STANFORD PREVENTION RESEARCH CENTER
the science of healthy living

California Tobacco Retail Surveillance Study, 2017

Nina C. Schleicher, PhD[1], Trent Johnson, MPH[1], Joseph Rigdon, PhD[2], Rajani Kaimal, MS[2], Manisha Desai, PhD[2], Kimberly Ababseh, BS/BA[1], Lisa Henriksen, PhD[1]
[1]Stanford Prevention Research Center
[2]Quantitative Sciences Unit
Stanford University School of Medicine
3300 Hillview Ave, Mail Code 5537
Palo Alto, CA 94304

Submitted to the California Tobacco Control Program, California Department of Public Health
December 22, 2017
Funding: Contract #14-10313 (PI: Lisa Henriksen, PhD)

Disclosure: Any views or opinions in this study are solely those of the authors and do not necessarily reflect the policies or official views of the California Department of Public Health.

Table of Contents

Recommend citation:
Schleicher N, Johnson T, Rigdon J, Kaimal R, Desai M, Ababseh K, Henriksen L. (2017) California Tobacco Retail Surveillance Study, 2017. <<Insert link to download from CTCP website.>>

EXECUTIVE SUMMARY

The 2017 California Tobacco Retail Surveillance Study (CTRSS) characterized the retail availability of tobacco in a larger, more diverse sample of stores. The study also assessed change over time in product availability, placement and promotion since 2014 and compared tobacco marketing at stores in rural counties with stores in other counties. This report includes the following key findings from a statewide random sample of 1,277 tobacco retailers, including vape shops that were not yet licensed. This report refers to the combination of electronic cigarettes, other electronic nicotine delivery systems, and e-liquids as electronic smoking devices (ESDs).

- Vape shops (including those that sold conventional tobacco) comprised 6.5 percent of the 2017 CTRSS sample. Approximately 5.1 percent of stores sold ESDs exclusively with the others also selling conventional tobacco. More than half of vape shops (56.6 percent) did not yet have a state tobacco retailer license.

- Rapid growth in the retail availability of ESDs levelled off by 2017. As in 2014, ESDs were sold in approximately 67 percent of stores. Flavored varieties were still widely available--in 87.9 percent of stores that sold ESDs (62.0 percent of total stores).

- With concern for the growing retail market for marijuana, half of stores (50.0 percent) sold blunts/cigar wraps, a significant increase from 38.0 percent in 2014. One in five stores (20.4 percent) sold herbal wraps or hemp rolling papers, which could be used to smoke tobacco and marijuana, alone or in combination.

- Self-service displays of little cigars/cigarillos were visible in 4.9 percent of stores, which is prohibited by state law (with some exceptions); self-service cigarette displays in 2.2 percent of stores were in violation of state law.

- The percent of stores that placed tobacco within 12 inches of kid-friendly items, such as candy, gum, mints, toys, slushy machines or ice cream decreased for ESDs (from 14.0 in 2014 to 8.9 percent in 2017), but not for conventional tobacco (from 6.0 percent to 5.9 percent).

- Between 2014 and 2017, the presence of tobacco advertising at children's eye level decreased for ESDs, but increased for conventional tobacco (from 26.3 to 33.5 percent of stores).

- Stores that contained at least one tobacco marketing material decreased from 88.8 percent in 2014 to 81.7 percent in 2017. A greater presence of vape shops in the sample does not explain this change.

- Nearly every store that sold cigarettes still sold menthol varieties (98.1 percent), and the majority (60.8 percent) advertised at least one discount for menthol cigarettes.

- In stores that sold little cigars/cigarillos, pack sizes sold for less than $1 were significantly larger in 2017 than in 2014.

- The average price of the cheapest e-cigarette regardless of brand was $9.82 (SD=7.62), more than twice the average price of the cheapest pack of cigarettes ($4.69, SD=1.03).

- The presence of advertised discounts for conventional tobacco decreased significantly from 70.6 in 2014 to 62.4 percent in 2017. The difference was mainly for cigarettes and chewing tobacco.

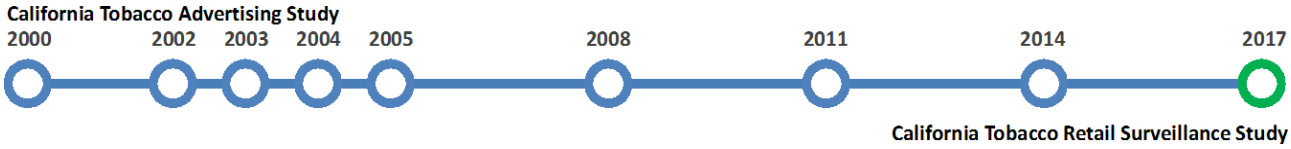
- Stores in *rural counties* were significantly more likely than other stores to sell chewing tobacco and to have at least one interior ad for that product.

List of Figures

List of Tables

BACKGROUND

The California Tobacco Retail Surveillance Study (CTRSS; formerly known as the California Tobacco Advertising Study, CTAS) represents the longest-running tobacco marketing surveillance system in any state in the United States (U.S.). Since 2000, standardized observations of retail tobacco marketing have been conducted at nine time points (in 2000, annually from 2002 to 2005, in 2008, 2011, 2014, and in 2017). The 2017 survey was conducted just before the Proposition 56 tax increase was implemented (April 1, 2017) and just after California required retail tobacco licensing for vape shops.



The proliferation of retail advertising and discounts for tobacco products is among the most important ways the tobacco industry maintains its commercial influence in California. Since 2014, annual marketing expenditures for tobacco products increased from $8.2 billion to $8.9 billion in 2015, the most recent year for which the Federal Trade Commission reports these data for cigarettes and smokeless tobacco.[1,2] Assuming that spending is proportional to population size across states, the industry spent approximately $1.14 billion in California on tobacco advertising and promotions in 2015, equivalent to more than $130,000 per hour. Not included in these figures are expenditures to promote cigars or e-cigarettes and other electronic smoking devices (ESDs). In the U.S., marketing expenditures on ESDs increased exponentially from $12 million in 2010 to $125 million in 2014.[3]

This report characterizes retail tobacco marketing in 2017 and additional cross-sectional analyses focus on the subset of stores that were vape shops and on differences between stores in self-identified rural counties and elsewhere. Similar to previous reports, the analyses also assessed change in product availability, placement and promotion since 2014. Prices for a larger array of cigarettes represented a baseline before the April 1, 2017, tax increase on cigarettes. In anticipation of a similar tax increase on ESDs and e-liquids, the current report does not focus on neighborhood variation in prices for these products or for conventional cigarettes. However, the data that were collected will serve as a baseline for comparison with data collection planned for 2018.

Marketing surveillance methods

Important differences between the 2017 sample and 2014 sample are: 1) different eligibility criteria, 2) larger sample size, 3) additional prices for cheapest e-cigarette and e-liquid regardless of brand and for Natural American Spirit (RJ Reynolds), 4) new measures relevant to the co-marketing of tobacco and marijuana, 5) storefront photographs to assess the percent of clear windows and covered by advertising, and 6) a count of exterior advertisements (ads) for any tobacco products, including ESDs and e-liquids.

Sample

The 2017 sample (n=1,277) is the largest sample in the history of CTRSS/CTAS. To be more responsive to the changing retail landscape for tobacco, a new sampling frame and eligibility criteria were established. The 2014 sample was comprised of licensed tobacco retailers that sold cigarettes (n=579). The current sample now includes stores that sell any tobacco product, including vape shops that had not yet obtained a state tobacco retail license that was required in January 2017.

The CTAS/CTRSS sample was originally derived from a 1997 list of 40,186 cigarette retailers, enumerated by the California Board of Equalization, renamed the California Department of Tax and Fee Administration (CDTFA) in 2017. The CTRSS 2017 sampling frame combined three sources: 1) the CTAS 2014 sample (n=562), 2) a 2016 list of 33,247 state licensed tobacco retailers that could be mapped to latitude/longitude (mapping rate>99 percent), and 3) a list of addresses for stores that vendors or customers described as vape shops, which we obtained by scraping data from Google and Yelp (n=1,838). This third source was added because the state did not require vape shops to obtain a tobacco retail license until January 1, 2017. In order to create a sampling frame for a maximum of 1,350 store visits, we attempted telephone verification of all CTAS 2014 stores (n=579), randomly selected stores from the licensing list (n=1,500) and scrape list for vape shops (n=145). A target sample size was estimated to compare retailers in order to compare rural and non-rural counties. The sample sizes for telephone verifications were informed by assumptions about attrition and contact rates from previous data collection and the proportion of vape shops that were not licensed.

Up to three attempts were made to each store's primary and secondary phone number, as needed. Repeat calls were attempted at varying times of day to maximize completion rate (79.6 percent). Our protocol asked whether stores sold cigarettes or cigars. If neither were sold, we asked about e-cigarettes or e-liquids. Of the 2,207 stores that we telephoned, 73.5 percent reported selling at least one tobacco product (conventional or ESDs). Of the 1,662 confirmed tobacco retailers, 153 appeared on the scraped list for vape shops. For a maximum of 1,350 store visits, we retained all CTAS 2014 stores that were still selling tobacco in 2017 (n=475) and randomly selected 875 from the phone-verified list. We added the remaining 44 vape shops that were phone-verified in order to obtain a sufficiently large number of vape shops for secondary analyses. Thus, the 2017 sample is a random sample of stores that sell any tobacco product (including ESDs), and includes unlicensed retailers because a state license was not required until January 1, 2017.

Surveyed stores were geocoded by Stanford Prevention Research Center (SPRC) staff using ArcGIS version 14.0 and a list of self-identified rural counties provided by the California Tobacco Control Program was used to categorize counties. In 2017, CTRSS stores were located in nearly every county, with the goal of obtaining a larger sample in self-identified rural counties (Figure 1).

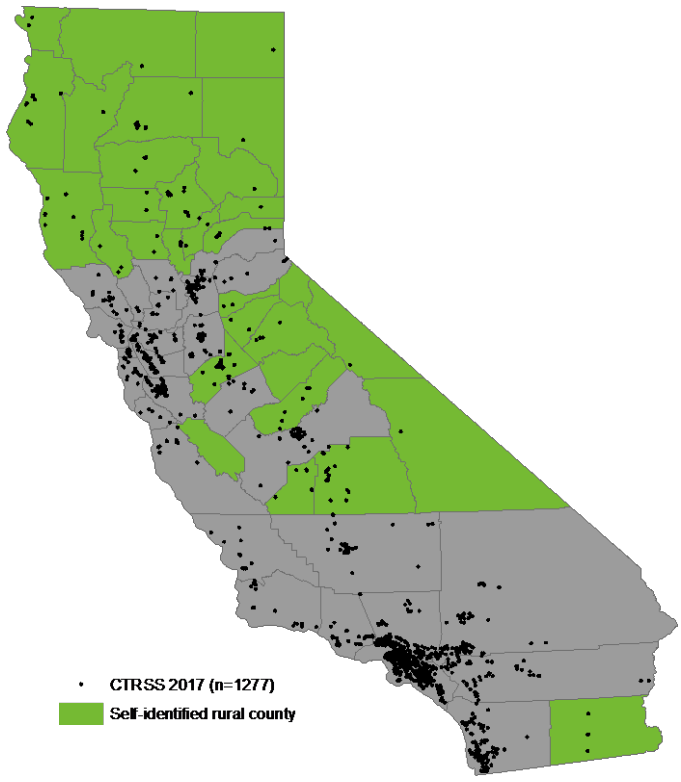


Figure 1: CTRSS 2017 sample, by county

Data collection

Retail marketing surveillance was conducted January–March 2017, before the $2 cigarette tax increase was implemented on April 1, 2017. Previous data were collected in August–September 2014; therefore, the longitudinal comparison differs by year and season. Marketing surveillance was

conducted by nine trained professional data collectors from Ewald & Wasserman, LLC, using a survey programmed with iSurveySoft (Harvest Your Data) for iPad mini devices. A day-long training session included classroom instruction, a detailed manual, sentinel products for category and brand identification, online quizzes, field practice and debriefing. After the first few days of fieldwork, SPRC staff conducted a teleconference with all data collectors to provide feedback and clarification, as needed. Average time to complete the store observations was 17.8 minutes (SD=9.0). To assess inter-rater reliability, two different coders visited 75 randomly selected stores on separate occasions. The mean time between visits was 4.0 days (SD=3.8, min=0, max=14). Unless noted otherwise, reliability was within acceptable ranges (Table 21) and consistent with other studies.[4,5].

Measures

The CTRSS instrument contained 43 questions and more than 400 variables, and was programmed with a branch for vape shops, head shops or "other" stores that did not sell conventional tobacco. After assessing product availability, the branched survey included all items pertaining to ESDs (placement, promotion and price) and excluded similar items about conventional tobacco. A complete survey is found in the Appendix.

Product availability. Compared to 2014, the 2017 survey assessed a larger array of tobacco products and included more non-tobacco products. As in 2014, product availability was recorded for conventional tobacco products: cigarettes, large cigars, little cigars/cigarillos (LCCs), loose or pipe tobacco, hookah/shisha, chewing tobacco and snus. As in 2014, the smallest unit size for LCCs was recorded, with response options one (sold as singles), packs of 2-5, packs of 6-19, and packs of 20 or more. With concern for the changing marketplace for marijuana in California, the 2017 survey assessed blunts/cigar wraps and added three non-tobacco products: herbal wraps, hemp rolling papers and dry-chamber vaporizers (e.g., PAX).

For consistency with 2014, this report refers to the combination of electronic cigarettes, other vapor products and e-liquids as electronic smoking devices (ESDs). Availability and location were recorded separately for devices and e-liquids. Availability of six device types was recorded: 1) disposable e-cigarettes, 2) reusable e-cigarettes, 3) other closed systems that use cartridge refills, 4) open systems that allow for dripping e-liquid, as well as products marketed as 5) e-hookah, or 6) e-cigars.

Flavors. In this report, "flavored" refers to tobacco products that are marketed with "taste" terms, such as menthol/mint, fruit/sweet/candy, or alcohol. Therefore, the category could underestimate the prevalence of flavors because it excludes other foods, such as "Chicken & Waffles" (Royal Blunts) cigarillos as well as "concept" flavors, such as "Summer Twist" (Swisher) and "Jazz" (Black & Mild) if these were the only flavor varieties in a store. As in 2014, the availability of flavored products was coded separately for cigarettes (menthol only). For all other tobacco products, data collectors recorded the presence of any mint/menthol flavors, fruit/sweet/candy flavors (e.g., cherry, vanilla, chocolate), or alcohol flavors (e.g., wine, rum, brandy). In 2017, data collectors coded chewing tobacco separately from snus and also assessed availability of flavored blunts/cigar wraps. New to 2017, data collectors recorded availability and flavor of 20-packs of little filtered cigars. However, these data were not

reported because the measure was unreliable. Packages that look identical to cigarettes proved difficult for coders to distinguish by recognizing brand names (e.g., Cheyenne, Swisher, etc.) and flavor variety was not obvious.

Product placement. For comparability with 2014, this report focuses on whether products were available without clerk assistance (i.e., "self-service") and "near kid-friendly items"; that is, within 12 inches of soda dispensers, slushy machines, ice cream, candy, gum, or toys.

Promotion. All variables about the presence of marketing materials (branded signs, shelving units, displays, and functional items) and price discounts were coded separately for the store exterior and interior. Data collectors recorded the presence of any marketing material for cigarettes, chewing tobacco, LCCs, ESDs, and e-liquids. Product categories were split by flavor for cigarettes (menthol, non-menthol), chewing tobacco, and LCCs (flavored, not flavored). Inside the store, coders indicated which tobacco products had marketing materials placed at or below three feet, near kid-friendly items, on the front counter, on the back counter, or elsewhere in the store. Outside the store, coders noted whether marketing materials were located at or below three feet. New to 2017, data collectors counted the number of exterior marketing materials for any tobacco product (including ESDs) and counted the number specific to ESDs.

Price promotions are temporary discounts, such as "___cents off," a lower price for purchasing multiple packs, buy-one-get-one-free, or other special price. These discounts could be located on marketing material, stickers, handwritten signs, or on product packaging. As in 2014, on-pack promotions (e.g., stickers that indicated 50 cents off) were included. New in 2017, data collectors did not differentiate between various types of promotions with the exception of cross-product promotions for vaping products, which were recorded separately and in detail (e.g., free/discounted e-liquid, vaping accessory, conventional tobacco, trinkets). Inside and outside the store, the presence of a price discount was recorded by product for cigarettes, chewing tobacco, LCCs, vaping products and e-liquids. As with marketing materials, product categories were split by flavor for cigarettes (menthol/non-menthol) and flavored/unflavored for conventional tobacco products. New in 2017, data collectors noted whether price promotions were professionally manufactured or amateur signage and indicated whether signs advertised mobile coupons for tobacco products.

Window coverage. Outside the store, data collectors categorized the proportion of windows and clear doors covered by signs: less than 10 percent, between 10 percent and 33 percent, more than 33 percent, or no windows/clear doors. New to 2017, data collectors were instructed to photograph the storefront area for this question and uploaded one image for each store.

Price. The 2017 survey collected prices for a larger array of tobacco products. As in previous years, cigarette prices were recorded for a single-pack purchase of Marlboro (red) (Philip Morris USA), which is the leading non-menthol premium brand and the top-selling cigarette brand; Newport menthol (formerly Lorillard, now Reynolds American), which was the leading menthol brand in 2014; Pall Mall red (Reynolds American), which is the leading value brand[6]; and cheapest pack of cigarettes regardless of brand and flavor. New to 2017, is the price of Natural American Spirit (Reynolds American), the most popular ultra-premium brand and the subject of a class action lawsuit about deceptive marketing.[7,8] Data collectors noted whether the single-pack price was discounted and whether sales tax was included.

As in 2014, data collectors noted the largest pack of LCCs that could be purchased for less than $1 (one, two, three, four, or more). In addition, data collectors recorded prices for two leading brands of chewing tobacco, Grizzly wintergreen (Reynolds American) and Copenhagen non-menthol (Altria). New

in 2017, when data collectors recorded the price for a 20-ounce bottle of water, they obtained the price of Dasani if Aquafina was not sold.

As in 2014, data collectors recorded the price of a blu disposable e-cigarette (classic tobacco) even though this is no longer the leading brand. Other brand-specific prices were eliminated (NJOY) and no new brands were added because we observed little variation in price between stores. New to 2017, data collectors requested the price of the cheapest e-cigarette regardless of brand. If none were sold, data collectors asked about e-hookah or other "vaping devices." If the cashier refused, the coder attempted to discern the price by looking at advertised prices. Data collectors noted how price was obtained (from cashier or advertised price), type of device (disposable or reusable e-cigarette, other closed system, open system, e-hookah, or e-cigar), and brand. Data collectors also obtained price of the cheapest bottle of e-liquid. As with cheapest e-cigarette, data collectors attempted to obtain price from cashier, if refused then coders were instructed to look at advertised prices.

Store type. Using standard definitions, data collectors classified stores into one of ten categories: convenience with or without gas, pharmacy, liquor store, small market, supermarket (at least three cash registers), gas only (kiosk without interior shopping section), tobacco shop, and other (Walmart, dollar stores, cigar/hookah lounges, gift shops, golf courses, gas-only kiosks, etc.). Two new categories of stores were added in 2017. Vape shops were defined as stores with at least 50 percent of visible product being e-cigarettes, or other vaping devices including e-liquid; head shops primarily sold accessories for smoking marijuana, and many also sell tobacco or other items such as hats or clothing. As in 2014, data collectors also indicated whether stores contained a pharmacy counter. However, these data could not be used because one coder mistakenly coded shelving units of non-prescription drugs as a pharmacy counter in many different store types.

Analyses

Cross-sectional. The goal of the cross-sectional analyses is to characterize several new measures that pertain to tobacco product availability, product placement and window coverage. In addition, we compared retail tobacco marketing in stores located in self-identified rural counties with other stores. For consistency with 2014, prices were computed to represent the price before sales tax. Descriptive statistics were generated using IBM SPSS Statistics for Windows, Version 24.0 and SAS 9.4. Tests for differences between stores located in rural and non-rural counties were performed using PROC GLIMMIX and PROC MIXED in SAS 9.4.

Storefront photo coding. In the field, data collectors recorded the percent of windows and clear doors covered by signs on the exterior. Photos of storefronts were coded by SPRC staff for window and clear door coverage with the same response options as the in-field item: less than 10 percent; between 10 percent and 33 percent; more than 33 percent; or no windows or clear doors. Photo coding data were linked to in-field store observation data for concordance analysis of the two methods: in-field data collection and photo coding. There were two components to the store front coding analysis: whether independent data collectors agreed in the field (inter-rater reliability) and whether assessments of photographs for the same stores agreed with assessments in the field. Coverage responses for in-field and photos were recoded to focus on two dichotomous measures: <10 percent vs. all other responses, and >33 percent vs. all other responses. One-hundred randomly selected photos were coded twice by SPRC staff (KA and TJ) for inter-rater reliability. Kappa coefficients were computed for each dichotomous measure to assess inter-rater reliability of fieldwork and photo coding. To assess concordance between these methods, agreement rates, and kappa coefficients were computed.

Longitudinal. The goal of the longitudinal analysis was to test whether changes between 2014 and 2017 were significant, controlling for store type because the samples differed. Descriptive statistics are summarized by year and product type, when relevant. Tests of significance for dichotomous outcomes that were tracked consistently include product availability and placement (near kid stuff, self-service), presence of price promotions, presence of marketing material and placement (low-height ads), and number of LCCs for less than $1. Observations at each time point were as nested within stores. Using SAS 9.4, Generalized Estimating Equation (GEE) models with exchangeable correlation structures controlled for store type and the primary predictor for time was coded “0” for 2014 and “1” for 2017. Store type was dummy coded with convenience store as the referent category because it was most prevalent. For dichotomous outcomes, odds ratios and p-values from population average estimates are presented.

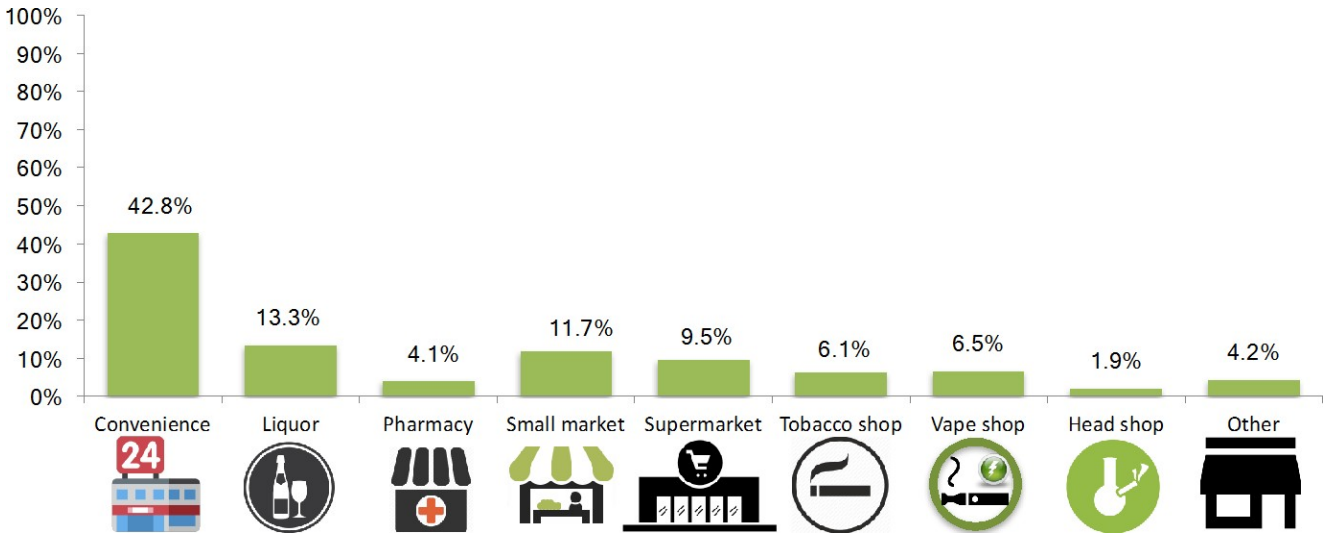
We did not examine change over time in cigarette prices because they increased so soon after the data collection. For other continuous outcomes (e.g., number of LCCs for less than $1), a linear regression model estimated via GEE with an exchangeable correlation structure among the sub-group of stores that sold LCCs. The numeric outcome measure was number of sticks per pack, with values from zero to four. Stores that sold LCCs, but did not sell any for less than $1 were scored as zero.

RESULTS

Section 1 characterizes retail tobacco marketing in 2017, with a focus on differences between stores in self-identified rural counties and others. Part 2 summarizes change in product availability, placement and promotion since 2014. Section 1 summarizes the store type composition in 2017 and attrition from 2014 to 2017. The remaining sections summarize results about product availability (section 2), placement (section 3), promotion (section 4), and price (section 5), including both cross-sectional (2017 only) as well as longitudinal (change since 2011) results where appropriate.

Section 1: Sample and attrition

Figure 2: CTRSS sample composition, 2017 (n=1,277)



Cross-sectional sample. More categories of store types are portrayed than in previous reports because of the larger sample size in 2017 (Table 1). Pharmacies represent only 4 percent of tobacco retailers and 98.1 percent of these were Walgreens and RiteAid, which announced a plan to merge in 2018.[9]

Figure 2 suggests that licensed tobacco retailers are comprised of slightly more vape shops than tobacco shops. However, the vape shop category is generous: It includes retailers who sell conventional tobacco products as long as coders judged that 50 percent or more of the stock appeared to be ESDs. If the definition were restricted to stores that sell ESDs and no other tobacco products, the proportion of vape shops would be 5.1 percent of the total sample. Another important change to the marketplace for tobacco products is that several chain dollar stores started selling since 2014 (e.g., Dollar General, Family Dollar). The few dollar stores and Walmart stores in the sample are included in the "other" category (Table 1).

Longitudinal sample. Of the 579 stores with valid data in 2014, 125 stores were lost to follow-up for reasons such as going out of business, discontinued sales of tobacco, or incomplete observation (see Figure 3). For example, the 33 stores that stopped selling tobacco were either CVS pharmacies or two grocery chains, Raley's and Bel Air supermarkets. Of the 579 stores with valid data in 2014, 454 (78.4 percent) had completed store observations in 2017. Figure 3 illustrates the composition of the longitudinal sample (all stores surveyed in 2014 or 2017, n=1402).

Figure 3: Origin of stores in the longitudinal sample (n=1,402)

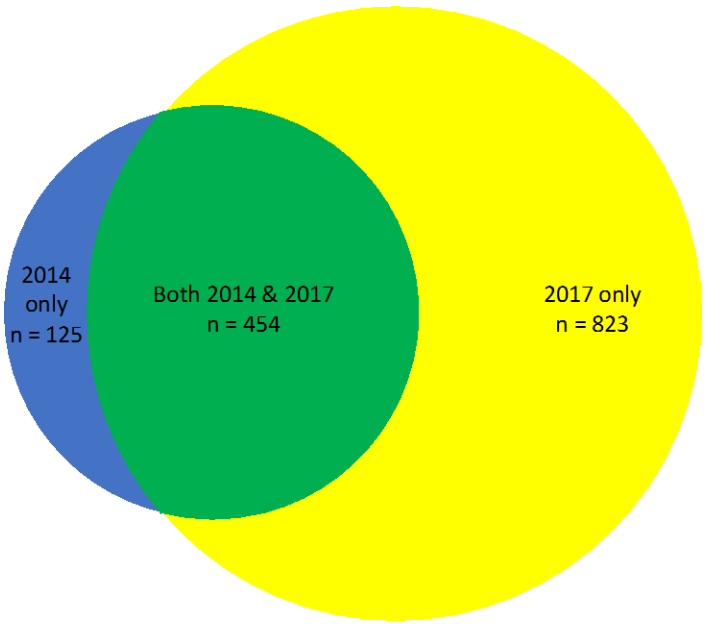
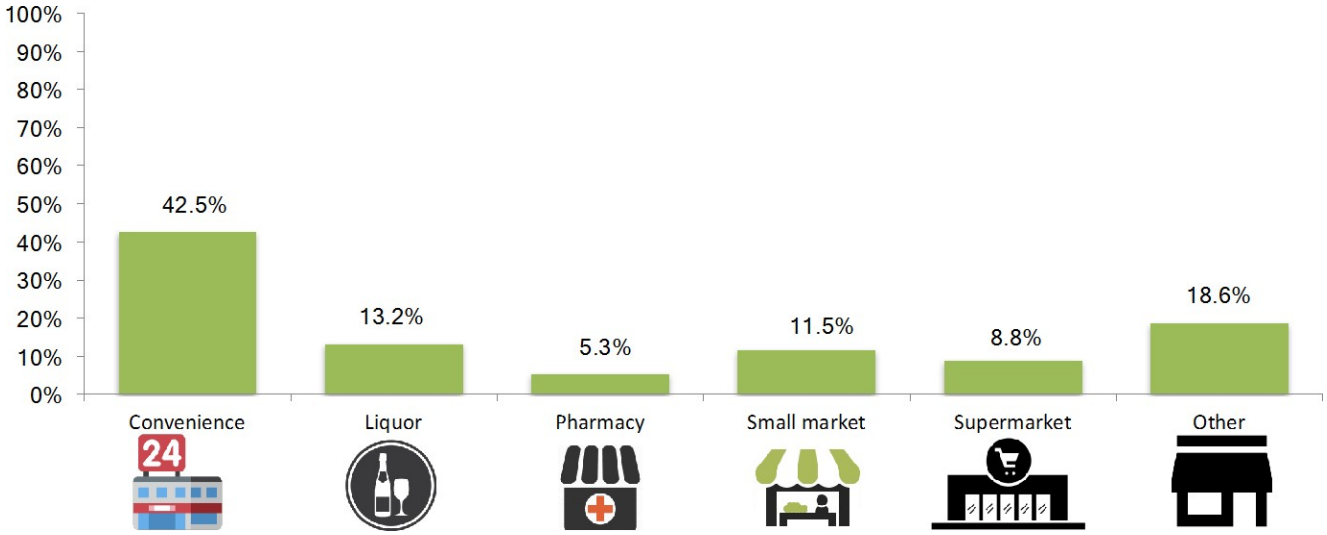


Figure 4 illustrates that convenience stores (with or without gas) were the most prevalent store type in the longitudinal sample. For comparison with 2014, small proportions of stores that were tobacco shops, vape shops, or head shops were combined with "other" store types.

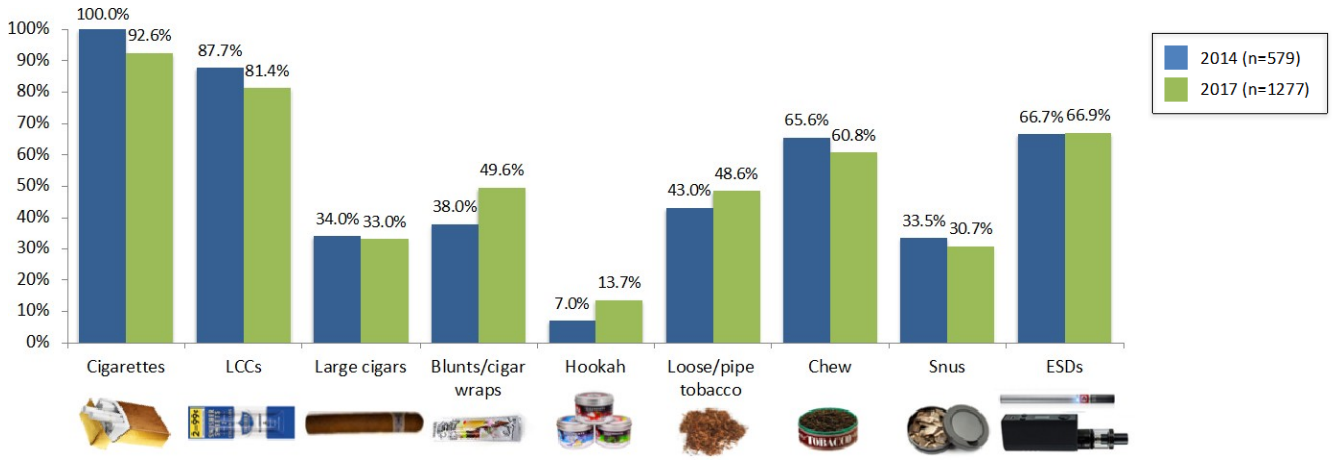
Figure 4: Longitudinal sample composition, 2014-2017 (n=1402)



Section 2: Product availability

This section summarizes change in the retail availability of tobacco products since 2014, and describes the presence of tobacco products that were not tracked previously. Descriptive data for ESDs include the availability of types of devices and presence of e-liquids (with and without nicotine). Availability of flavored tobacco products is summarized by product type and flavor category. Statements about significant increase or decrease over time included a control for store type.

Figure 5: Percent of stores that sold tobacco, by product and year

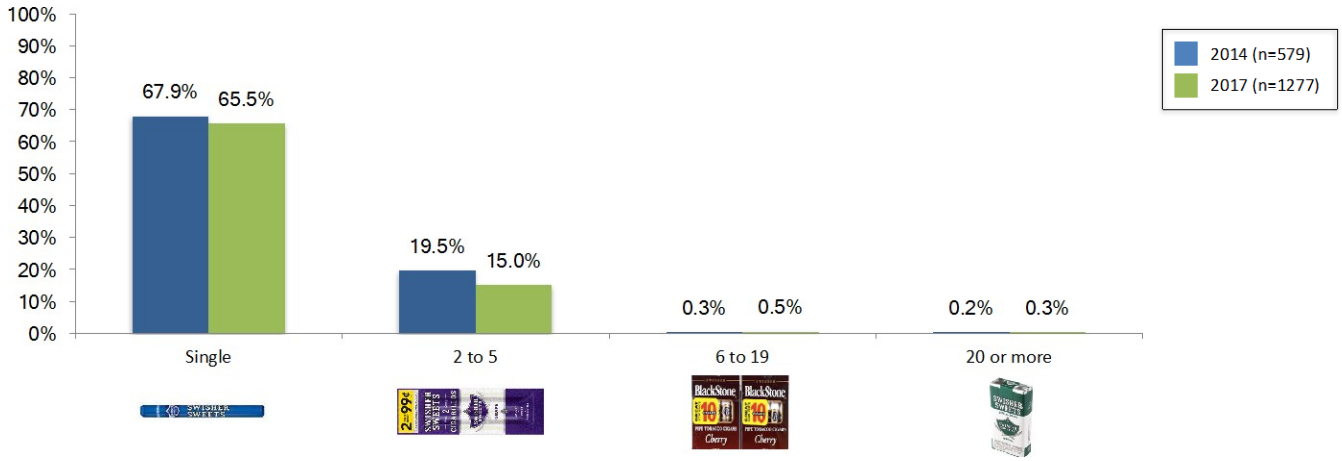


*Note. Selling cigarettes was an eligibility criterion in 2014.

Conventional tobacco products. Figure 5 illustrates the different eligibility criteria for CTRSS 2017: Overall, 7.4 percent of the sample did not sell cigarettes and 5.2 percent did not sell conventional tobacco (Table 2). Descriptive data by product and store type are found in Table 4. Among the vape shops, 21.7 percent sold conventional tobacco and all head shops surveyed sold conventional tobacco.

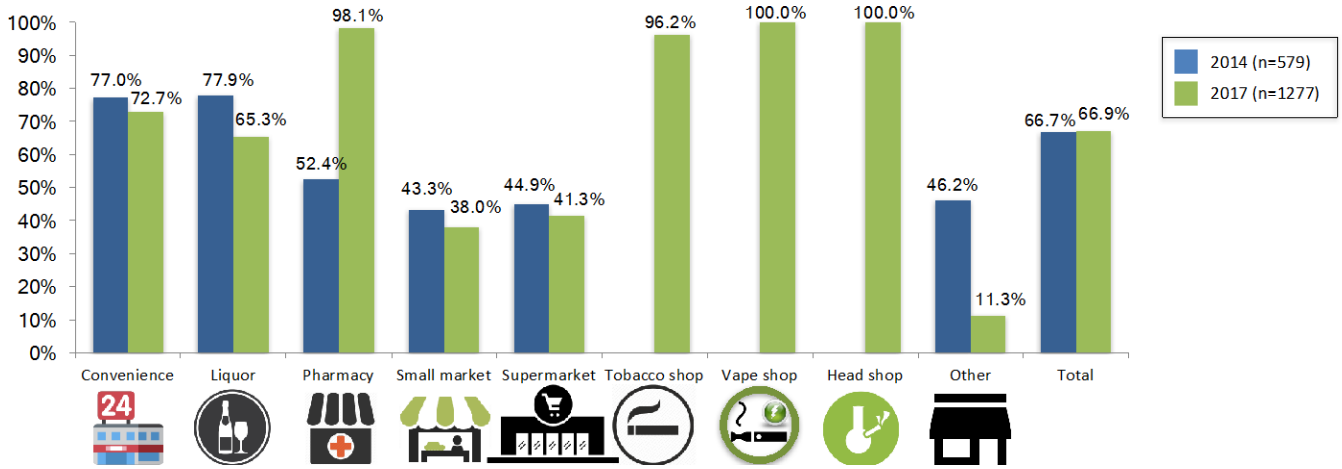
There was a dramatic increase in the availability of blunts/cigar wraps since 2014 (OR=1.64, 95% CI=1.39, 2.06) (Table 16). A smaller increase in the availability of hookah was not statistically significant. The prevalence of single LCCs suggests that cheap tobacco is readily available and the decline was not significant. As in 2014, two-thirds of stores (65.5 percent) sold single LCCs and less than one percent of stores sold LCCs in a minimum pack size of six or more (Figure 6).

Figure 6: Minimum pack size of LCCs in stores, by year



ESDs (including e-liquids). There was little change in the availability of ESDs overall (Figure 7 and Table 3). Because CVS never sold ESDs, the dramatic increase for ESDs in pharmacies merely reflects that CVS was in the sample in 2014, but not in 2017. Retail availability of ESDs declined slightly in traditional tobacco retailers (e.g., convenience, liquor, small grocery stores, and supermarkets), but these changes were not significant.

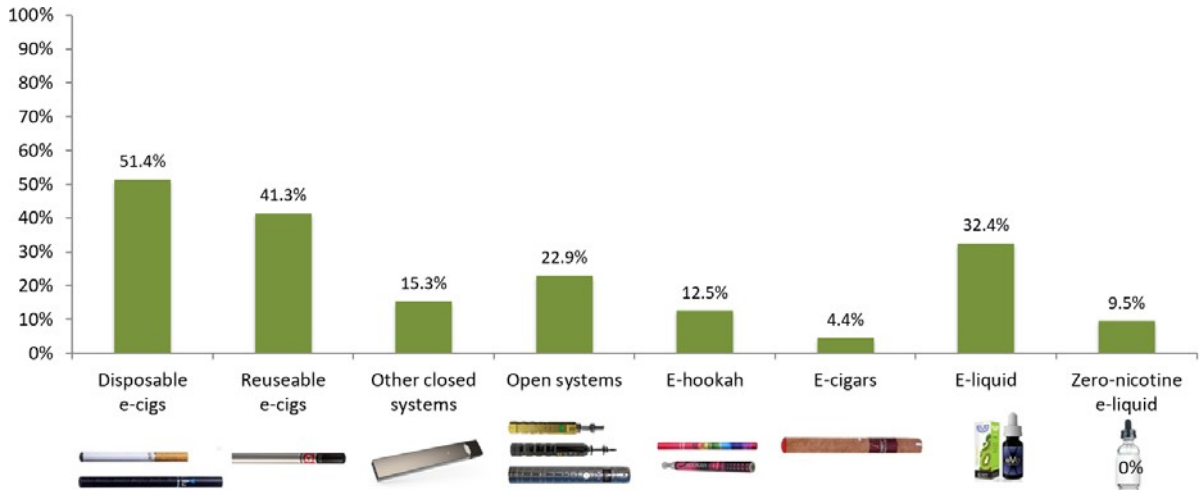
Figure 7: Percent of stores that sold ESDs, by store type and year*



*Note. In 2014, the few tobacco and vape shops in the smaller sample were coded as "other."

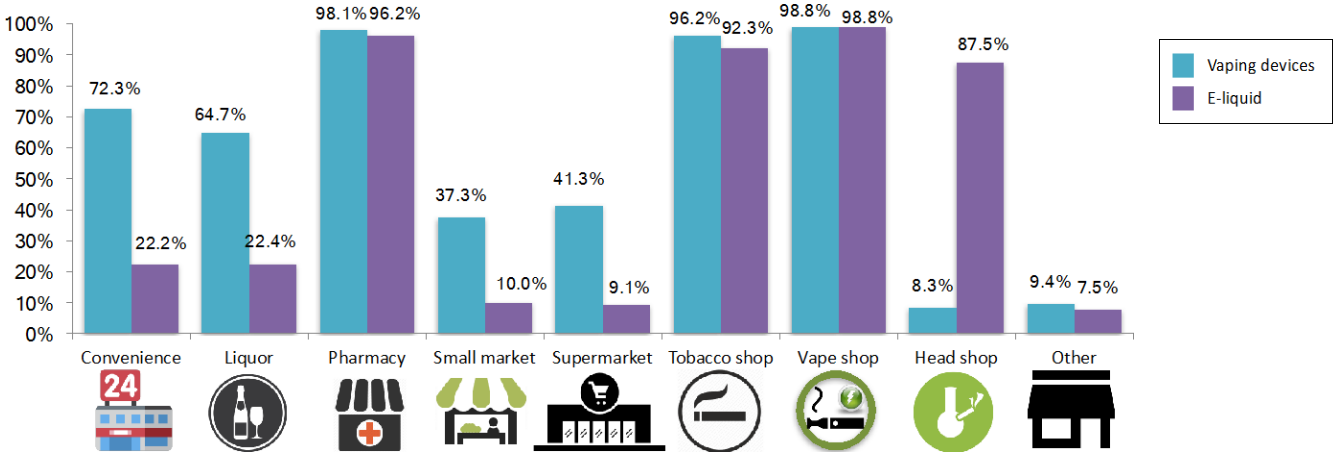
In 2017, half of stores (51.4 percent) sold disposable e-cigarettes (Figure 8). These were still the most commonly available ESDs product, followed by reusable e-cigarettes (41.3 percent) and e-liquids (32.4 percent). Zero-nicotine e-liquids were sold in 9.5 percent of stores (Table 5).

Figure 8: Retail availability of ESD products in 2017



Vaping devices were more commonly available than e-liquids in convenience, liquor, small grocery stores, and supermarkets (Figure 9). Recall that the "other" store type category is comprised primarily of golf courses, donut shops, hotels, and Walmart/dollar stores. Few of these sold either vaping devices or e-liquid.

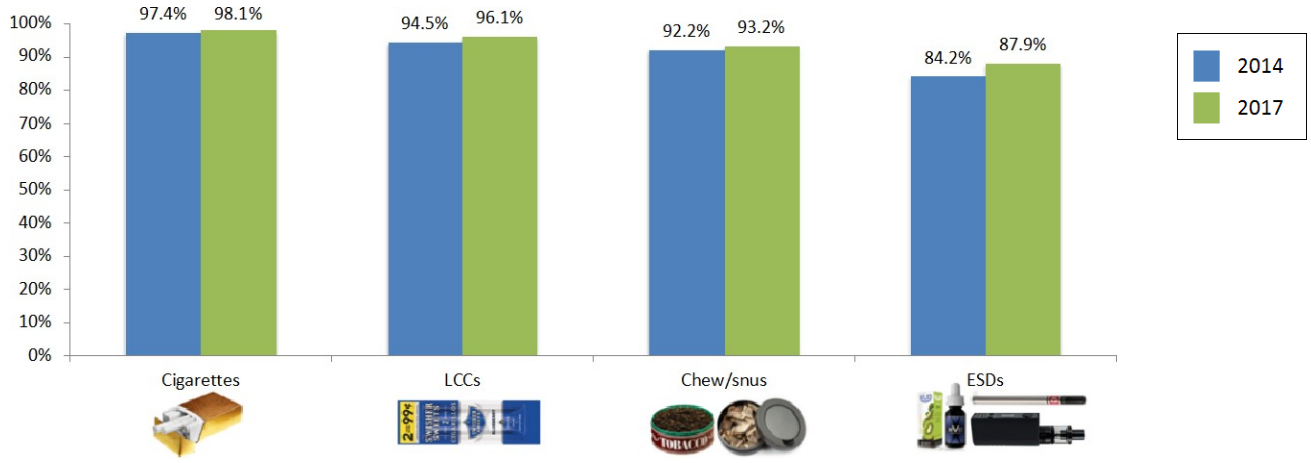
Figure 9: Percent of stores that sold ESDs, by store type (2017)



Non-tobacco products. In anticipation of California's changing retail environment for marijuana, data collectors observed that 6.7 percent of stores sold dry-chamber vaporizers that are compatible with "herbs" (e.g., PAX) (Table 6). In addition, hemp rolling papers were sold in 20.4 percent and herbal wraps in 8.2 percent of stores. Both products can be filled with tobacco, marijuana, or both. Like cigar wraps, herbal wraps are sold in a variety of flavors (e.g., cherry, peach, cocoa bean).

Flavored tobacco. Menthol cigarettes and flavored varieties of LCCs, chew/snus and ESDs were still available in the majority of stores in 2017: 90.8 percent sold menthol cigarettes, 78.2 percent sold LCCs in flavored varieties and 57.6 percent sold flavored chew or snus. The proportion of all stores that sold flavored ESDs (including e-liquid) was 62.0 percent (Table 7). Given differences between store types in 2014 and 2017, Figure 10 compares the availability of flavored tobacco products in stores that sold cigarettes, LCCs, chew/snus or ESDs. Nearly all stores still sold menthol cigarettes in 2017 and flavored varieties of other tobacco products. None of the small increases in availability of flavored products were statistically significant.

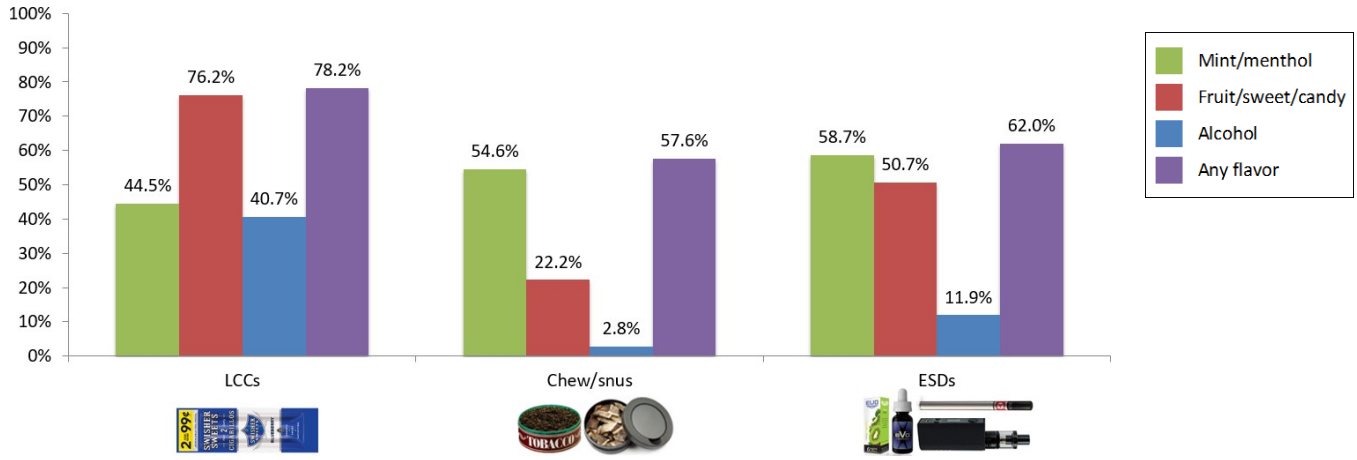
Figure 10: Availability of flavored tobacco in stores that sold the product category*, by year



*Note. Denominators are the subset of stores that sold the product category.

Retail availability of menthol or mint-flavored tobacco was greater for cigarettes than for LCCs and chew/snus (Figure 11). Flavored LCCs were available in approximately three out of four tobacco retailers (78.2 percent). However, fruit/sweet/candy was the most common flavor for LCCs (76.2 percent), compared to mint/menthol and alcohol available in just over 40 percent of stores. The majority of stores sold flavored ESDs (62.0 percent), with mint/menthol (58.7 percent) and fruit/sweet/candy (50.7 percent) flavors more common than alcohol flavored product (11.9 percent).

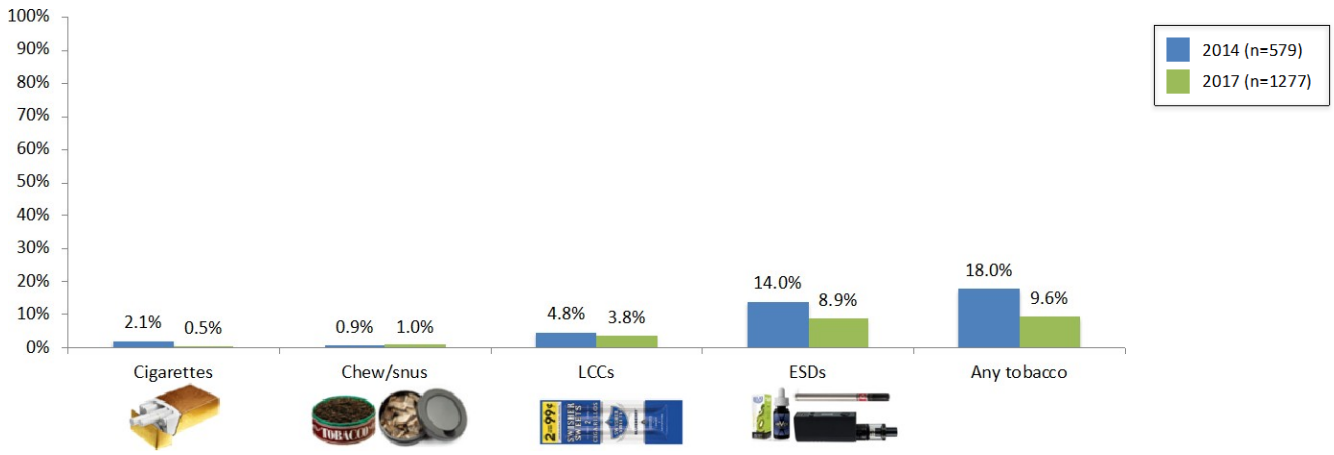
Figure 11: Availability of flavored tobacco among all stores, by product type in 2017



Section 3: Product placement

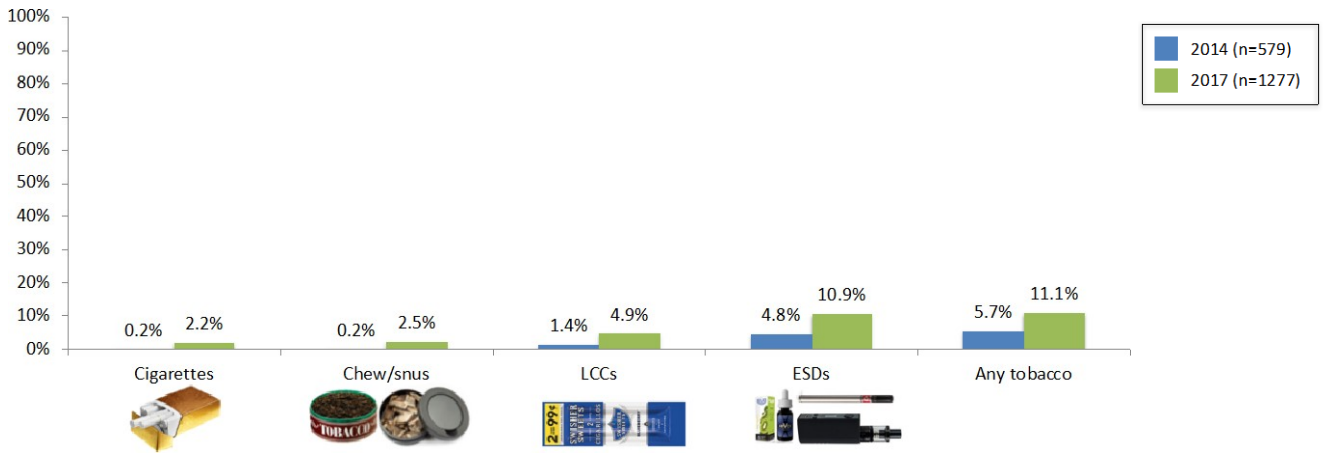
This section describes where and how tobacco products were displayed. In 2017, 9.6 percent of stores displayed at least one tobacco product (including ESDs) near kid-friendly items (Figure 12). ESDs were most commonly found near kid-friendly items in 2014 (14.0 percent) and 2017 (8.9 percent), and the decline was significant (OR=0.51, 95% CI=0.38, 0.69, Table 16). This accounts for the overall decrease in any tobacco near kid-friendly items from 2014 to 2017.

Figure 12: Percent of stores that displayed tobacco near kid-friendly items, by year



In 2017, 11.1 percent of stores had self-service displays for at least one tobacco product (Figure 13). ESDs were most commonly available by self-service in both 2014 and 2017 and the increase was not significant (Table 16). In 2017, 4.9 percent of stores had self-service displays of LCCs, which are prohibited by state law (with some exceptions), and 2.2 percent had self-service displays for cigarettes, which violate California law.

Figure 13: Percent of stores with self-service displays, by year



Section 4: Promotions

Marketing materials. Branded tobacco ads, displays, functional items and/or shelving units were found in nearly all stores. Descriptive data by product, flavor, and store type are found in Table 8. Combustible cigarettes are still the most widely advertised tobacco product on the outside of stores: 36.7 percent of stores displayed at least one marketing material for cigarettes outside (on windows, doors, building, or sidewalk) (Figure 14). ESDs (11.6 percent) and LCCs (10.5 percent) were the second and third most commonly advertised (Table 11). New in 2017, the average number of exterior ads for any tobacco was 1.6 (SD=2.9, max=22), 1.4 (SD=2.6, max=22) for conventional tobacco and 0.2 (SD=0.8, max=10) for ESDs (Table 9). Between 2014 and 2017, the percent of stores with at least one tobacco marketing material decreased from 88.8 percent to 81.7 percent and the change was statistically significant. Controlling for store type, the odds of a store having at least one tobacco marketing material decreased from 2014 to 2017 (OR=0.64, 95% CI=0.49, 0.8, Table 17). However, the 2014 and 2017 surveys were conducted in different seasons.

Figure 14: Percent of stores with tobacco marketing materials in 2017, by product and location

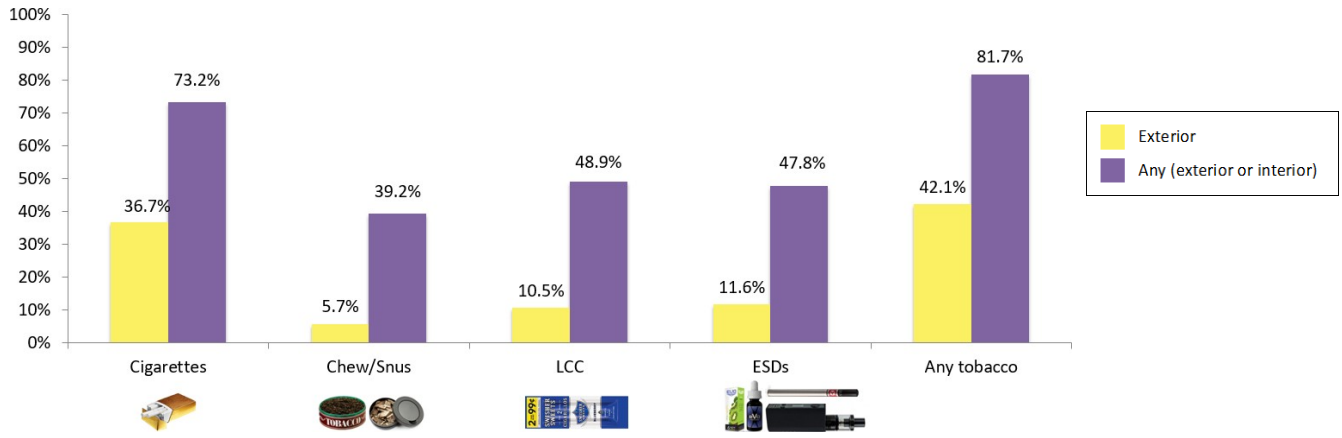
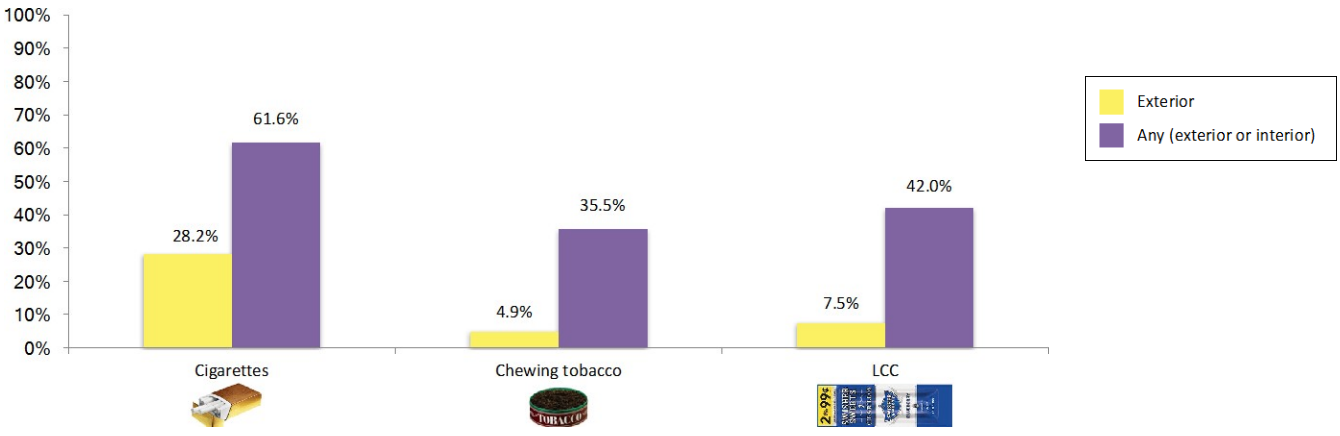


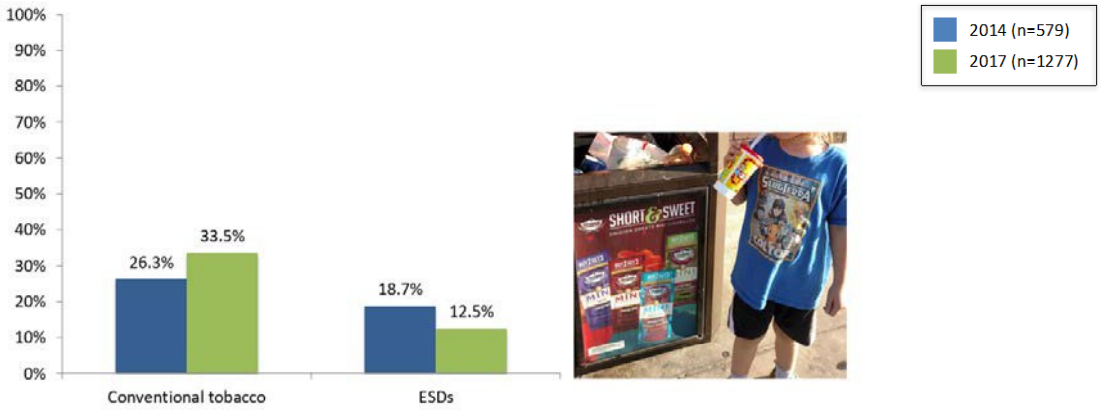
Figure 15: Percent of stores with flavored tobacco marketing materials, by product and location



Low-height ads. Tobacco ads at children's eye-level were present in 36.3 percent of stores in 2017. Since 2014, low-height advertising significantly *increased* for conventional tobacco (OR=1.54, 95% CI=1.25, 1.90) but significantly *decreased* for ESDs (OR=0.48, 95% CI=0.37, 0.62, Figure 16). In 2017,

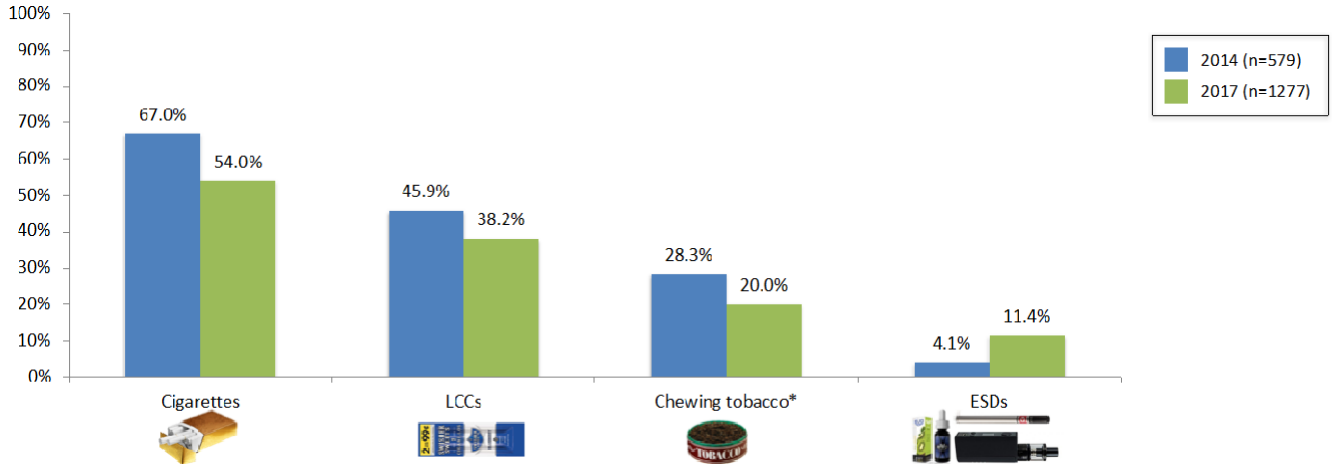
the products most commonly featured on low-height ads were cigarettes (31.1 percent of stores), LCCs (12.7 percent) and ESDs (12.5 percent, Table 10).

Figure 16: Presence of low-height tobacco ads, by product category and year



Price promotions. Price promotions that were not professionally printed (amateur) were excluded from the cross-sectional data because they were uncommon: ranging from 6.1 percent for cigarettes to 0.9 percent for LCCs. As in 2014, discounts for the most harmful (combustible) products were more prevalent than for other tobacco products (Figure 17). In 2017, 11.4 percent advertised discounts for ESDs. Cross-product promotions were rare: 2.3 percent offered liquids/accessories with device purchase, 1.6 percent offered bonus e-liquid with purchase, 0.2 percent offered trinkets (Table 12).

Figure 17: Change in availability of price discounts, by product and year



*Note. In 2014 the category for chewing tobacco was combined with snus.

Between 2014 and 2017, the presence of advertised discounts for any tobacco products decreased from 70.6 to 62.4 percent (OR = 0.73, 95% CI = 0.59, 0.89, Table 17). Although the majority of stores still advertise discounts, their presence decreased in every product category except for ESDs (Figure 17). In models that adjusted for store type, the decrease was significant for cigarettes (OR = 0.74, 95% CI = 0.62, 0.89) and for chewing tobacco (OR = 0.75, 95% CI = 0.60, 0.93, Table 17).

However, the result should be interpreted with caution because the 2017 data excluded price discounts for snus on the store exterior. New in 2017, exterior marketing materials that referred to mobile coupons were present at 8.8 percent of stores (Table 12).

In 2017, the difference between presence of advertised discounts for menthol cigarettes (47.6 percent) and non-menthol (49.4 percent) was small, but statistically significant (Table 11). In 2017, nearly half of stores (47.6 percent) advertised discounts for menthol cigarettes inside (compared to 49.4 for non-menthol) and 14.6 percent advertised menthol discounts outside (compared to 18.2 percent for non-menthol cigarettes).

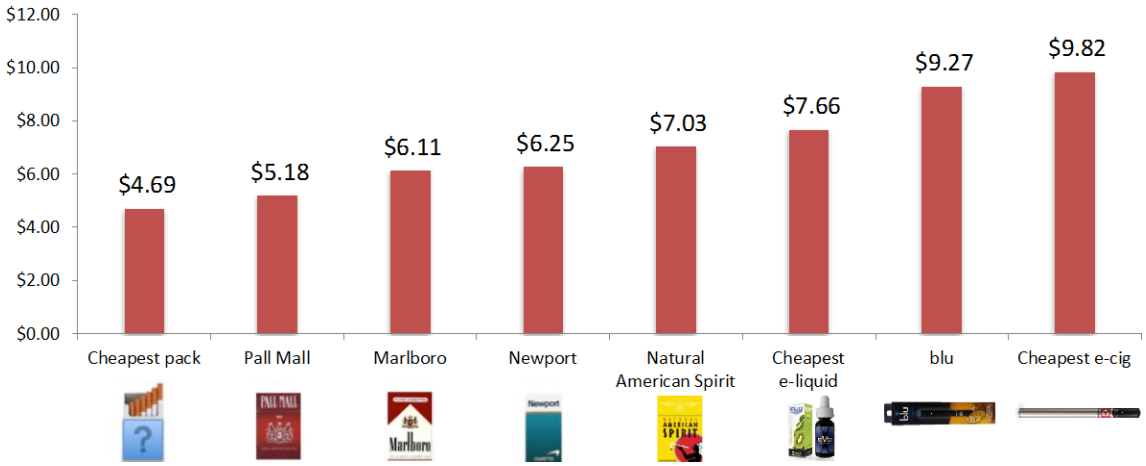
Storefront window/door coverage. In 2017, 32.7 percent of stores had clear windows/doors that were 33 percent or more covered with advertising and 26.8 percent of stores had <10 percent of clear windows and doors covered (Table 13). Professional data collectors made reliable estimates: There was 75.7 percent agreement for the lowest category of coverage and 79.7 percent agreement for highest category. Efforts to use photographs for this measure were less successful. Less than half 48.8 percent) of photographs could be coded – the remainder were too blurry, distant, dark, or otherwise obstructed. For the subset of 678 usable photos, two independent coders (KA and TJ) achieved 90.6 percent agreement on the lowest category of window coverage (<10 percent) and 78.1 percent agreement on the highest category of window coverage (33 percent or more).

Section 5: Price of Cigarettes, ESDs and LCCs

Cigarettes and ESDs. The average price of one pack of cigarettes (before sales tax) ranged from $4.69 for the cheapest pack regardless of brand to $7.03 for Natural American Spirit (Figure 18). The average difference between the price of Pall Mall and the cheapest pack in same store was $0.77, which illustrates a price-point strategy that may have contributed to the brand's increased popularity.[10]

Although the nicotine content of a disposable e-cigarette is roughly the same as a pack of cigarettes,[11] prices for ESDs and e-liquid were typically higher than for combustible tobacco products (Figure 18). There was also greater variation in the price of ESDs in 2017. For example, the percent of stores that sold blu (disposable e-cigarette) at $9.99 decreased from 78.5 percent in 2014 to 34.5 percent in 2017. The most common price for blu was $7.99 in 2017 (40.8 percent of stores) (Table 15). In some stores, the cheapest "e-cigarette" was a more costly open-system device.

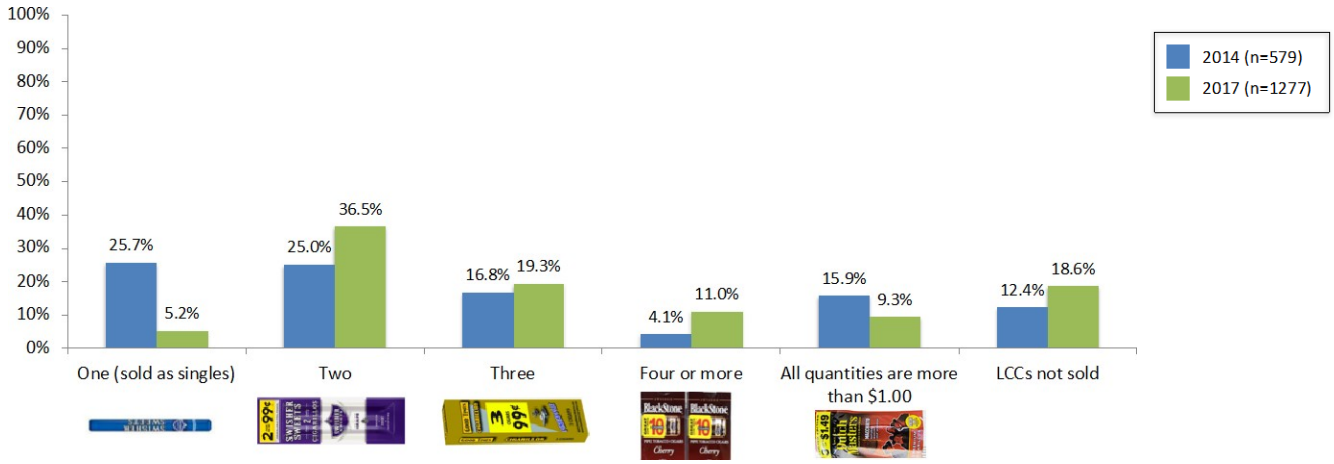
Figure 18: Price (before sales tax) of cigarettes, e-cigarettes and e-liquid in 2017



*Note. Data were collected before the 2017 cigarette tax increase. Descriptive data for prices are in Table 14.

Little cigars/cigarillos (LCCs). More stores sold LCCs for less than $1 in 2017 (78.3 percent) than in 2014 (71.6 percent) but this difference was not significant (Figure 19) and (Table 17). However, the number of sticks for less than $1 increased significantly between 2014 and 2017, controlling for store type ($p< 0.001$, Table 17). The estimated average increase between 2014 to 2017 was 0.5 sticks.

Figure 19. Maximum quantity of LCCs sold for less than $1, by year



Section 6: Retail tobacco marketing in rural counties

In 2017, 11.4 percent of all stores were located in 31 self-identified rural counties. This section compares retail tobacco marketing in these stores to those in non-rural counties. Tests of significance controlled for store type because the composition of stores in rural counties differed. Models used "all other store types" as the referent category in order to compare convenience stores in rural and non-rural areas (Table A).

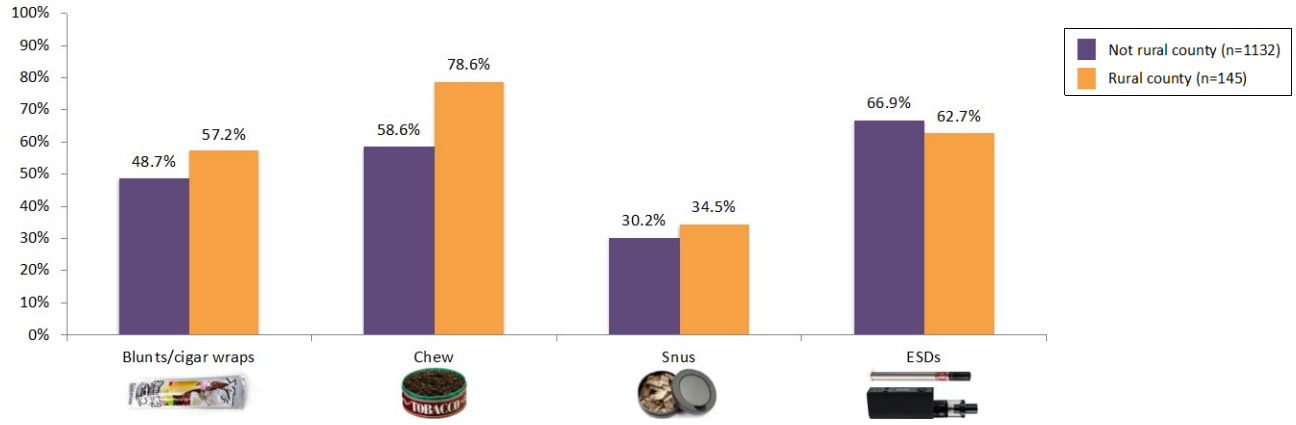
Table A: Store-neighborhood characteristics, by type of county

	Non-rural (n=1131)		**Rural** (n=145)	
Store type				
Convenience stores	41.4%		53.1%	
All others	58.6%		46.9%	
Store-neighborhood characteristics	Mean	SD	Mean	SD
% African American	5.6	7.5	1.6	1.6
% Asian/Pacific Islander	12.8	13.4	3.8	5.4
% American Indian/Alaskan Native	0.3	0.5	1.5	2.5
% Multiple race	2.7	1.8	2.9	2.3
% Other	0.2	0.4	0.1	0.2
% White	37.0	23.8	57.8	24.2
% Hispanic	41.4	24.6	32.4	25.4
Median household income	$62,488	$25,180	$44,559	$12,412
Population density (1k per square mile)	8573	8204	1875	2001
Total population	3388	3587	738	843

Note. Neighborhoods are store-centered, half-mile roadway buffers characterized by American Community Survey 5-yr tract estimates, 2011-2015. Estimates are weighted in proportion to tract area in the buffer. With the exception of multiracial, racial categories are single race and non-Hispanic. More detailed breakdown of store type by county is in Table 1.

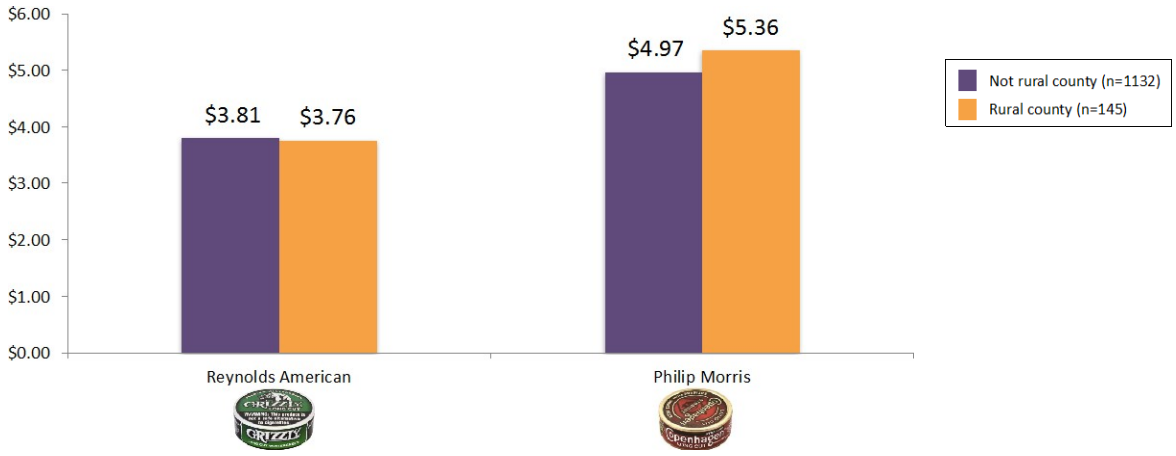
As shown in Figure 20, chewing tobacco was significantly more available at stores in rural than non-rural counties, after adjusting for store type (OR=2.07, 95% CI=1.23, 3.50, Table 20). The association was attenuated in a model that adjusted for neighborhood income and race. In rural-county stores, the presence of marketing materials for chewing tobacco was 31.9 percent with ads inside and 5.9 percent for chew/snus outside. Controlling for store type, rural-county stores were more likely than non-rural county stores to have an interior ad for chew (OR=1.83, 95% CI=1.09, 3.09, Table 20). However, the association was attenuated when neighborhood income and race were controlled. The percent of stores with price promotions for chewing tobacco was not significantly greater in rural-county stores (35.9 percent) than elsewhere (17.9 percent) after controlling for store type (Table 20). Similar to stores in non-rural counties, 33.8 percent of stores in rural counties had 33 percent or more clear window/door area covered with advertising and 37.6 percent of stores had <10 percent of clear windows and doors covered (Table 18).

Figure 20: Percent of stores with non-cigarette tobacco products, by county location (2017, n=1277)



Not surprisingly, the leading premium brand (Copenhagen, Altria) averaged $5.36 (SD=0.85) and cost more than the leading discount brand (Grizzly, Reynolds American) $3.76 (SD=0.48) in rural counties (Figure 21). Contrary to expectation, the premium brand cost significantly *more* in rural-county stores than in non-rural stores (Table 19). After controlling for store type (Table 20), the average estimated difference was $0.40 per tin in rural counties. Prices for other tobacco products did not differ significantly between stores in rural counties and non-rural counties (results not shown).

Figure 21: Average price of chewing tobacco (before sales tax) in 2017, by county location



CONCLUSION AND RECOMMENDATIONS

For the first time in 2017, marketing surveillance in California's tobacco retail environment included vape shops that sell ESDs but no other tobacco products. Such retailers comprised 5.1 percent of the statewide sample, which suggests there are at least 1696 vape shops in California. Regardless of whether vape shops sold conventional tobacco, more than half of them did not appear on the state tobacco retail license in October 2016. This suggests a need to monitor implementation and enforcement of retail licensing at the state level. The CTRSS 2017 surveillance was also first to characterize the variety of vaping devices and the availability of e-liquids (33 percent of stores). Such information is useful to identify the scope of evaluating the state's child-proof packaging requirement. Zero-nicotine e-liquids were sold in ten percent of stores, and the U.S. Food and Drug Administration has not decided whether to exercise regulatory authority over zero-nicotine products. Therefore, it would be up to the state to determine whether such products are actually nicotine-free.

For the first time in 2017, the CTRSS sample was sufficiently large to compare retail tobacco marketing at stores in self-identified rural counties, where prevalence of cigarette smoking and smokeless tobacco use are higher.[12,13] Consistent with expectation, stores in rural counties were more likely to sell chewing tobacco and to have at least one interior ad. Contrary to expectation, chewing tobacco did not cost less in rural stores – indeed, the premium brand (Copenhagen, Altria) cost significantly more. Future analyses should make similar comparisons for cigarettes and ESDs, taking into account the relevant tax increases on both.

CTRSS 2017 also represents the first effort to record cigarette prices across multiple price points and compare different price points from the same manufacturers. For example, the third most popular brand of cigarettes in California in 2017 was Natural American Spirit (RJ Reynolds),[14] which is an ultra-premium brand with an average price that was 1.4 times greater than a value brand (Pall Mall) from the same manufacturer, and 1.5 times greater than the average price of the cheapest pack regardless of brand. An upward trend in the presence of cigarette price discounts that was observed from 2011 to 2014 was reversed.[15] The percentage of stores that advertised price discounts for cigarettes was 49.4 percent in 2011, 67.0 percent in 2014, and 54.0 percent in 2017. Mobile coupons were advertised at less than ten percent of stores, but this was only assessed for the store exterior. Research is needed to assess the presence of such promotions inside stores, and to better understand consumer use of these coupons. The practice of targeting smokers, based on proximity to stores, with price promotions that are location-specific and/or time-sensitive is also under-studied.[16]

Continued widespread availability of cheap, flavored cigar products are particularly concerning in the context of a $2 tax increase on cigarettes. Between 2014 and 2017, notable changes are significant increases in: 1) the number of little cigars/cigarillos that could be purchased for less than $1 and 2) tobacco products that are marketed with appeal to marijuana users (e.g., blunts/cigar wraps). These results renew concerns about the appeal of cigar products to youth and young adults. Also noteworthy was the retail availability of other products (e.g., open-system vaping devices, dry-chamber vaporizers, hemp rolling papers, and herbal wraps) that can be used with marijuana and tobacco, whether interchangeably or simultaneously. In the changing retail environment for marijuana in California, new measures are needed to examine how tobacco companies capitalize on the appeal of marijuana to consumers.[17] Coordinated surveillance efforts and shared data between tobacco control and drug prevention would promote an understanding of how marijuana deregulation affects tobacco use and marijuana co-use.

There was greater availability of discounts on ESDs and lower prices for disposable e-cigarettes in 2017 than in 2014, before e-cigarettes from RJ Reynolds (Vuse) and Altria (MarkTen) were introduced. The 2017 data collected prior to tax increases for cigarettes and ESDs will be a useful baseline for

studying change in absolute and relative prices of cigarettes and e-cigarettes. However, tracking price of the same products over time is more challenging for ESDs. Between 2014 and 2017, for example, the retail availability of blu decreased from 42.5 to 30.5 percent of stores. Scanner data will be useful to inform product selection and to complement what is learned from in-store observations.

The expanding variety of tobacco products and accessories makes retail marketing surveillance and regulation a more complex task. Surveying retail environments for stores that sell entirely different product lines (vape shops versus supermarkets) required an instrument with branching modules that were appropriate to different settings and demanded more interaction clerk interaction. The software application for CTRSS 2017 was not up to the challenge, and the branched questionnaire for vape shops made data analysis more time-consuming. Software that allows for skip patterns based on programming logic is essential and has been identified for CTRSS 2018. Determining what information about retail marketing is most needed to support state and local programs will help refine and reduce existing measures. New measures are needed to keep pace with the changing environment and regulatory priorities. Marijuana-related and other “concept” flavors, value packaging, and display size could be considered for future surveillance efforts.

Disclosure: Any views or opinions in this study are solely those of the authors and do not necessarily reflect the policies or official views of the California Department of Public Health (Dec 21, 2017).

REFERENCES

1. Federal Trade Commission. Federal Trade Commission Cigarette Report for 2015. Washington, DC; Octoboer, 2017. https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-cigarette-report-2015-federal-trade-commission-smokeless-tobacco-report/2015_cigarette_report.pdf

2. Federal Trade Commission. Federal Trade Commission Smokeless Tobacco Report 2015. Washington, DC; October, 2017. https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-cigarette-report-2015-federal-trade-commission-smokeless-tobacco-report/2015_smokeless_tobacco_report.pdf

3. Kornfield R, Huang J, Vera L, Emery SL. Rapidly increasing promotional expenditures for e-cigarettes. *Tob Control*. 2015;24:110-111.

4. Schleicher NC, Johnson TO, Dauphinee AL, Henriksen L. Tobacco Marketing in California's Retail Environment (2008-2011). Stanford, CA: Stanford Prevention Research Center; 2013 Jul. Final report for the California Tobacco Advertising Survey (2011) Submitted to the California Tobacco Control Program, California Department of Public Health. Available from: https://www.cdph.ca.gov/Programs/CCDPHP/DCDIC/CTCB/CDPH%20Document%20Library/ResearchandEvaluation/Reports/Tobacco-MarketingIinCaliforniasRetailEnvironment2014.pdf

5. Shrout PE, Fleiss JL. Intraclass correlations: uses in assessing rater reliability. *Psychol Bull*. 1979 Mar;86(2):420–8.

6. RJ Reynolds Web site: http://www.rjrt.com/transforming-tobacco/what-we-make/ [Accessed 12/21/2017].

7. Epperson AE, Prochaska JJ, Henriksen L. The flip side of Natural American Spirit: corporate social responsibility advertising. *Tob Control*. Published Online First: 25 February 2017. doi:10.1136/ tobaccocontrol-2016-053576

8. Epperson AE, Henriksen L, Prochaska JJ. Natural American Spirit Brand Marketing Casts Health Halo Around Smoking. *Am J Public Health*. 2017 Apr 11;107(5):668–70.

9. Walgreens is taking over 1,900 Rite Aids [Internet]. USA TODAY. [cited 2017 Dec 21]. Available from: https://www.usatoday.com/story/money/2017/09/19/walgreens-rite-aid-regulatory-approval/680269001/

10. Sharma A, Fix BV, Delnevo C, et al. Trends in market share of leading cigarette brands in the USA: national survey on drug use and health 2002-2013. *BMJ Open*. 2016 Jan 29;6(1):e008813.

11. Liber AC, Drope JM, Stoklosa M. Combustible cigarettes cost less to use than e-cigarettes: global evidence and tax policy implications. *Tob Control*. 2017 Mar;26(2):158–63.

12. James CV, Moonesinghe R, Wilson-Frederick SM, et al. Racial/Ethnic Health Disparities Among Rural Adults - United States, 2012-2015. *Morb Mortal Wkly Rep*. 2017 Nov 17;66(23):1–9.

13. Bernat DH, Choi K. Differences in Cigarette Use and the Tobacco Environment Among Youth Living in Metropolitan and Nonmetropolitan Areas. *J Rural Health*. 2016: doi:10.1111/jrh.12194

14. Johnson TO, Shyu R, Schleicher N, Henriksen L. Using retail sales data for tobacco products inform state and local tobacco control (November, 2017). Report for the California Department of Public Health, California Tobacco Control Program. Stanford Prevention Research Center, Stanford University School of Medicine. Palo Alto, CA.

15. Schleicher NC, Johnson TO, Ahmad I, et al. Tobacco Marketing in California's Retail Environment (2011-2014). Report prepared for the California Tobacco Control Program. https://www.cdph.ca.gov/Programs/CCDPHP/DCDIC/CTCB/CDPH%20Document%20Library/ResearchandEvaluation/Reports/Tobacco-MarketingIinCaliforniasRetailEnvironment2014.pdf

16. Seidenberg AB, Jo CL. Cigarette couponing goes mobile. *Tob Control*. 2017 Mar;26(2):233–4.

17. Henriksen L, Schleicher NC, Ababseh K, et al. Marijuana as a "concept" flavour for cigar products: availability and price near California schools. *Tob Control*. Published Online First: 12 October 2017. doi:10.1136/tobaccocontrol-2017-053961

TABLES

Table 1: Sample composition in 2017, overall and by type of non-rural/rural county

	All stores		Stores located in a non-rural county		Stores located in a rural county	
	n=1277	%	n=1132	%	n=145	%
Convenience	546	42.8	469	41.4	77	53.1
Liquor	170	13.3	160	14.1	10	6.9
Pharmacy	52	4.1	43	3.8	9	6.2
Small market/deli/produce mrkt	150	11.7	138	12.2	16	11.0
Supermarket	121	9.5	98	8.7	19	13.1
Tobacco	78	6.1	73	6.4	5	3.4
Vape	83	6.5	80	7.1	3	2.1
Head shop	24	1.9	21	1.9	3	2.1
Other	53	4.2	50	4.4	3	2.1

Table 2: Change in retail availability of tobacco, by product and year

	2014 n=579	2017 n=1277
	%	%
Conventional Tobacco	100.0	94.8
Cigarettes	100.0*	92.6
LCC	87.7	81.4
Large cigars	33.9	33.0
Blunt/cigar wraps	38.3	49.6
Hookah	6.7	13.7
Loose pipe tobacco	43.0	48.6
Chew	63.6	60.8
Snus	39.4	30.7
ESDs	66.7	66.9
Disposable cigarette look-a-likes	62.7	51.4
Reusable cigarette look-a-likes	45.6	41.3
E-hookah	17.4	12.5
E-cigars	15.0	4.4
Open systems	20.9	22.9
E-liquid	18.3	32.4

*Cigarette availablity was a store eligibility criterion in 2014

Table 3: Retail availability of ESDs, by product, store type and year

	2014	2017
Store type	%	%
Convenience	77.0	72.7
Liquor	77.9	65.3
Pharmacy	52.4	98.1
Small Market	43.3	38.0
Supermarket	44.9	41.3
Tobacco shop	N/A	96.2
Vape shop	N/A	100.0
Head shop	N/A	100.0
Other	46.2	11.3
Total	66.7	66.9

Table 4: Retail availability of conventional tobacco in 2017, by product and store type

		Cigarettes	LCCs	Large Cigars	Blunt/ Cigar Wraps	Hookah/ Shisha	Loose or Pipe Tobacco	Chew	Snus
Store type	n	%	%	%	%	%	%	%	%
Convenience	546	99.6	95.4	20.9	57.3	4.9	52.0	81.9	50.7
Liquor	170	96.5	91.8	53.5	65.9	15.3	54.7	68.8	17.1
Pharmacy	52	100.0	96.2	84.6	32.7	5.8	86.5	46.2	13.5
Small market	150	100.0	72.7	20.0	34.7	6.7	32.7	38.0	9.3
Supermarket	121	99.2	59.5	25.6	19.8	2.5	33.9	36.4	8.3
Tobacco shop	78	96.2	97.4	92.3	93.6	82.1	97.4	82.1	57.7
Vape shop	83	15.7	20.5	16.9	20.5	20.5	14.5	7.2	7.2
Head shop	24	79.2	100.0	62.5	87.5	95.8	70.8	33.3	8.3
Other	53	84.9	26.4	18.9	9.4	3.8	7.5	18.9	3.8
Total	1277	92.6	81.4	33.0	49.6	13.7	48.6	60.8	30.7

Table 5: Retail availability of ESDs in 2017, by product and store type

		Disposable cigarette look-a-likes	Reusable cigarette look-a-likes	Other closed system	Open systems	E-hookah	E-cigars	Any ESD device	E-liquid	Zero-nicotine e-liquid	Any ESD
Store type	n	%	%	%	%	%	%	%	%	%	%
Convenience	546	59.9	52.0	19.2	11.0	9.3	1.3	72.3	22.2	10.4	72.7
Liquor	170	58.2	34.1	2.9	10.6	13.5	1.8	64.7	22.4	9.4	65.3
Pharmacy	52	96.2	94.2	44.2	63.5	0.0	13.5	98.1	96.2	63.5	98.1
Small market	150	29.3	16.0	2.7	5.3	7.3	0.7	37.3	10.0	3.3	38.0
Supermarket	121	34.7	17.4	6.6	5.0	0.8	0.8	41.3	9.1	3.3	41.3
Tobacco shop	78	79.5	69.2	29.5	85.9	57.7	32.1	96.2	92.3	1.3	96.2
Vape shop	83	16.9	24.1	18.1	92.8	12.0	7.2	98.8	98.8	2.4	100.0
Head shop	24	58.3	58.3	41.7	83.3	66.7	25.0	95.8	87.5	4.2	100.0
Other	53	7.5	7.5	5.7	5.7	3.8	0.0	11.3	7.5	3.8	11.3
Total	1277	51.4	41.3	15.3	22.9	12.5	4.4	66.0	32.4	9.5	66.9

Table 6: Availability of non-tobacco products in 2017, by store type

		Non-Tobacco Products			
		Herbal Wraps	Hemp Rolling Papers	Dry-chamber vaporizers	Bottled water*
Store type	n	%	%	%	%
Convenience	546	4.2	14.5	0.2	74.4
Liquor	170	5.9	25.3	1.2	52.4
Pharmacy	52	3.8	5.8	1.9	100.0
Small market	150	4.0	10.0	1.3	54.7
Supermarket	121	0.8	6.6	0.8	65.3
Tobacco shop	78	53.8	91.0	52.6	14.1
Vape shop	83	6.0	19.3	26.5	3.6
Head shop	24	62.5	95.8	66.7	8.3
Other	53	1.9	3.8	0.0	20.8
Total	1277	8.2	20.4	6.7	57.6

Table 7: Availability of flavored tobacco, by product category, flavor variety and store type

		Cigarettes	Little Cigars & Cigarillos				Chew/Snus				ESD			
				Fruit/sweet/				Fruit/sweet/				Fruit/sweet/		
		Menthol	Mint	candy	Liquor	Any Flavor	Mint	candy	Liquor	Any Flavor	Mint	candy	Liquor	Any Flavor
Store type	n	%	%	%	%	%	%	%	%	%	%	%	%	%
Convenience	546	99.5	51.8	91.6	47.8	93.6	76.9	31.9	3.3	79.9	63.0	54.2	5.9	66.8
Liquor store	170	96.5	44.7	86.5	55.3	88.2	53.5	20.6	1.2	61.8	51.8	42.4	5.9	58.8
Pharmacy	52	100.0	38.5	88.5	48.1	92.3	30.8	13.5	1.9	30.8	98.1	75.0	3.8	98.1
Small market	150	94.7	38.7	66.7	26.0	68.0	33.3	8.0	1.3	35.3	28.0	20.7	1.3	30.0
Supermarket	121	96.7	25.6	43.8	16.5	48.8	30.6	5.8	2.5	31.4	34.7	20.7	0.8	36.4
Tobacco shop	78	96.2	87.2	94.9	66.7	96.2	80.8	53.8	11.5	82.1	93.6	94.9	51.3	96.2
Vape shop	83	14.5	12.0	19.3	10.8	19.3	7.2	1.2	1.2	7.2	97.6	98.8	57.8	100.0
Head shop	24	79.2	62.5	100.0	66.7	100.0	29.2	12.5	0.0	33.3	95.8	95.8	66.7	95.8
Other	53	67.9	13.2	24.5	7.5	24.5	13.2	5.7	0.0	17.0	11.3	9.4	1.9	11.3
Total	1277	90.8	44.5	76.2	40.7	78.2	54.6	22.2	2.8	57.6	58.7	50.7	11.9	62.0

Table 8: Percent of stores with any exterior marketing materials by product category, flavor and store type

		Flavored			Not flavored/regular			Overall			
		Cigarettes	LCCs	Chew/Snus*	Cigarettes	LCCs	Chew/Snus*	Cigarettes	LCCs	Chew/Snus	ESDs
Store type	n	%	%	%	%	%	%	%	%	%	%
Convenience	546	40.8	7.1	7.0	51.5	9.5	6.6	54.2	11.4	8.8	13.4
Liquor store	170	18.8	7.6	3.5	29.4	12.4	1.8	30.6	13.5	3.5	8.8
Pharmacy	52	1.9	0.0	0.0	1.9	0.0	0.0	1.9	0.0	0.0	0.0
Small Market	150	16.0	6.7	2.0	24.0	7.3	0.7	24.0	8.7	2.0	4.0
Supermarket	121	4.1	0.8	0.0	5.0	0.8	0.0	5.0	0.8	0.0	2.5
Tobacco shop	78	70.5	32.1	19.2	75.6	34.6	17.9	79.5	39.7	23.1	39.7
Vape shop	83	9.6	3.6	0.0	10.8	4.8	0.0	10.8	4.8	0.0	22.9
Head shop	24	20.8	12.5	0.0	25.0	20.8	0.0	25.0	20.8	0.0	25.0
Other	53	13.2	3.8	0.0	17.0	3.8	0.0	17.0	3.8	0.0	1.9
Total	1277	28.2	7.5	4.9	35.8	9.6	4.2	37.4	11.0	5.9	12.1

*For Interior: Only Chew (no Snus data collected); For Exterior: Chew/Snus data collected

Table 9: Count of exterior tobacco ads, by product category and store type

		Any tobacco		Conventional Tobacco		ESDs	
Store type	n	Mean	SD	Mean	SD	Mean	SD
Total	1277	1.6	2.9	1.4	2.6	0.2	0.8

Table 10: Percent of stores with any marketing materials below 3 feet, by product category and location

	Cigarettes	LCCs	Chew*	ESDs	Any tobacco (Conventional + vaping	Any conventional tobacco (cigarettes, chew, LCCs)
Marketing materials	%	%	%	%	%	%
Interior below 3 ft.	21.1	9.5	4.6	10.4	26.3	23.1
Exterior below 3 ft.	21.8	5.6	2.1	4.1	24.4	23.3
Interior or Exterior below 3 ft.	31.1	12.7	6.0	12.5	36.3	33.5

**For Interior: Only Chew (no Snus data collected), for Exterior Chew/Snus data collected*

Table 11: Presence of marketing materials by location (interior/exterior), product category and flavor

	Cigarettes %			Chew/Snus* %			LCCs %			ESDs - not by flavor %			Larger categories - not by flavor %		
	Not flavored	Menthol	Any	Not flavored	Flavored	Any	Not flavored	Flavored	Any	Vape devices	E-liquids	Any ESDs	Any conventional tobacco (cigarettes, chew, LCCs)	Any ESDs (vaping devices, e-liquids)	Any tobacco (cigarettes, chew, LCC, ESDs)
Any marketing materials (interior or exterior)	72.2	61.6	73.2	36.6	35.5	39.2	46.4	42.0	48.9	46.3	20.4	47.8	76.4	47.2	81.7
Any exterior marketing maerials	35.8	28.2	36.7	4.2	4.9	5.7	9.6	7.5	10.5	10.6	3.0	11.6	39.6	11.6	42.1
Any amateur signage price promotions (interior or exterior)	6.0	5.2	6.1	2.1	1.5	2.1	0.9	0.8	0.9	3.1	4.1	5.3	7.8	5.3	11.9

**For Interior: Only Chew (no Snus data collected), for Exterior Chew/Snus data collected*

Table 12: Types of price promotion, by product category

Type of promotion	n	%
Professional price promotion (interior or exterior)		
Cigarettes	690	54.0
Chew	255	20.0
LCCs	488	38.2
Vape device	139	10.9
E-liquid	32	2.5
Conventional tobacco	783	61.3
ESDs	146	11.4
Any tobacco	797	62.4
Cross-product promotions for ESDs		
Buy ESD device, get free/discounted ESD related item	29	2.3
Buy ESD device, get free/discounted conventional tobacco	0	0.0
Buy ESD device, get free/discounted trinket	1	0.1
Buy e-liquid, get free/discounted liquid	13	1.0
Any of the above offers	39	3.1
Mobile coupon offer on exterior	112	8.8

Table 13: Percent of stores with windows/clear doors covered by signs, categorized by store type

		No window/ doors	Less than 10%	Between 10% and 33%	More than 33%
Store type	n	%	%	%	%
Convenience	546	1.5	19.0	50.9	28.6
Liquor store	170	2.9	10.0	28.2	58.8
Pharmacy	52	0.0	61.5	34.6	3.8
Small market	150	9.3	15.3	26.7	48.7
Supermarket	121	6.6	62.0	14.9	16.5
Tobacco shop	78	0.0	17.9	32.1	50.0
Vape shop	83	14.5	59.0	13.3	13.3
Head shop	24	8.3	29.2	29.2	33.3
Other	53	24.5	39.6	20.8	15.1
Total	1277	4.9	26.8	35.7	32.7

Table 14: Price of tobacco products in 2017, before the $2 cigarette tax increase

Product	n	Mean	SD
Cigarettes			
Marlboro	1141	6.11	0.66
Newport	1027	6.25	0.76
Natural American Spirit		7.03	0.66
Pall Mall	914	5.18	0.77
Cheapest Pack	776	4.69	1.03
Chew			
Grizzly	535	3.80	0.64
Copenhagen	521	5.04	0.93
ESDs			
Blu Classic Tobacco	390	9.27	1.39
Cheapest e-cigarette	799	9.82	7.62
Cheapest e-liquid	385	7.66	3.12
Water			
Aquafina	535	1.49	0.33
Dasani	521	1.53	0.33

*Prices exclude sales tax.

Table 15: Price of blu disposable e-cigarette, by year

	2014		2017	
Price (Dollars)	**n**	**%**	**n**	**%**
5.99 - 7.89	2	0.8	9	2.3
7.99	**0**	**0.0**	**156**	**40.0**
8.00-8.98	1	0.4	3	0.8
8.99	3	1.2	22	5.6
9.00-9.89	3	1.2	13	3.3
9.99	**193**	**78.5**	**133**	**34.1**
10.00-10.89	5	2.0	9	2.3
10.99	23	9.3	21	5.4
11.00-11.98	1	0.4	4	1.0
11.99	7	2.8	8	2.1
12.00 - 16.00	8	3.3	12	3.1
Total	246	100	390	100
	Price data from 42.5% of stores		*Price data from 30.5% of stores*	

*Price excludes sales tax

Table 16: Change over time in product availability, placement and self-service, adjusted for store type

	Product availability										Product location near kid stuff								Product location self-service	
	Chew		Snus		LCCs/Cigars		Blunts/Cigar wraps		Hookah		Conventional tobacco		ESDs		Any Tobacco		ESDs	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Year (ref=2014)																		
2017	0.96 (0.80, 1.14)	0.608	0.84 (0.70, 1.02)	0.074	0.83 (0.64, 1.07)	0.150	1.69 (1.39, 2.06)	<0.001	1.21 (0.85, 1.73)	0.293	0.93 (0.64, 1.34)	0.687	0.51 (0.38, 0.69)	<0.001	0.58 (0.45, 0.76)	<0.001	0.89 (0.58, 1.38)	0.613
Store type (ref=Convenience)																		
Liquor store	0.59 (0.42, 0.84)	0.003	0.26 (0.18, 0.37)	<0.001	0.81 (0.44, 1.47)	0.481	1.48 (1.09, 2.02)	0.012	3.81 (2.28, 6.36)	<0.001	1.61 (0.94, 2.77)	0.083	1.08 (0.72, 1.63)	0.694	1.22 (0.84, 1.77)	0.294	2.58 (1.45, 4.61)	0.001
Pharmacy	0.24 (0.15, 0.38)	<0.001	0.10 (0.05, 0.22)	<0.001	0.98 (0.37, 2.56)	0.967	0.46 (0.29, 0.72)	0.001	1.70 (0.75, 3.87)	0.204	0.17 (0.02, 1.29)	0.087	0.06 (0.01, 0.47)	0.007	0.05 (0.01, 0.36)	0.003	0.56 (0.13, 2.41)	0.436
Small market	0.15 (0.10, 0.21)	<0.001	0.14 (0.09, 0.22)	<0.001	0.17 (0.11, 0.27)	<0.001	0.41 (0.29, 0.58)	<0.001	1.50 (0.79, 2.87)	0.214	0.94 (0.48, 1.83)	0.859	0.31 (0.16, 0.59)	<0.001	0.49 (0.29, 0.83)	0.008	0.70 (0.31, 1.61)	0.402
Supermarket	0.17 (0.12, 0.25)	<0.001	0.08 (0.04, 0.15)	<0.001	0.09 (0.06, 0.15)	<0.001	0.14 (0.09, 0.22)	<0.001	0.39 (0.12, 1.27)	0.118	0.37 (0.13, 1.06)	0.063	0.04 (0.00, 0.26)	0.001	0.11 (0.04, 0.30)	<0.001	0.00 (0.00, 0.00)	<0.001
Other	0.15 (0.11, 0.21)	<0.001	0.30 (0.21, 0.41)	<0.001	0.09 (0.06, 0.13)	<0.001	0.68 (0.51, 0.91)	0.009	14.27 (9.29, 21.9)	<0.001	0.74 (0.39, 1.43)	0.369	0.14 (0.05, 0.34)	<0.001	0.30 (0.17, 0.53)	<0.001	3.55 (2.15, 5.88)	<0.001

Estimates from logistic regression models estimated via generalized estimating equations with exchangeable correlation structure

Table 17: Change over time in marketing, price promotion, LCCs and maximum size for less than $1, adjusted for store type

	Any marketing materials		Marketing Materials Below 3-feet				At least one price promotion										Any LCCs for less than $1.00 (all stores)		Maximum pack size of LCCs for <$1.00*	
	Any tobacco		Conventional tobacco		ESDs		Cigarette		Chew/Snus		LCC		ESDs		Any tobacco					
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	Est. (95% CI)	p-value
Year (ref=2014)																				
2017	0.64 (0.49, 0.85)	0.002	1.54 (1.25, 1.90)	<0.001	0.48 (0.37, 0.62)	<0.001	0.74 (0.62, 0.89)	0.002	0.75 (0.60, 0.93)	0.008	0.86 (0.70, 1.04)	0.115	1.07 (0.77, 1.48)	0.677	0.73 (0.59, 0.89)	0.002	1.14 (0.91, 1.44)	0.263	0.46 (0.36, 0.56)	<0.001
Store type (ref=Convenience)																				
Liquor store	0.43 (0.27, 0.68)	<0.001	0.70 (0.51, 0.96)	0.027	0.55 (0.35, 0.86)	0.010	0.45 (0.33, 0.62)	<0.001	0.33 (0.22, 0.49)	<0.001	0.80 (0.60, 1.08)	0.144	0.66 (0.42, 1.03)	0.069	0.48 (0.35, 0.66)	<0.001	0.65 (0.42, 0.99)	0.044	0.13 (-0.05, 0.31)	0.159
Pharmacy	0.70 (0.32, 1.55)	0.382	0.23 (0.13, 0.43)	<0.001	0.34 (0.15, 0.78)	0.011	1.17 (0.69, 1.98)	0.568	0.16 (0.08, 0.34)	<0.001	1.02 (0.66, 1.60)	0.920	0.89 (0.48, 1.66)	0.723	1.38 (0.75, 2.53)	0.306	0.08 (0.05, 0.13)	<0.001	-1.39 (-1.61, -1.17)	<0.001
Small market	0.15 (0.10, 0.23)	<0.001	0.19 (0.12, 0.30)	<0.001	0.25 (0.13, 0.45)	<0.001	0.23 (0.17, 0.33)	<0.001	0.13 (0.08, 0.23)	<0.001	0.44 (0.32, 0.62)	<0.001	0.45 (0.26, 0.77)	0.003	0.24 (0.17, 0.34)	<0.001	0.24 (0.16, 0.34)	<0.001	-0.10 (-0.31, 0.10)	0.329
Supermarket	0.19 (0.12, 0.31)	<0.001	0.14 (0.08, 0.24)	<0.001	0.05 (0.01, 0.22)	<0.001	0.32 (0.22, 0.45)	<0.001	0.08 (0.04, 0.17)	<0.001	0.23 (0.15, 0.35)	<0.001	0.29 (0.14, 0.58)	0.001	0.32 (0.23, 0.45)	<0.001	0.06 (0.04, 0.09)	<0.001	-1.07 (-1.31, -0.83)	<0.001
Other	0.15 (0.10, 0.23)	<0.001	0.43 (0.31, 0.59)	<0.001	1.18 (0.82, 1.71)	0.378	0.23 (0.17, 0.31)	<0.001	0.24 (0.16, 0.37)	<0.001	0.47 (0.35, 0.64)	<0.001	0.65 (0.42, 1.02)	0.061	0.28 (0.21, 0.38)	<0.001	0.16 (0.11, 0.22)	<0.001	0.27 (0.10, 0.45)	0.002

*Estimates from linear regression model estimated via generalized estimating equations with exchangeable correlation structure. Only among stores that sold LCC.

Table 18: Product availability and marketing, by type of county (non-rural, rural)

	Stores in non-rural counties n=132	Stores in rural counties n=145
	%	%
Product availability		
Snus	30.2%	34.5%
Chew	58.6%	78.6%
Blunts	48.7%	57.2%
Hookah	14.2%	9.7%
Vape products	66.9%	62.7%
Any External Marketing Materials		
Chew/Snus	5.1%	11.7%
Conventional tobacco	39.9%	43.4%
ESDs	11.8%	13.8%
Any Interior Marketing Materials		
Chew	36.7%	57.9%
ESDs	45.4%	51.7%
Conventional tobacco	72.3%	87.6%
Any price promotions (int/ext)		
ESDs	11.2%	13.1%
Amount of windows & clear doors covered by signs on exterior		
At least 33%	32.5%	33.8%
Less than 10%	26.7%	37.6%

Table 19: Price of chew, water, and largest number of LCCs for less than $1, by type of county

	Stores in non-rural counties			Stores in rural counties		
Price, before sales tax	**n stores**	**Mean**	**SD**	**n stores**	**Mean**	**SD**
Grizzly chew	441	3.81	0.68	94	3.76	0.48
Copenhagen chew	429	4.97	0.93	92	5.36	0.85
Cheapest Cigarette	964	4.72	1.06	136	4.48	0.82
Cheapest e-cig	712	9.93	7.95	87	8.96	3.88
Water	620	1.51	0.33	103	1.44	0.35
Largest number of LCCs for <$1.00 (among stores selling LCCs)	911	2.21	1.09	128	2.26	1.34

Table 20: Multilevel models (stores nested in counties) of product availability, price and marketing materials, controlling for store type, neighborhood characteristics

	Sold Chew				At least one price promotion for chew		Price of Copenhagen				Any interior marketing materials for chew				Any exterior marketing materials for chew	
	Control for store type		Control for store type & neighborhood characteristics		Control for store type		Control for store type		Control for store type & neighborhood characteristics		Control for store type		Control for store type & neighborhood characteristics		Control for store type	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	Est. (95% CI)	p-value	Est. (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Intercept	0.91 (0.66, 1.16)	0.450	0.86 (0.64, 1.08)	0.179	0.09 (-0.35, 0.54)	<0.001	4.88 (4.67, 5.09)	<0.001	4.85 (4.64, 5.06)	<0.001	0.33 (0.03, 0.63)	<0.001	0.30 (0.01, 0.60)	<0.001	0.04 (-0.47, 0.55)	<0.001
Store type All other store types																
Convenience store	5.78 (4.40, 7.61)	<0.001	6.15 (4.65, 8.13)	<0.001	6.29 (4.47, 8.83)	<0.001	0.26 (0.10, 0.42)	0.001	0.27 (0.11, 0.42)	0.001	5.84 (4.49, 7.59)	<0.001	6.15 (4.71, 8.05)	<0.001	2.42 (1.46, 4.00)	<0.001
Store neighborhood*																
White, non-Hispanic			1.51 (1.18, 1.93)	0.001					0.05 (-0.10, 0.21)	0.506			1.36 (1.05, 1.76)	0.020		
Hispanic			0.98 (0.77, 1.24)	0.861					0.00 (-0.16, 0.16)	0.985			0.91 (0.70, 1.19)	0.500		
Median Household Income			1.02 (0.87, 1.20)	0.794					0.06 (-0.04, 0.16)	0.214			1.02 (0.86, 1.22)	0.780		
Rural (store is in a rural county)	2.07 (1.23, 3.50)	0.007	1.65 (0.96, 2.83)	0.069	1.77 (0.90, 3.47)	0.097	0.39 (0.08, 0.70)	0.014	0.40 (0.06, 0.73)	0.020	1.83 (1.09, 3.09)	0.023	1.49 (0.85, 2.60)	0.170	1.80 (0.86, 3.77)	0.119

*Store neighborhood census based measures are standardized within statewide sample

Generalized linear mixed models that control for clustering of stores within counties

Table 21: Inter-rater reliability analysis for select variables

Variable	n	% Agreement
Store type	74	77.0
Product Availability		
Cigarettes	74	98.6
Chew	74	82.4
Snus	74	91.9
LCCs/Cigars	74	93.2
ESDs	74	89.2
Blunt/Cigar Wraps	74	85.1
Hookah	74	98.6
Product Placement		
Any conventional tobacco product near kid stuff	74	94.6
Any ENDS products near kid stuff	74	93.2
Any self-service ENDS	74	89.2
Marketing Materials		
Any marketing materials: Any tobacco	74	81.1
Any price promotions: Cigarettes	74	82.4
Any conventional tobacco marketing materials below 3 ft.	74	84.2
Any ESD marketing materials below 3 ft.	74	78.4
Price Related Variables		
Any LCCs for less than $1.00 (all stores)	74	93.2

	n	ICC	p-value
Maximum pack size of LCCs for <$1.00 (excludes stores not selling LCCs)	42	0.86	<0.001
Price of Copenhagen	11	0.61	0.079
Price of Grizzly	8	0.83	0.017

n = number of stores included in analysis
ICC = Intraclass correlation coefficient

CTRSS 2017 SURVEY INSTRUMENT (APPENDIX)