

# Trends in Nicotine and Tobacco Product Use among U.S. Adolescents, 1999-2020

CAsToR Symposium 2021

Ruoyan Sun, PhD\*; David Mendez, PhD<sup>+</sup>; Kenneth E. Warner, PhD<sup>+</sup>

\* Department of Health Care Organization and Policy, University of Alabama at Birmingham School of Public Health

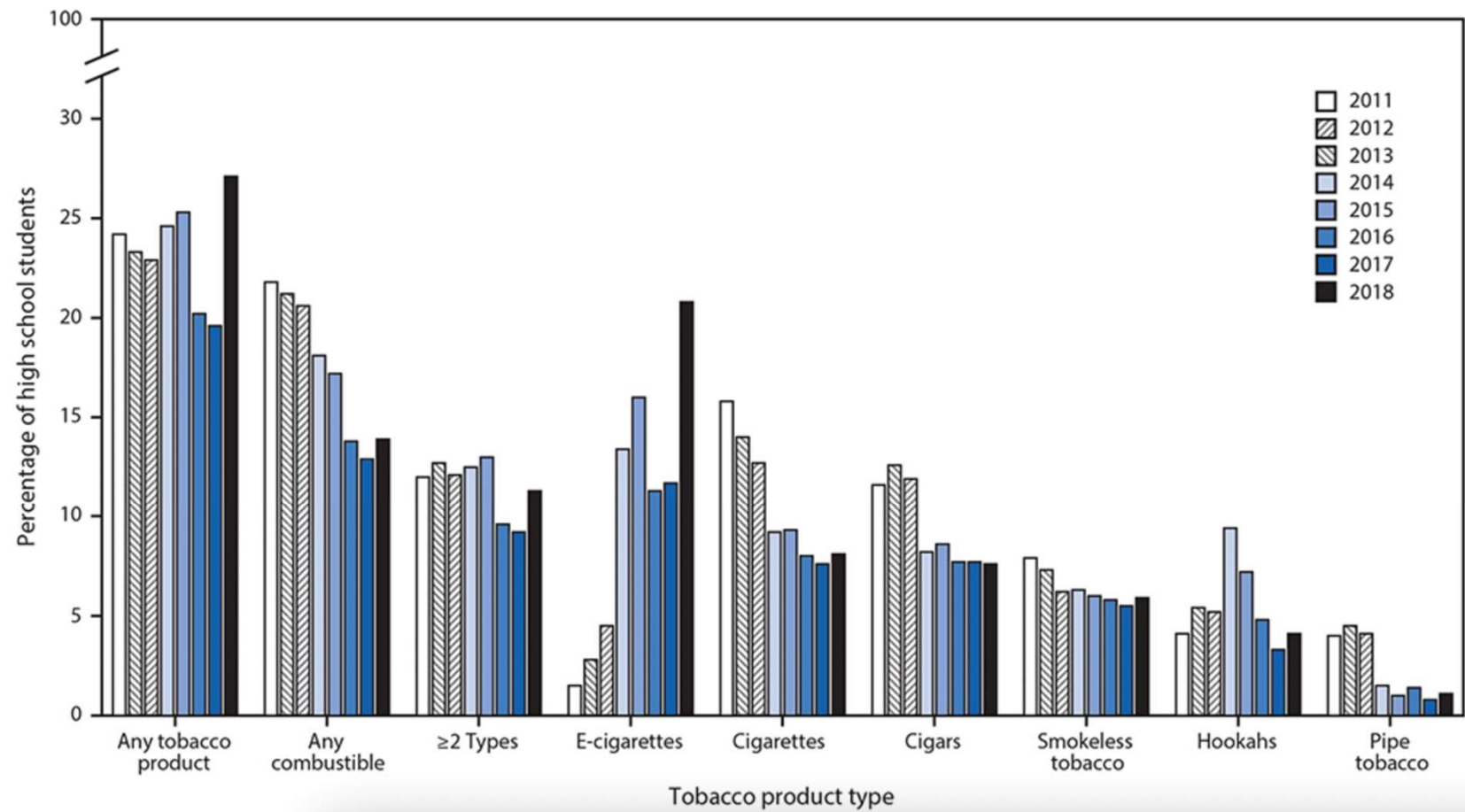
+ Department of Health Management and Policy, University of Michigan School of Public Health

# Background

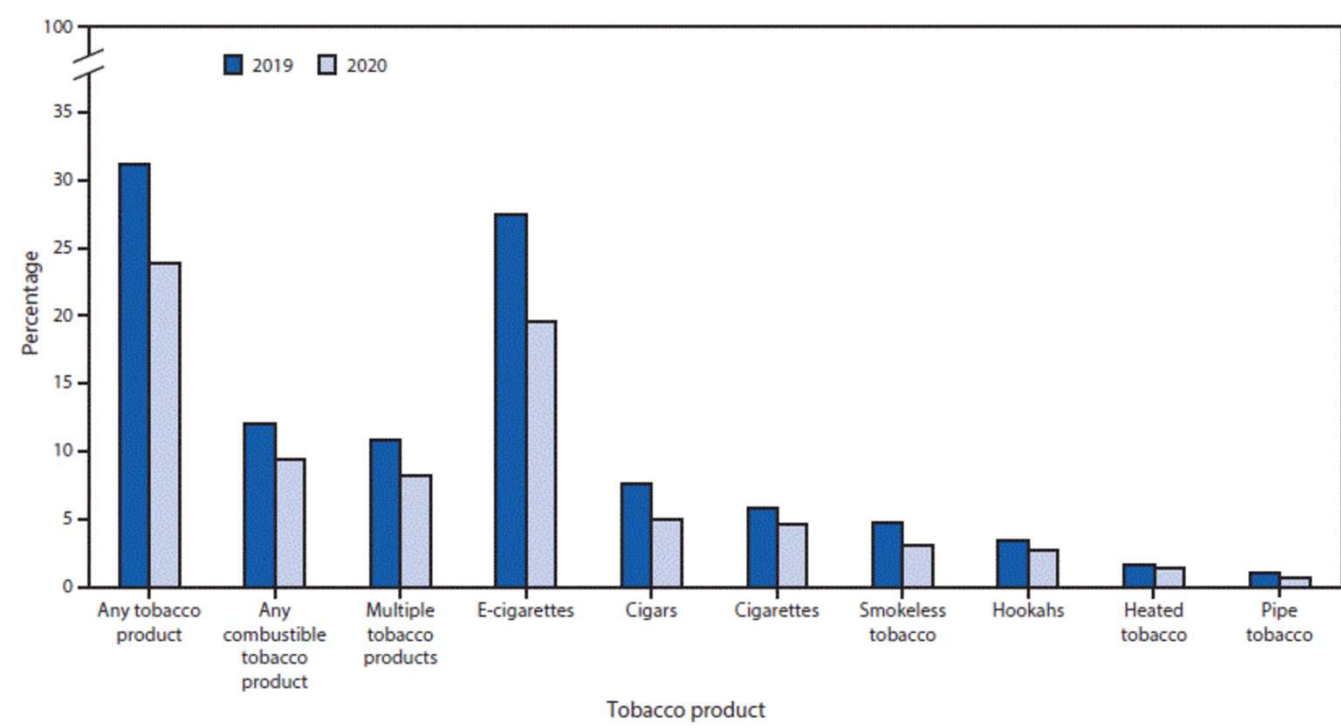
1

- CDC closely monitors tobacco use trends among U.S. adolescents via the annual National Youth Tobacco Survey (NYTS).
- Key measures:
  1. Current (past 30-day) use of individual tobacco product;
  2. Any tobacco product use in the past 30 days (binary), refer to as ATP.

**FIGURE 2. Estimated percentage of high school students who currently use any tobacco product,\* any combustible tobacco product,<sup>†</sup> ≥2 tobacco product types,<sup>§</sup> and selected tobacco products — National Youth Tobacco Survey, 2011–2018<sup>¶,\*,\*\*,††</sup>**



**FIGURE 1. Percentage of current use of selected tobacco products,\* any tobacco product,<sup>†</sup> any combustible tobacco product,<sup>§</sup> and multiple tobacco products<sup>¶</sup> among high school students — National Youth Tobacco Survey, United States, 2019 and 2020\*\***



## Limitations of ATP

1. Does not reflect utilization changes in the types of nicotine and tobacco product.
2. Does not reflect frequency of use, could vary from use of a single product on a single day to use of multiple products daily in the past 30 days.
3. Does not account for differential health risks associated with different products. We know some products, especially combustible products, cause greater health risks than others.

# Research Question

- How to better assess changes in exposure to nicotine and tobacco products?
- Nicotine product days (NPD), defined as the number of days that an individual consumed a nicotine product in the past 30 days.
- NPD permits quantitative comparison of changes in exposure to various products.
- NPD can account for differential product risks by adding risk weight for each product.

# Methods

- Nationally representative data on youth tobacco use from NYTS.
- We included all 16 NYTS surveys from 1999 till 2020.
- NPD is constructed by adding frequency of use data on 9 nicotine and tobacco products in available years.
- During the past 30 days, on how many days did you smoke/use [product]?

## Nicotine Product Days (NPD)

- Students vaped 3 days and used hookah once last month

➡  $3 + 1 = 4$  NPD

- Students smoked cigarettes 10 days and vaped 5 days last month

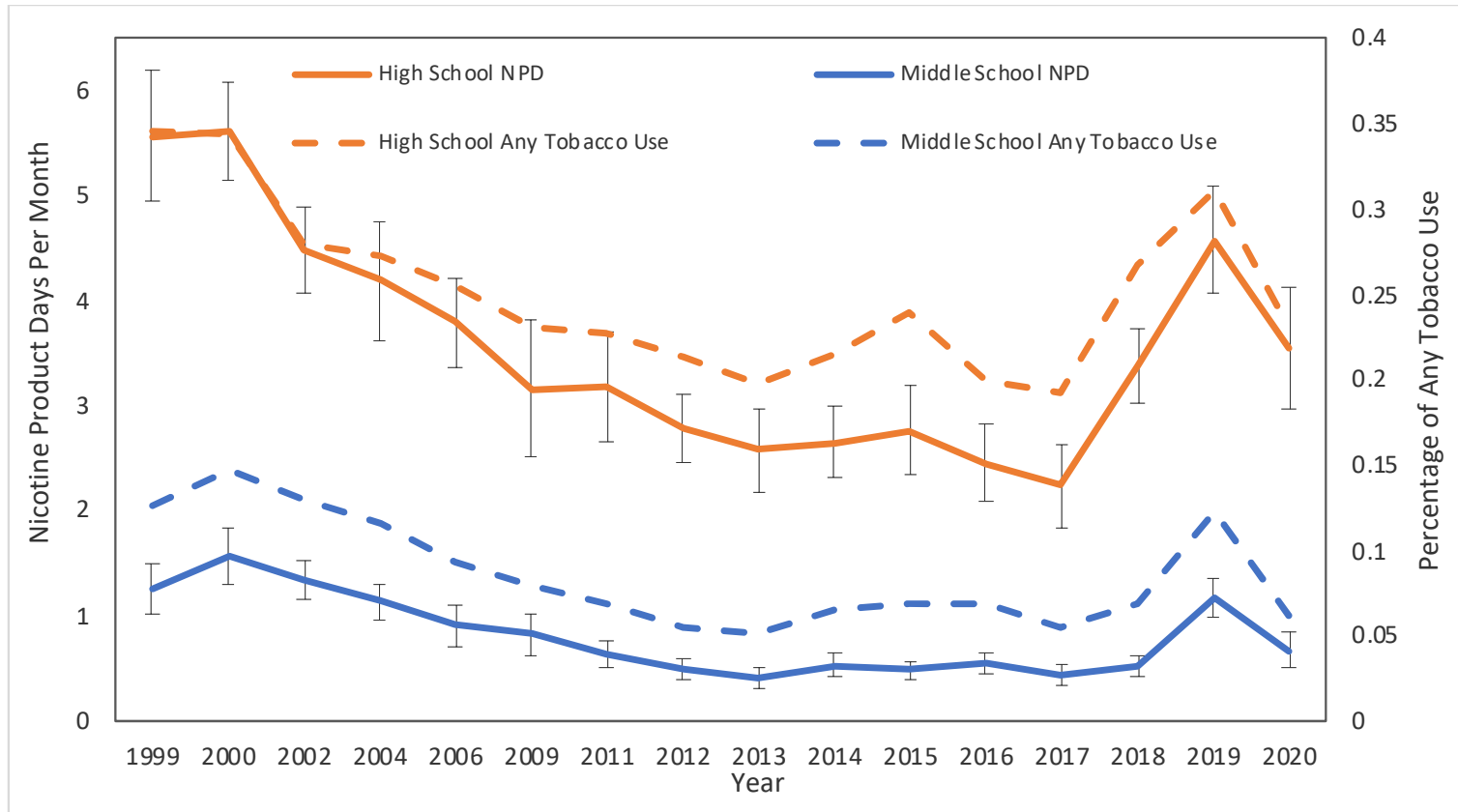
➡  $10 + 5 = 15$  NPD

- In both cases, their ATP is 1.



# Nicotine Product Days (NPD)

8



# Nicotine Product Days (NPD)

Fig 2A. High School

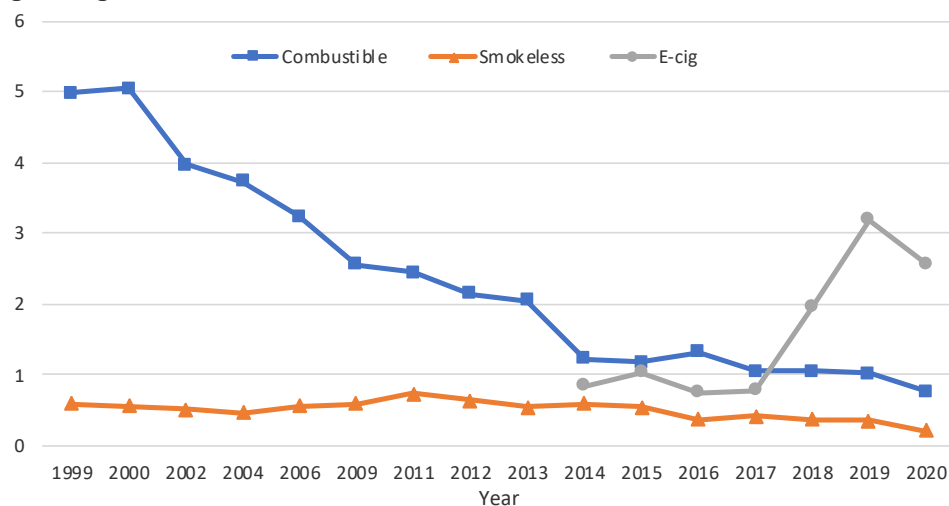
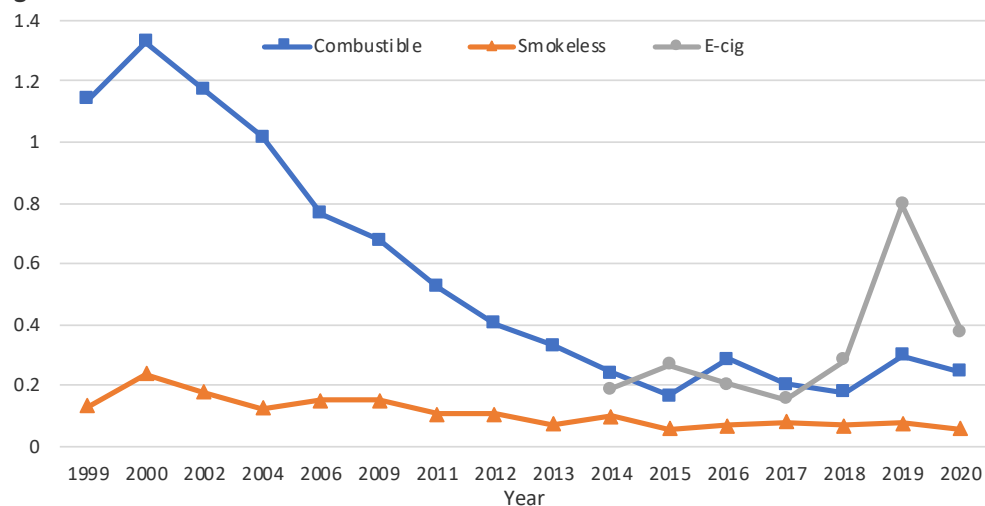


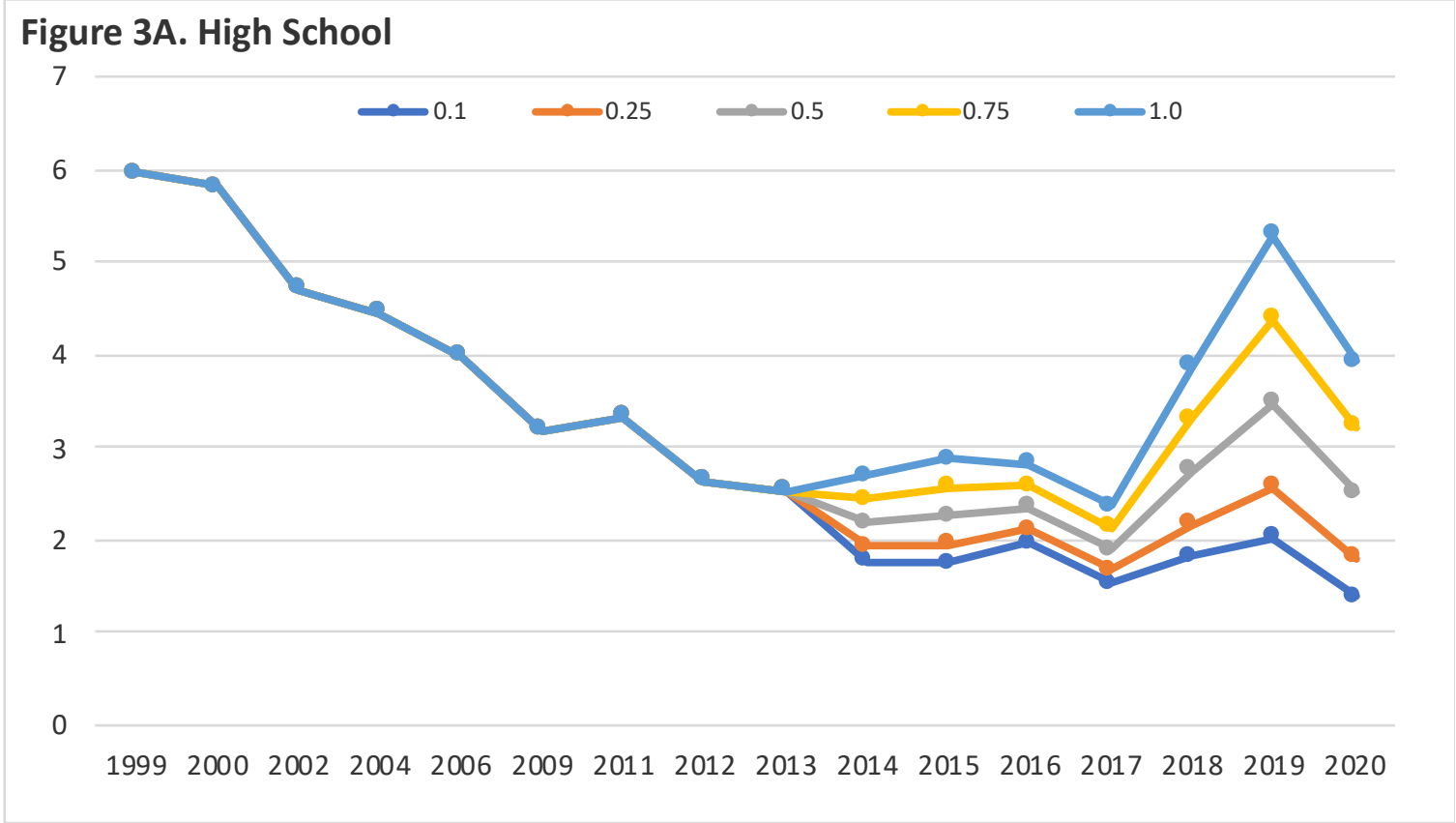
Fig 2B. Middle School



## Risk-Adjusted NPD

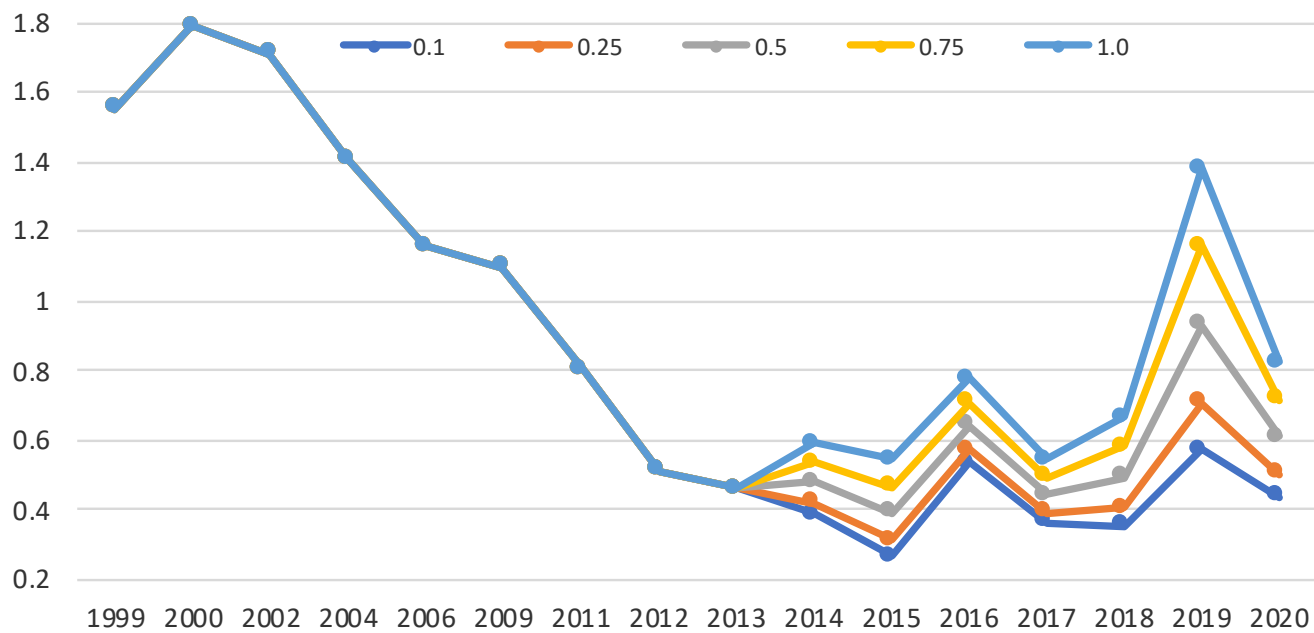
- Risk weights: all risks associated with using a particular product as an adolescent.
- Including risks potentially occurring during the adolescent years, as well as long-term chronic disease risks.
- We also consider potential changes in utilization patterns.
- Given the uncertainty, we vary the possible risk weights for e-cigarettes from 10% to 100%.

# Risk-Adjusted NPD



# Risk-Adjusted NPD

Figure 3B. Middle School



## Discussions

- Mean NPD generally mirrors ATP for the period 1999-2020.
- Exposure to nicotine and tobacco products, assessed by NPD, declined prior to the popularity of e-cigarettes. This decline slowed and then reversed due to the upsurge of vaping.
- Using low risk weight for e-cigarettes, risk-adjusted NPD continues to decrease post 2013 among middle and high school students.

## Discussions

- Whether the health risks associated with nicotine and tobacco product use have increased or not due to the popularity of e-cigarettes depends on one's assessment of the risks associated with youth vaping.
- We hope that NPD represents a modest step forward in assessing adolescent exposure to nicotine and tobacco products.

## Limitations

- NPD does not assess nicotine exposure directly, but indirectly through exposure to nicotine and tobacco products.
- NPD does not incorporate information on intensity of use.
- NYTS does not distinguish vaping nicotine vs vaping THC.





Thank you!