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Recent trends in sales of electronic nicotine devices and oral nicotine pouches by flavour

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ABSTRACT

Background The landscape of tobacco and nicotine delivery products has rapidly evolved with the introduction of electronic nicotine delivery systems (ENDS) and oral nicotine pouches (ONPs). Understanding sales trends and flavour preferences is critical for assessing these products' public health impact and informing regulatory strategies.

Objective To characterise recent trends in US sales of ENDS and ONPs from 2018 to 2023, overall and by flavour.

Methods Information Resources retail sales data covering 40 states from 7 January 2018 to 16 July 2023, were used to document trends in ENDS and ONP sales from brick-and-mortar retailers, by product flavour (non-menthol, mint/menthol and tobacco/unflavoured) in 4 week periods.

Results ENDS and ONP sales have shown significant growth, with notable fluctuations coinciding with public health concerns and regulatory announcements. Specifically, non-menthol flavoured ENDS initially experienced a decline in sales following regulatory actions in early 2020 but strongly rebounded thereafter. Meanwhile, ONP sales have increased steadily, dominated by mint/menthol flavours. These trends may reflect consumer flavour preferences as well as manufacturers' strategic responses to policy changes. Sensitivity analyses using more recent sales data from 24 states confirm that these patterns persist.

Conclusions Differences in ENDS and ONP sales trends by flavour type underscore the importance of ongoing, detailed monitoring of nicotine product sales and use, to clarify public health implications and guide regulation. Given the growing variety of nicotine and tobacco products available today, tobacco regulatory frameworks must consider trends across this rapidly evolving market to understand and mitigate associated public health risks.

INTRODUCTION

The tobacco landscape has changed dramatically in the last twenty years with the emergence of alternative nicotine delivery products, such as electronic nicotine delivery systems (ENDS), heated tobacco products and oral nicotine pouches (ONPs), including brands like Zyn.¹ While these products provide potentially less harmful alternatives to combustibles,^{2,3} flavoured versions' appeal to youth⁴ has driven increased state and local regulation of ENDS flavours.⁵ During the 2018–2023 analytic period, 7 states, Washington D.C. and localities in nine states restricted flavoured ENDS sales, not counting Montana and Washington's

WHAT IS ALREADY KNOWN ON THIS SUBJECT

⇒ New non-combustible nicotine products introduced over the past two decades offer potentially less harmful alternatives to combustible tobacco products, but flavoured products also appeal to youth, prompting state and local regulation.

WHAT IMPORTANT GAPS IN KNOWLEDGE EXIST ON THIS TOPIC

⇒ The emergence of oral nicotine pouches (ONPs) provides similar flavour appeal and possibly less risk than combustibles, similar to electronic nicotine delivery systems (ENDS). Tracking recent shifts in ENDS and ONP sales by flavour type reveals early consumption trends, clarifying this market's potential public health impact and informing regulatory responses.

WHAT THIS STUDY ADDS

⇒ Evidence that different flavours drive growth in ENDS versus ONP sales highlights the complexity of the US regulatory environment, particularly with respect to flavour restrictions. Decision makers need to consider both product-specific and cross-product effects to predict such policies' impacts on individual behaviour and population health.

temporary restrictions. Among these, Massachusetts, California and D.C. also prohibited sales of other flavoured nicotine products.^{6,7} On the manufacturer side, JUUL suspended in-person retail sales of its fruit and sweet flavoured products in November 2018,⁸ before voluntarily removing all non-tobacco flavours from its in-person and online sales in late 2019.⁹ Supplier activity also has accelerated the ONP market's development; particularly, Phillip Morris's February 2023 acquisition of Zyn/Swedish Match and consequent investment of \$28 million in digital advertising.^{10,11}

As understanding ENDS and ONP sales trends is essential to identify shifts in these markets, potential public health implications and corresponding regulatory needs,^{12–15} we characterise time trends from 2018 to 2023 in US ENDS and ONP sales, overall and by flavour.

DATA AND METHODS

Retail scanner data from Information Resources (now Circana) were used to assess US ENDS and ONP sales across 40 states in 4-week intervals from 7 January 2018, through 16 July 2023.¹⁶ These

data capture barcode-scanned retail sales from brick-and-mortar stores covered by Circana, which excludes specialty retailers in addition to online sales and sales from states not covered by Circana and therefore are not comprehensive of all 50 states. Per capita sales were calculated by dividing total sales volume by the same-year state population estimate from the US Census Bureau.¹⁷ Analyses estimate trends in per capita product sales across three flavour categories: non-menthol flavoured, mint/menthol-only and tobacco/unflavoured. Year-over-year percent change in total annual sales was calculated to compare the relative growth rates of ENDS and ONPs using the 54-week period from August to July. To assess whether observed trends persisted beyond the primary study period, we supplemented the Circana dataset with Nielsen retail scanner data containing later observations (2020–2024). Expanded methodological details, including flavour classification and data standardisation procedures, are provided in the online supplemental information.

RESULTS

Figure 1 shows time trends in ENDS volume sales per capita by flavour (figure 1A). While ENDS sales have generally increased over time, sales dipped across flavours in the second half of 2019, concurrent with the US outbreak of vaping-associated lung injuries.¹⁸ Non-menthol flavoured ENDS sales narrowed in early 2020 after the US Food and Drug Administration (FDA) announced that it would prioritise enforcement against sales of non-menthol flavoured cartridge-based ENDS.¹⁹ Thereafter, non-menthol flavoured ENDS sales increased sharply, driving increases in overall ENDS sales.²⁰ By July 2023, non-menthol flavours accounted for 50.9% of per capita ENDS sales, with mint/menthol making up 36.3% and tobacco and unflavoured ENDS comprising the remaining 12.8%, a sharp contrast from the more even distribution across flavour categories at the start of 2018.

Data on ONP sales per capita (figure 1B) show that these products are relatively new, with sales growing from 1.47 pouches per capita in early 2018 to 127.4 by July 2023. Over successive 13×4 week (52-week) intervals ending each July, cumulative ONP growth was +271%, +115%, +58% and +40% in consecutive years. For comparison, percent increases in overall ENDS sales were +17%, +51%, +41% and +12%. A sharp rise in ONP sales over the second quarter of 2023 followed Phillip Morris's acquisition of Zyn/Swedish Match.

While all three flavour categories show increased ONP sales, those trends differ from ENDS: mint/menthol-only flavours dominate the ONP market, with the share of non-menthol flavours remaining relatively stable over time at ~22%–28% of pouches sold while the unflavoured and tobacco-flavoured share increased from 0.2% to 8.9% over the analytic period. By July 2023, 64.0% of ONP sales were mint/menthol flavoured, 27.1% were non-menthol flavours, and 8.9% were tobacco or unflavoured products.

Nielsen's January 2020 to November 2024 sales data show similar trends and demonstrate that they persist into late 2024 (See online supplemental SI).

DISCUSSION

Retail sales data show significant growth in both ENDS and ONP sales from January 2018 through July 2023, overall and by flavour. Flavour-specific trends, however, differed between these products: non-menthol flavours drove ENDS sales growth post-2019, whereas mint/menthol-only products dominated ONP sales and growth throughout this period.

While the immediate contraction in non-menthol flavoured ENDS sales and increase in mint/menthol ENDS sales following the FDA's announcement of prioritised enforcement of flavoured cartridge-based ENDS suggests that such policies may influence behaviour, the rapid rebound of non-menthol flavoured ENDS sales and growth highlights a significant challenge: compensatory responses by both consumers and companies may attenuate policies' effects. For example, while the immediate contraction in non-menthol flavoured ENDS sales in early 2020 suggests retailer compliance, short-run increases in mint/menthol ENDS sales are consistent with consumers responding by substituting towards allowable alternatives. Subsequent rapid growth in non-menthol flavoured ENDS sales may reflect industry responses, as companies shifted towards flavoured disposable ENDS not covered by FDA's policy. The early 2023 rise in flavoured ENDS sales may also reflect industry responses to non-US policies, particularly the increase in flavoured vape exports by Chinese manufacturers following China's October 2022 ban on domestic flavoured ENDS sales.²¹

The observation that ONP sales did not mirror these trends is not surprising, as many of the aforementioned policies did not apply to ONPs. However, this segment's rapid growth in recent years, particularly for mint and menthol flavours, necessitates continued monitoring. Growth in these products may reflect strategic industry responses to FDA's prioritisation of enforcement against non-menthol flavoured ENDS (eg, a defensive strategy to reduce ONP scrutiny) and the agency's proposed restriction on menthol in cigarettes and lack of marketing authorisation for any menthol ENDS prior to 2024 (a proactive strategy to capture profits from consumers who favour menthol cigarettes or vapes).²² In the current context, where dominant tobacco and nicotine firms often offer multiple types of products, accounting for such strategic responses may reveal critical opportunities to shift the market away from offerings that most appeal to youth. Specifically, if restrictive regulation of certain flavours, presentation or marketing in one product leads firms to avoid similar traits and positioning for new offerings, strategic regulation that accounts for potential impacts on firms' investment in and development of alternative offerings beyond the regulated product could be leveraged to improve population health and health equity.

Critically, stark differences in the flavour distribution of US ENDS and ONP sales highlight the need for distinct policy approaches—especially when viewed alongside their differing risk profiles. ENDS expose users to aerosols containing potentially harmful chemicals that can affect respiratory and cardiovascular health, while ONPs bypass the lungs entirely and generally have lower toxicant profiles.³ Both products are considerably less harmful than combustible cigarettes, but long-term health effects—particularly for ONPs—are still being studied. Thus, uniform flavour policies across products may not make sense due to differential product risks, in addition to the potential for targeted policies to elicit supply-side responses and promote less harmful offerings.

Our analysis has several limitations. First, reliance on sales data limits the conclusions we can draw regarding use, preferences and potential health effects, since we cannot distinguish consumer characteristics, differentiate heavy use by few from less frequent use by many, or disentangle new nicotine product uptake from transitions between products or dual use. Second, retail sales data exclude sales from specialty tobacco or vape stores, online retailers and the illicit ENDS marketplace. Prior work estimates that brick-and-mortar sales cover 42%–86% of ENDS volume sales, depending on the state.²³ As open-system

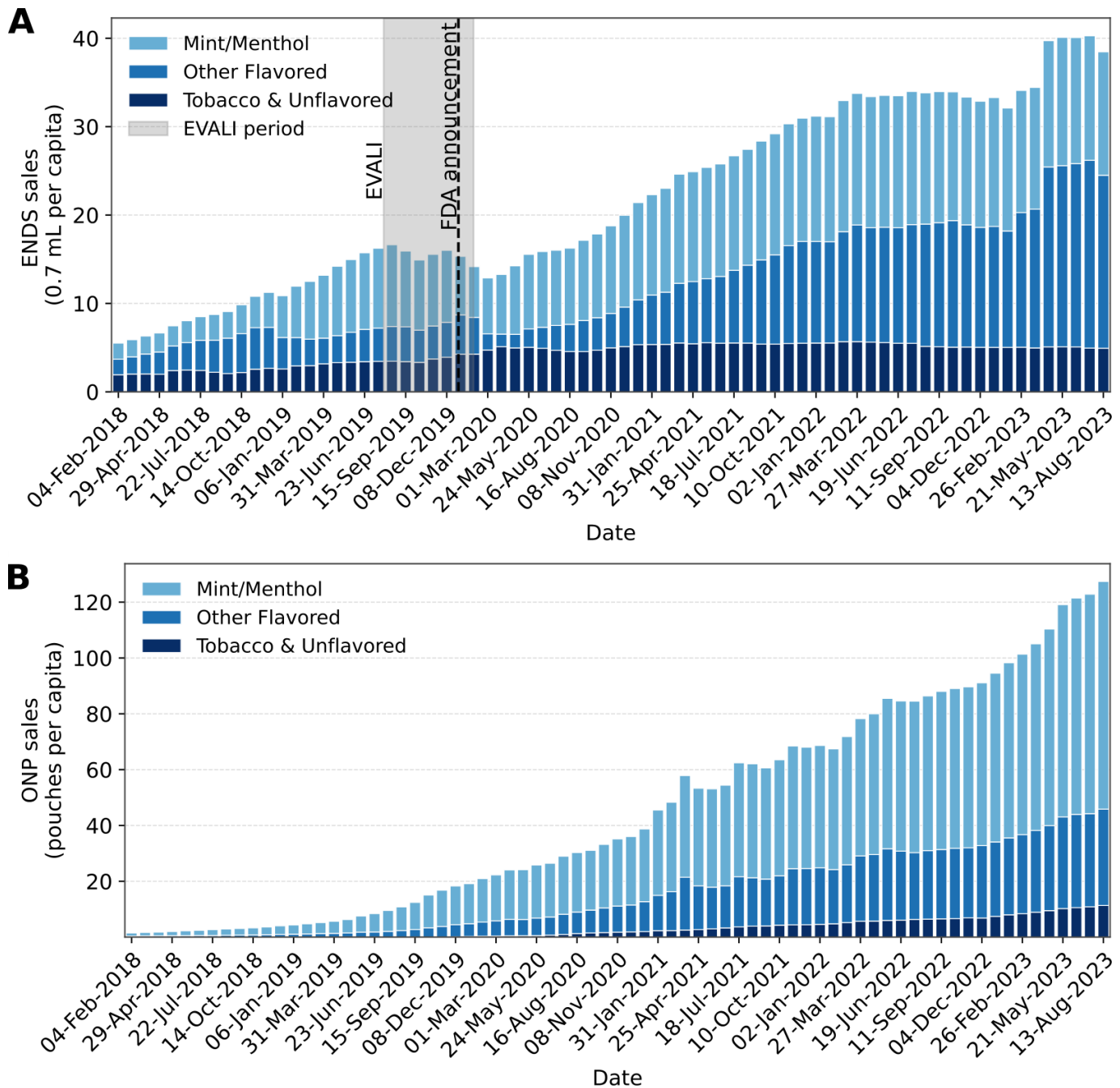


Figure 1 Sales trends of Electronic Nicotine Delivery System (ENDS) and Oral Nicotine Pouches (ONPs) from January 2018 to July 2023 by flavour. Retail Sales Trends of ENDS and ONPs from 7 January 2018 to 12 July 2023, with labels representing the end of the 4-week period. Data sourced from information resources (now Circana), reported in 4-week increments by Universal Product Code and categorised into three flavour types: (1) mint/menthol, (2) non-menthol flavoured and (3) tobacco and unflavoured. (A) Sales volume of ENDS per capita, measured in units of 0.7 mL. Non-menthol flavours show the highest sales, followed by mint/menthol, and then tobacco and unflavoured. The shaded region represents the EVALI outbreak, and the dashed line represents the Food and Drug Administration announcement for prioritised enforcement against sales of non-menthol flavoured cartridge-based ENDS. (B) Sales volume of ONPs per capita, measured in pouches.

ENDS are more commonly sold by vape shops and used by adults, retail sales data trends may under-represent flavour preferences for those types of devices if they differ from preferences for flavours in closed-system ENDS. Similarly, as the data used here are not comprehensive of all 50 states, regional differences may impact findings' generalisability. Third, our analyses do not account for differences in nicotine concentration. This avoids oversimplifying the relationship between nicotine concentration and nicotine delivery: not only do ONPs and ENDS have

different delivery mechanisms, but ENDS nicotine delivery from a given nicotine concentration can differ markedly with device characteristics and e-liquid constituents.^{15 24 25} Finally, this study is descriptive and does not investigate flavour policy such as that in Friedman *et al*²⁶ Further research is needed to disentangle how companies' versus consumers' responses to flavour policies shape health behaviours and outcomes.

Rapid growth in ENDS and ONP sales with differential trends by flavour underscores the need for ongoing, detailed monitoring

of trends in nicotine product sales and use by product characteristics, to enable closer study of policies' effects and gauge public health implications. Concurrently, regulatory responses should consider firms' potential strategic responses alongside consumer behaviour, accounting for the relative risks posed by different products. Future research examining flavour policies' relationships to product choice and substitution among ENDS, ONPs and combustibles will be critical to informing effective regulation. Recent FDA marketing authorisations for NJOY menthol-flavoured ENDS (June 2024) and flavoured Zyn nicotine pouches (January 2025) illustrate the evolving regulatory landscape and highlight the importance of continued surveillance of market composition by flavour type. Understanding both companies' and consumers' responses to nicotine and tobacco policies, including adult and youth uptake and cessation, may enable more effective regulation of these products going forward to improve public health.

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