

Quantification of  
Risks and Benefits  
Associated with ENDS  
by Assessing Their  
Impact on Tobacco Use  
Transitions in the U.S.

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Background

Electronic nicotine delivery systems (ENDS) can benefit combustible tobacco users if they switch completely to ENDS. ENDS use can also result in nicotine addiction among tobacco naïve people. To date, there has not been a quantification of these outcomes in a real-world setting. We assessed the impact of ENDS on tobacco use transitions among U.S. youth and adults.

Methods

- We used weighted Population Assessment of Tobacco and Health Study (PATH) wave 4 (2016 - 2017) and 5 (2018 - 2019) adult and youth data, to understand transitions between combustible and electronic tobacco products.
- “Less harm” (benefit) was defined as combustible users completely transitioning to ENDS or combustible users quitting combustible products with the help of ENDS.
- We defined the following transitions as “more harm” (risk): those who use ENDS only adding or transitioning to combustible products, nonusers initiating ENDS with or without combustibles.

In the U.S., from 2016-2019,  
for every **1 beneficial** tobacco use  
transition, ENDS use was associated with  
**3.2 risky transitions** in the U.S.



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**Disclaimer:** Research reported in this poster was supported by NIDA and FDA Center for Tobacco Products (CTP) under Award Number U54DA036105. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the Food and Drug Administration.

Results

**Table 1: Transitions Associated with ENDS and Likely Reduce Population Harm**

| Wave 4                           | Wave 5    | n                |
|----------------------------------|-----------|------------------|
| Dual users                       | ENDS Only | 469,351          |
| Dual users                       | Nonusers* | 4,796            |
| Cigarette Only                   | ENDS Only | 776,276          |
| Cigarette Only                   | Nonusers* | 22,653           |
| Poly Users                       | ENDS Only | 86,188           |
| Poly Users                       | Nonusers* | 2,285            |
| ENDS+1                           | ENDS Only | 96,577           |
| ENDS+1                           | Nonusers* | 0                |
| Other Nonelectronic Combustibles | ENDS Only | 205,785          |
| Other Nonelectronic Combustibles | Nonusers* | 8,043            |
| <b>Total</b>                     |           | <b>1,202,603</b> |

\*Wave 4 combustible users who tried ENDS to quit a combustible tobacco product and became a nonuser in wave 5.

**Table 2: Transitions Associated with ENDS and Likely Increase Population Harm**

| Wave 4       | Wave 5                           | n                |
|--------------|----------------------------------|------------------|
| ENDS Only    | Dual Users                       | 275,243          |
| ENDS Only    | Cigarette Only                   | 185,745          |
| ENDS Only    | Poly Users                       | 44,815           |
| ENDS Only    | ENDS+1                           | 71,241           |
| ENDS Only    | Other Nonelectronic Combustibles | 26,776           |
| Nonusers     | Dual Users                       | 338,405          |
| Nonusers     | ENDS Only                        | 2,654,378        |
| Nonusers     | Poly Users                       | 68,970           |
| Nonusers     | ENDS+1                           | 161,112          |
| <b>Total</b> |                                  | <b>3,826,685</b> |

Conclusion

While ENDS may have some benefits for adults who smoke, they should be regulated to restrict access for tobacco naïve people.

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