaging International Developments*. 2019. [https://www.tobaccofreekids.org/assets/global/pdfs/en/standardized\\_packaging\\_developments\\_en.pdf](https://www.tobaccofreekids.org/assets/global/pdfs/en/standardized_packaging_developments_en.pdf). Accessed November 12, 2019.
- People's Republic of China. *Rules on Cigarette Package Labelling in the Jurisdiction of the People's Republic of China*. <https://www.tobaccocontrol.org/files/live/China/China%20-%20Rules%20on%20Cigarette%20Packaging%20%282015%29.pdf>. Accessed November 12, 2019.
- Drope J, Schluger N, Cahn Z, et al. *The Tobacco Atlas*. Atlanta, GA: American Cancer Society and Vital Strategies; 2018.
- World Health Organization. *Report on the Global Tobacco Epidemic, Country Profile China*. 2017. [http://www.who.int/tobacco/surveillance/policy/country\\_profile/chn.pdf](http://www.who.int/tobacco/surveillance/policy/country_profile/chn.pdf). Accessed November 12, 2019.
- Global Burden of Disease. GBD Compare | Viz Hub. <http://ihmeuw.org/4z1f>. Accessed November 13, 2019.
- He P, Takeuchi T, Yano E. An overview of the China national tobacco corporation and state tobacco monopoly administration. *Environ Health Prev Med*. 2013;18(1):85–90.
- Wang S. *Why China Can't Get Enough of QR Codes*. CNN Business; 2017. <https://money.cnn.com/2017/09/08/technology/china-qr-codes/index.html>. Accessed April 22, 2019.
- Soneji S, Pierce JP, Choi K, et al. Engagement with online tobacco marketing and associations with tobacco product use among U.S. youth. *J Adolesc Health*. 2017;61(1):61–69.
- National Cancer Institute. *The Role of the Media in Promoting and Reducing Tobacco Use*. Tobacco Control Monograph No. 19. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2008. NIH Pub. No. 07-6242.
- 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.
- 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. *J Med Internet Res Public Health Surveill*. 2015;1(2):e8.
- Asma S, Mackay J, Song SY, et al. *The GATS Atlas*. Atlanta, GA: CDC Foundation; 2015.
- Euromonitor. *About Us*. Euromonitor International. <https://www.euromonitor.com/about-us-page>. Accessed April 9, 2020.
- DeGennaro T. *10 Most Popular Social Media Sites in China (2019 Updated)*. Dragon Social; 2019. <https://www.dragonsocial.net/blog/social-media-in-china/>. Accessed March 20, 2019.
- Johns Hopkins Bloomberg School of Public Health Institute for Global Tobacco Control. *Online Marketing of Electronic Cigarettes in Russia Fact Sheet*. <http://globaltobaccocontrol.org/sites/default/files/FS-russia-ecigaretteweb.pdf>. Accessed March 20, 2019.
- Weiger C, Cohen JE, Smith KC, Hong A. Websites found on cigarette packs in 13 low- and middle-income countries: a content analysis. Rapid response poster presentation at the Society for Research on Nicotine & Tobacco Annual Meeting; February 21–24, 2018; Baltimore, MD. [https://www.jhsph.edu/research/centers-and-institutes/institute-for-global-tobacco-control/resources/posters-and-presentations/2018/Weiger\\_SRNT2018.pdf](https://www.jhsph.edu/research/centers-and-institutes/institute-for-global-tobacco-control/resources/posters-and-presentations/2018/Weiger_SRNT2018.pdf). Accessed June 22, 2019.
- Campaign for Tobacco Free Kids. *Tobacco Control Laws, Legislation by Country China*. 2019. <https://www.tobaccocontrol.org/legislation/country/china/summary>. Accessed November 19, 2019.
- Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33(1):159–174.
- China Tobacco. *Interim Regulations on Websites of the Tobacco Industry (China National Tobacco Company)*. 2005. [http://www.law-lib.com/law/law\\_view1.asp?id=124636](http://www.law-lib.com/law/law_view1.asp?id=124636). Accessed November 19, 2019.
- Jao N. *A Short History of the QR Code in China and Why Southeast Asia is Next*. 2018. <https://technode.com/2018/09/10/qr-code-payment-overseas-china/>. Accessed December 6, 2019.
- Cheung MC. *China Mobile Payment Users 2019: Moving Toward a Cashless Society*. 2019. <https://www.emarketer.com/content/china-mobile-payment-users-2019>. Accessed December 6, 2019.
- Moodie M, Purves R, McKell J, de Andrade M. Novel means of using cigarette packaging and cigarettes to communicate health risk and cessation messages: a qualitative study. *Int J Ment Health Addiction*. 2015;13(3):333–344.