National and State-Specific Sales and Prices for Electronic Cigarettes—U.S., 2012–2013

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Introduction: The growing market for electronic cigarettes (e-cigarettes) has been widely reported in the media, but very little objective data exist in the scientific literature, and no data have been published on state-specific trends in prices or sales. Our objective is to assess state-specific annual sales and average prices for e-cigarettes in the U.S.

Methods: Commercial retail scanner data were used to assess total dollar sales and average price per unit for disposable e-cigarettes, starter kits, and cartridge refills for selected states and the total U.S. during 2012−2013. Data were analyzed in 2014. Data were available for convenience stores (29 states) and food, drug, and mass merchandisers (44 states).

Results: In convenience stores, dollar sales increased markedly during 2012−2013: 320.8% for disposable e-cigarettes, 72.4% for starter kits, and 82% for cartridges. In food, drug, and mass merchandisers, dollar sales increased 49.5% for disposable e-cigarettes, 89.4% for starter kits, and 126.2% for cartridges. Average prices across all product categories increased in convenience stores and decreased in food, drug, and mass merchandisers. Sales and prices varied substantially across states included in the analyses.

Conclusions: Sales of all e-cigarette device types grew considerably in convenience stores and food, drug, and mass merchandisers during 2012−2013. The market for e-cigarettes is growing rapidly, resulting in dynamic sales and price changes that vary across the U.S. Continued state-specific surveillance of the e-cigarette market is warranted.
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Introduction

Electronic nicotine delivery systems (ENDSs), including electronic cigarettes (e-cigarettes), are battery-powered devices that heat liquid in a cartridge to deliver an inhaled dose of nicotine and other additives. Although the impact of e-cigarettes on public health is unclear,[1,2] awareness and use has increased markedly since being introduced into the U.S. in 2007.[3–6] During 2011–2013, ever use of e-cigarettes increased from 1.4% to 3.0% among middle school students and from 4.7% to 11.9% among high school students.[7] Similarly, ever use of e-cigarettes has increased among adults, from 3.3% in 2010 to 8.5% in 2013, with higher prevalence among current (36.5%) and former (9.6%) cigarette smokers than never smokers (1.2%) in 2013.[8] Despite the low proportion of tobacco product sales accounted for by e-cigarettes, monitoring e-cigarette sales is warranted, given the rapid increase in e-cigarette use and the continuing decline in conventional cigarette sales.[9]

Several factors may be driving the surge in popularity of e-cigarettes. First,[10] e-cigarettes have been promoted as socially acceptable alternatives in situations where conventional tobacco smoking is not allowed.[11,12] Second, e-cigarettes have been promoted as safer alternatives to conventional tobacco products[11] and are used as a cessation aid by consumers.[13] There is, however, no conclusive scientific evidence that e-cigarettes promote long-term cessation, and the products are not currently

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approved by the U.S Food and Drug Administration (FDA) for smoking cessation.[14] Third, annual advertising expenditures for e-cigarettes across multiple channels tripled from $6.4 million in 2011 to $18.3 million in 2012, including advertising on TV,[15] where advertising of conventional cigarettes has been banned since 1971.[16] Smokers are particularly receptive to e-cigarette TV advertisements.[17] Increasing cigarette prices are associated with decreasing cigarette consumption,[18] and recent evidence suggests that e-cigarette sales are also price sensitive.[19] Fourth, e-cigarettes are available in numerous configurations, and many e-cigarettes contain interchangeable components, allowing users to modify the device and customize its performance.[20] Finally, e-cigarettes are available in a variety of flavors, including fruit, alcohol, and chocolate, which are banned in conventional cigarettes in the U.S.[21]

E-cigarettes may have lower potential harm to the individual user than smoked tobacco[22] and may aid in short-term smoking cessation[23]; however, concerns exist, including the potential for e-cigarettes to promote continued smoking of cigarettes among current smokers, promote relapse among former smokers, encourage uptake of e-cigarettes among nonsmokers, and renormalize smoking behaviors.[24] The current dearth of objective data on the effects of e-cigarettes on individuals, populations, and the environment presents a challenge for protecting the public's health.[25,26] On April 24, 2014, the FDA proposed to extend its tobacco regulatory authority to include e-cigarettes, but implementation could take several years.[27] However, some states have implemented policies to prevent youth access to e-cigarettes, avoid renormalization of tobacco use, and preserve clean indoor air standards. As of November 2014, a total of 40 states regulate youth access to e-cigarettes, and three states prohibit e-cigarette use in indoor areas of worksites, restaurants, and bars.[28] Currently, only two states tax e-cigarettes: Minnesota applies a tax to some e-cigarettes equal to 95% of the wholesale price,[29] and North Carolina applies a tax of 5 cents per milliliter of nicotine liquid.[30]

Although the increasing market for e-cigarettes has been widely reported in the media,[31–33] very few data exist in the scientific literature documenting sales and prices of e-cigarettes in the U.S., and no data have yet been published on state-specific trends in these measures. To address this gap, this study assessed state-specific sales and prices of disposable e-cigarettes, starter kits, and replacement cartridges.

Methods

Data Source

Data were from a custom-designed database of retail scanner data provided by Information Resources, Inc. The data contain dollar and unit sales in convenience stores (C-stores) and food, drug, and mass merchandisers combined (FDMs) for 2012 and 2013. Dollar and unit sales are reported at the item level, defined by a Universal Product Code (UPC). Information compiled for each item includes UPC, brand name, product type, and number of items per unit (e.g., a single unit might contain three disposable e-cigarettes). Dollar and unit sales were calculated for the total U.S. and states with sample sizes sufficient for precise estimation, yielding 29 states with C-store data and 44 with FDM data. Estimates did not include Walmart, Sam's Club, Costco, or venues that generally do not use scanners, such as small grocery stores, tobacco shops, or "vape shops."[34] For a general description of scanner data, see Adhikari et al.[35]

Measures and Methods

The data were stratified into three product categories: (1) disposable e-cigarettes; (2) starter kits; and (3) cartridge refills (Appendix Figure 1, available online). Disposable e-cigarettes have a nonrechargeable battery, and the entire unit is discarded after the e-liquid solution is depleted. Disposable e-cigarette data were standardized so that one unit equaled one disposable e-cigarette. Starter kits contain all the items a new e-cigarette user needs to begin using refillable e-cigarettes, including a rechargeable battery and charger, a refillable e-cigarette, and one or more refills. All starter kits were treated as a single unit, irrespective of package contents. A cartridge is a replaceable component of an e-cigarette that contains the e-liquid solution. A cartridge refill may consist of the tank of e-liquid alone, but may also include an atomizer used to vaporize the e-liquid. Because scanner data cannot reliably separate cartridge-only refills from cartridge–atomizer combinations, all refills were combined into a single category labeled "cartridge refills" and standardized so that each individual cartridge equaled a single unit.

For each product category, total dollar sales and average price in U.S. dollars per standardized unit were calculated for the entire U.S. and each state in 2012 and 2013. To obtain total annual dollar sales, dollar sales for all items within each category were summed. To obtain average price per (standardized) unit, total dollar sales were divided by total standardized unit sales. Relative percentage change in dollar sales and average price per unit were calculated as the change in sales or price from 2012 to 2013. Average dollar sales and prices, SDs, coefficients of variation, and minimum and maximum values were calculated across states. FDM estimates for Wyoming in 2012 were excluded because data were not available prior to the fourth quarter of 2012. All analyses were conducted in 2014 using Stata, version 13.

Results

Tables 1 and 2 report annual dollar sales for disposable e-cigarettes, starter kits, and cartridge refills in C-stores and FDMs, respectively. Sales of disposable e-cigarettes increased in all 29 states with C-stores, while sales of starter kits and cartridge refills increased in 26 states. Across states, the average change in C-store sales was 345.7% for disposable e-cigarettes (minimum=39.7% [South Carolina], maximum=708.5% [Arkansas]), 110.3% for starter kits (minimum=−16.9% [Arizona],