

**An evaluation of the relationship between access to e-cigarettes and the usage of e-cigarettes among high and middle school students in the US**

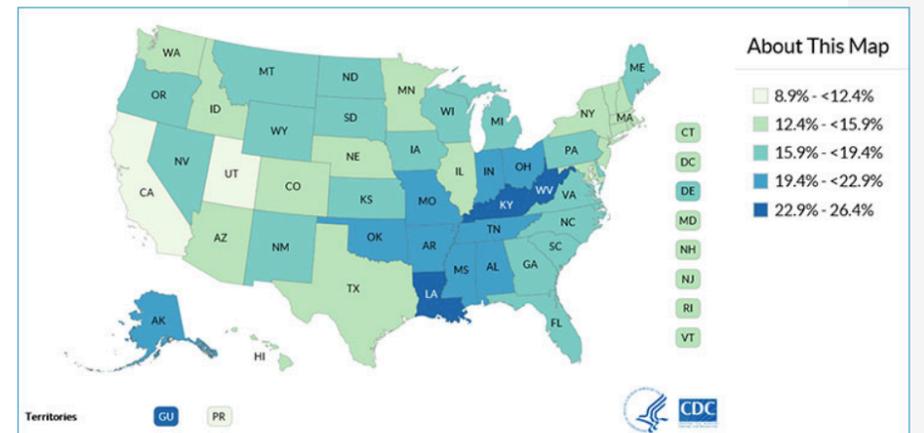
**By**

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OPHA 2019 Presentation**

# Tobacco usage in the US (among adults)

Cigarette smoking is down, but about  
**34 MILLION**  
American adults still smoke

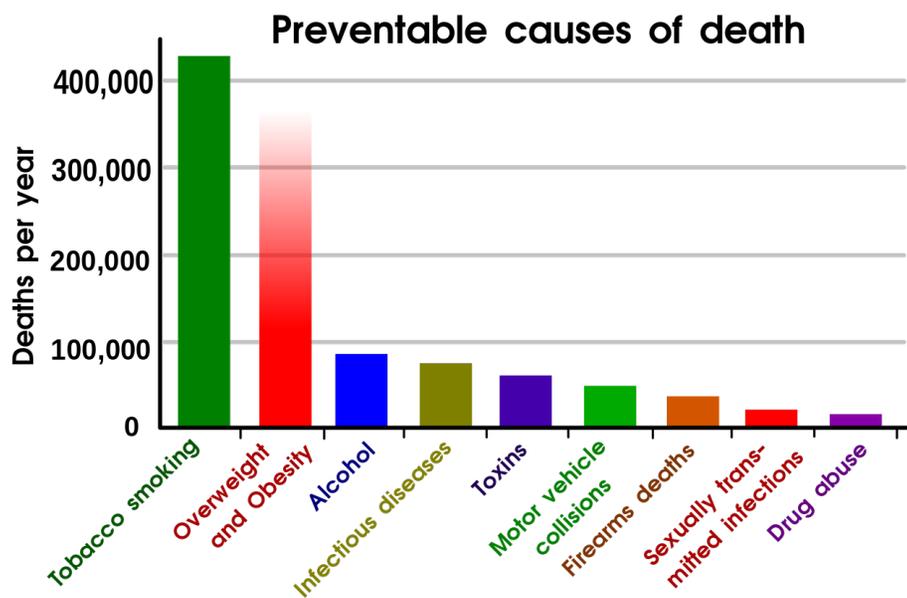
Cigarette smoking remains high  
among certain groups



[https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/adult\\_data/cig\\_smoking/index.htm](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm)

[https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/adult\\_data/cig\\_smoking/index.htm](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm)

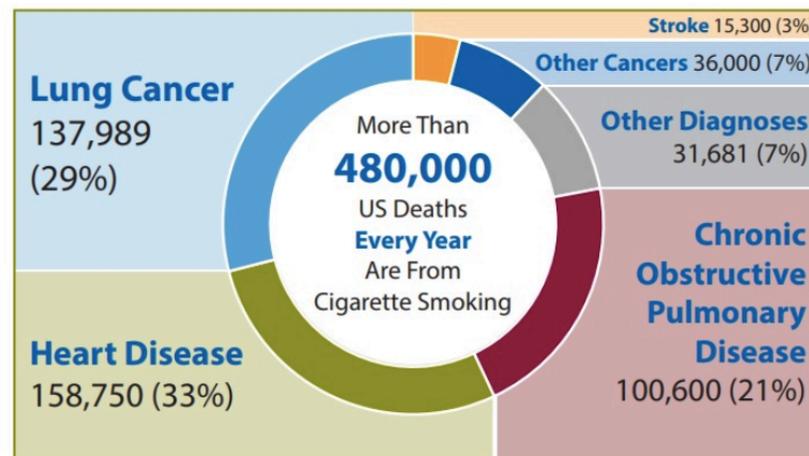
# Health Consequences of Tobacco Use in the US



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## Annual Deaths Attributable to Cigarette Smoking—United States

Annual Deaths from Smoking, United States



Note: Average annual number of deaths for adults aged 35 or older, 2005–2009.  
Source: [2014 Surgeon General's Report, Table 12.4, page 660.](#)

# Teens and E-cigarettes

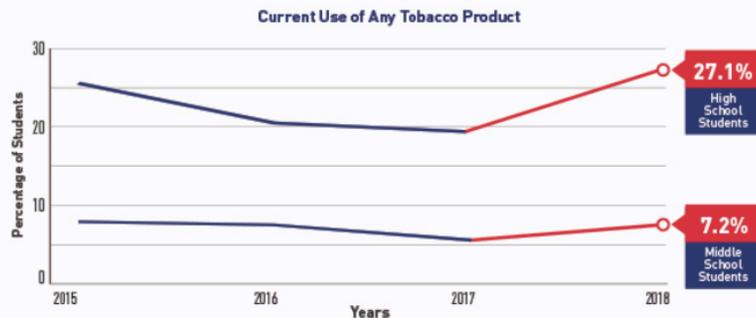


NIDA: <https://bit.ly/29vzsEr>

E-cigarette is the most commonly used tobacco product among high and middle schoolers in the US and this has led to calls for regulatory actions.<sup>[1]</sup>

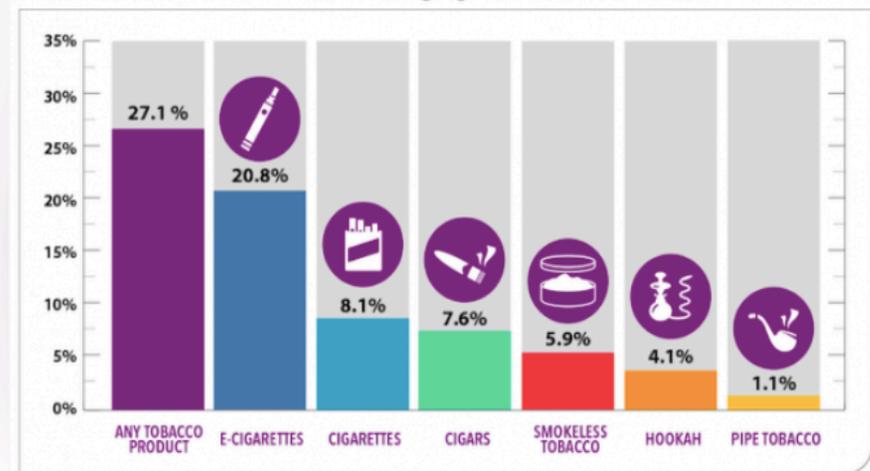
# More than 3.6 million students used E-cigarettes in 2018

## E-CIGARETTE USE SURGE LED TO UPTICK IN OVERALL TOBACCO USE — Reversing Previous Declines



FDA: <https://bit.ly/31WxpQS>

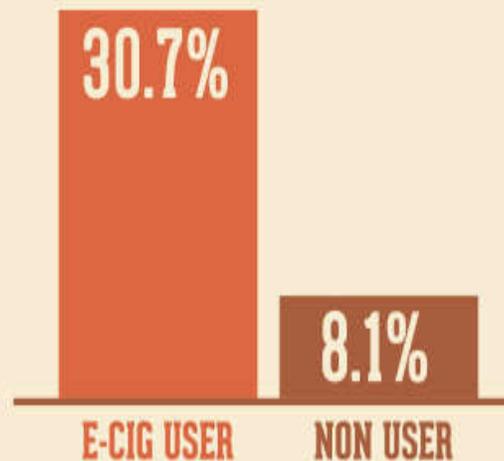
Data Visualization: Tobacco Product Use Among High School Students — 2018



SOURCE: Tobacco Product Use Among Middle and High School Students — United States, 2011–2018. Morbidity and Mortality Weekly Report (MMWR), February 2019  
Centers for Disease Control and Prevention

## TEEN E-CIG USERS ARE MORE LIKELY TO START SMOKING.\*<sup>2</sup>

### Start Smoking Within 6 Months



\*Includes combustible tobacco products [cigarettes, cigars, and hookahs]

<https://www.drugabuse.gov/related-topics/trends-statistics/infographics/teens-e-cigarettes>

**Tobacco use is a leading cause of preventable mortality in the US and its use begins mostly during adolescence and young adulthood.<sup>[1]</sup>**

The New York Times

## ***Vaping-Related Illnesses Climb to 805, C.D.C. Says***

The latest weekly tally includes 275 more reports of patients sickened, in 46 states. There are now 12 deaths linked to vaping-related lung injuries.



Sept 26, 2019

New York Times: <https://nyti.ms/2Ozd113>

Vaping related lung disease is a recent development which is being monitored by the CDC. 16 percent of the 373 cases with accessible patient related data (as at September 26) were observed to be younger than 16 years old.<sup>[2]</sup>

[Home](#) > [About](#) > [News](#) > Surgeon General releases advisory on E-cigarette epidemic among youth

**December 18, 2018**

**202-205-0143**

[media@hhs.gov](mailto:media@hhs.gov)

## Surgeon General releases advisory on E-cigarette epidemic among youth

U.S. Surgeon General Vice Adm. Jerome M. Adams issued an advisory today stressing the importance of protecting children from a lifetime of nicotine addiction and associated health risks by immediately addressing the epidemic of youth e-cigarette use.

E-cigarette use among youth has skyrocketed in the past year at a rate of epidemic proportions.

US-DHHS: <https://bit.ly/2Cje4in>

E-Cigarette use by US High and Middle schoolers was declared an epidemic and a Public Health Threat by the US Surgeon General in December 2018.<sup>[3]</sup>

# What are E-cigarettes and What do they contain?



CS298852-A

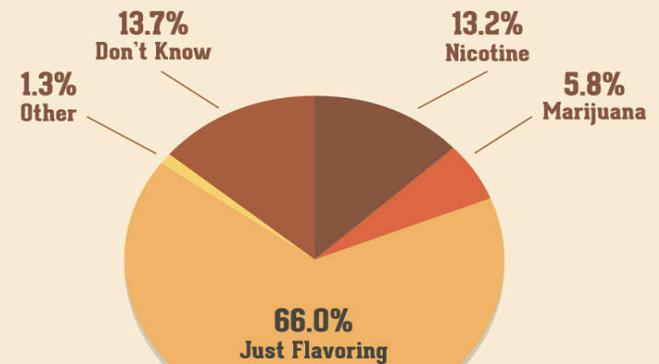


U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

For Print Only

\*Includes combustible tobacco products [cigarettes, cigars, and hookahs]

## WHAT DO TEENS SAY IS IN THEIR E-CIG?<sup>3</sup>

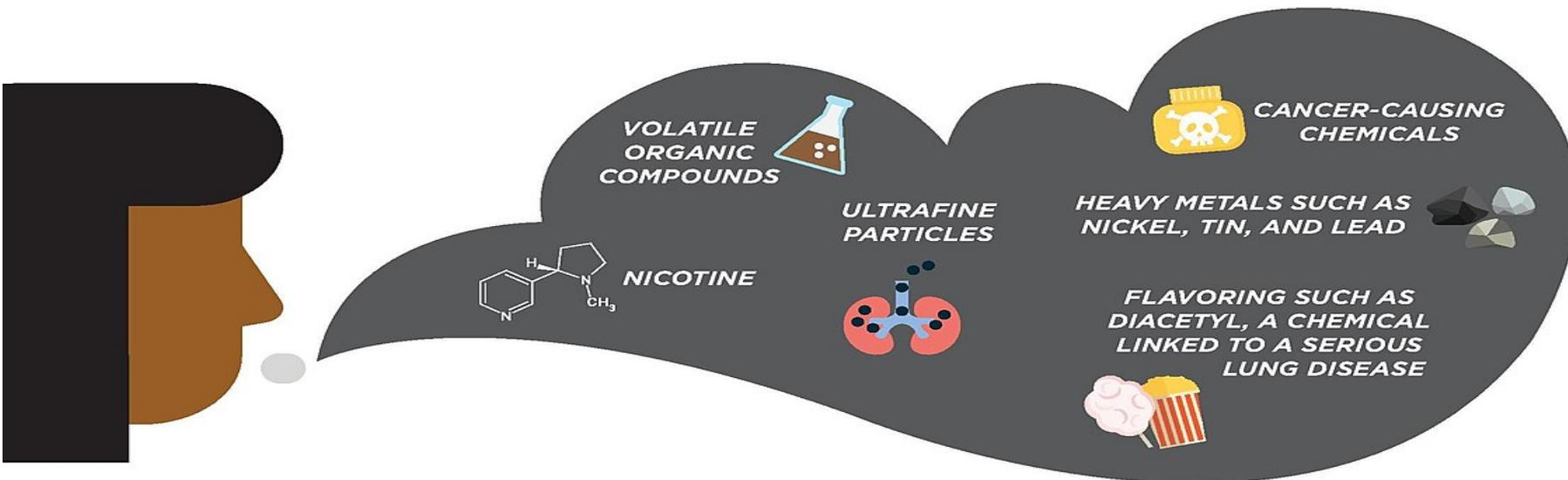


Manufacturers don't have to report e-cig ingredients, so users don't know what's actually in them.

NIDA: <https://bit.ly/29vzsEr>

## WHAT IS IN E-CIGARETTE AEROSOL?

THE E-CIGARETTE AEROSOL THAT USERS BREATHE FROM THE DEVICE AND EXHALE CAN CONTAIN HARMFUL AND POTENTIALLY HARMFUL SUBSTANCES:



It is difficult for consumers to know what e-cigarette products contain. For example, some e-cigarettes marketed as containing zero percent nicotine have been found to contain nicotine.

CDC: [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/pdfs/Electronic-Cigarettes-Infographic-p.pdf](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/Electronic-Cigarettes-Infographic-p.pdf)

# Research Aim and Question

## **Aim**

This study assessed how the frequency of e-cigarette usage by high and middle school students is correlated with access to e-cigarettes through different access points (e.g. physical stores such as vape shops, gas stations/convenience stores, online stores, friends, families, etc.)

## **Research Question**

Is the frequency of e-cigarette usage in the last 30 days by US high and middle school students associated with the accessibility to e-cigarettes through different access points?

# Research Design and Methods



**Study Design:** Cross sectional study using a stratified, three stage cluster sample design (stratified random sampling was used for school selection and in the selection of eligible classes for the survey).

**Data source:** The 2018 National Youth Tobacco Survey (NYTS).

**Target Population:** All public and private school students enrolled in regular high and middle schools (grades 6 - 12) in all US states.

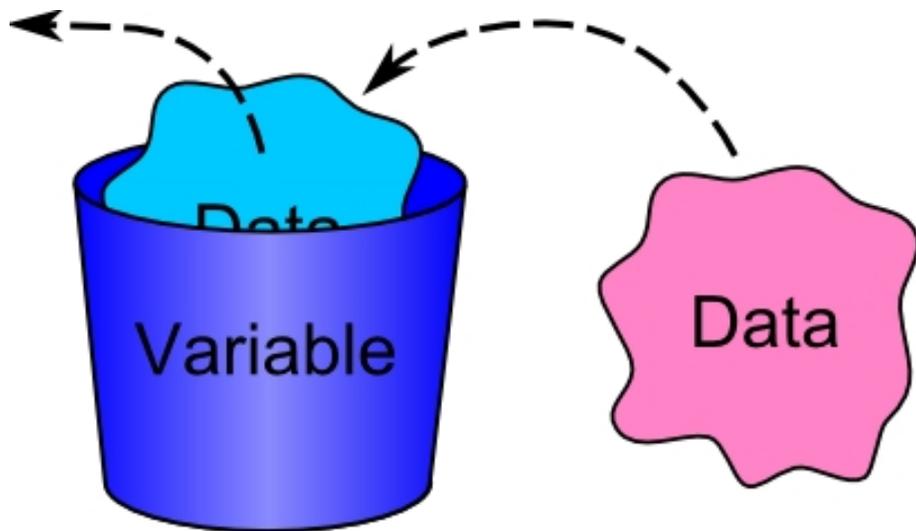
# Research Design and Methods



**Study Participants:** A nationally representative sample of 22,729 US high and middle school students from 310 selected US schools.

**Data Collection Methods:** In Person self-reported surveys.

# Defining the Variables



## **Dependent variable (Y):**

Amount of e-cigarette used (based on number of days of use in the last 30 days).

## **Independent variables (X):**

Access points to e-cigarettes e.g. gas stations/convenience stores, online stores, vape shops or other shops that sell e-cigarettes, family members, and friends.

# Hypotheses



## **Null Hypothesis ( $H_0$ ):**

The amount of e-cigarette used in the last 30 days is not associated with (is independent of) access points.

## **Alternative Hypothesis ( $H_a$ ):**

The amount of e-cigarette used is associated with (is not independent of) access points.

# Data Analysis



## **Test of independence (Chi-square):**

The variables are nominal categorical variables. e.g. amount of e-cigarette used in the last 30 days based on days of use (1 -2 days - 2; 3-5 days - 3 etc.) and e- cigarette access points.

# Data Analysis

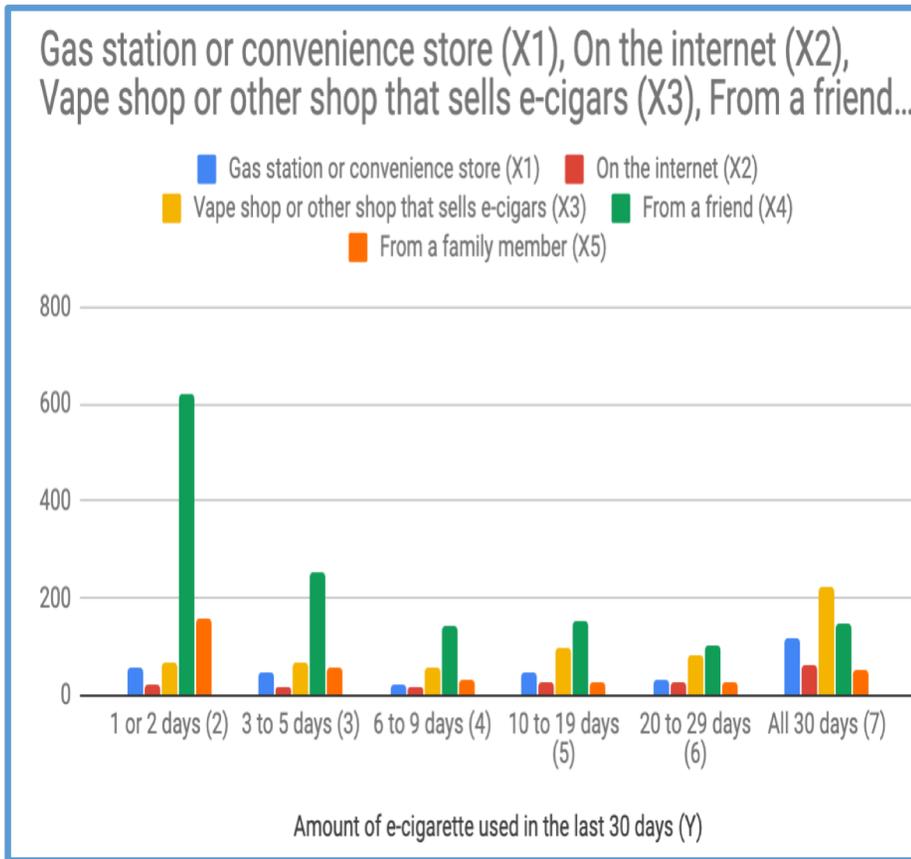
Amount of e-cigarette used in the last 30 days (Y)	Observed counts					Row total
	Gas station or convenience store (X1)	On the internet (X2)	Vape shop or other shop that sells e-cigars (X3)	From a friend (X4)	From a family member (X5)	
1 or 2 days (2)	58	20	70	621	157	926
3 to 5 days (3)	46	19	70	256	59	450
6 to 9 days (4)	24	18	58	144	34	278
10 to 19 days (5)	48	28	96	152	25	349
20 to 29 days (6)	34	27	85	103	27	276
All 30 days (7)	116	61	224	149	54	604
Column Total	326	173	603	1425	356	2883

## Patterns in the Data

High number of occasional users observed through family and friends (1-2 days), which might serve as a gateway to e-cigarette use.

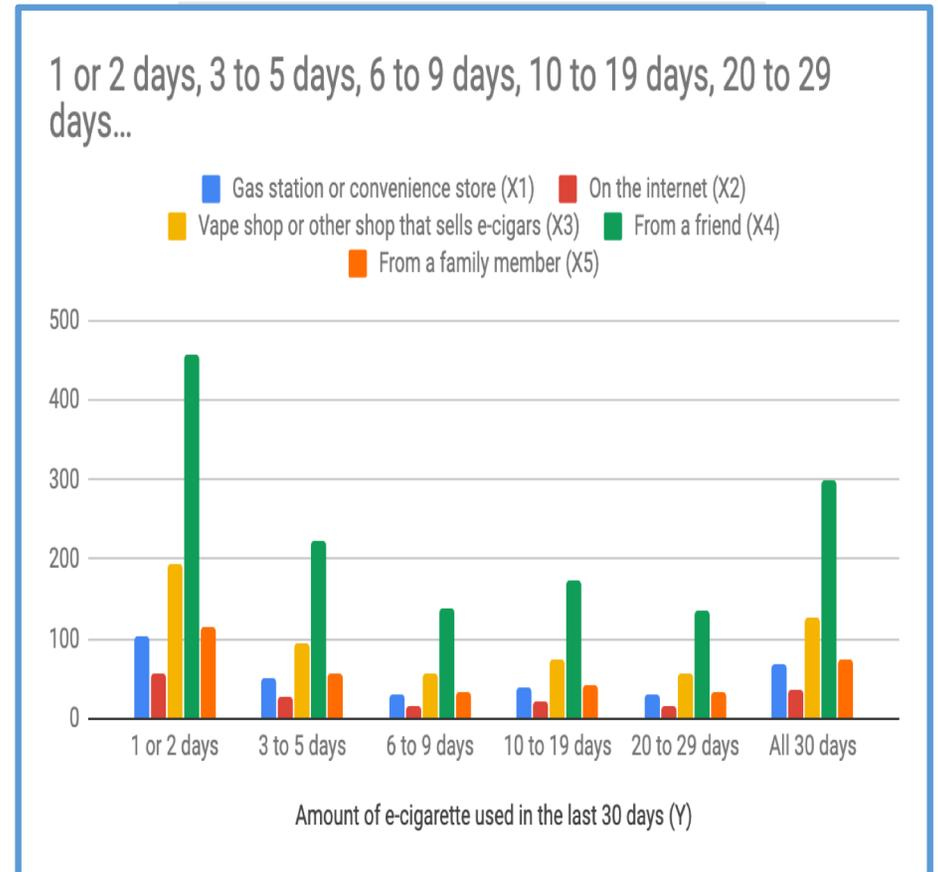
High number of habitual users (all 30 days) observed having access through vape shops, other shops that sell e-cigarette, gas stations and convenience stores.

# Observed Counts



# Expected Counts

(row total \* column total) / table total



# Study Finding



Chi Square value = 470.44

P value is less than 0.00001, therefore the result is statistically significant at alpha less than 0.05.

**The amount of e-cigarette used is associated with point of access .i.e. E-cigarette usage is not independent of point of access.**

# How strong is the Association? - Strength of Association

$0.1 < \mathbf{0.20} < 0.3$  : Moderate association

## Strength of Phi or Kramer's V

Value	Strength
Between 0.0 and 0.10	Weak
Between 0.10 and 0.30	Moderate
Greater than 0.30	Strong



## Implications for Practice and Policy

- Limiting youth access to e-cigarettes through a focus on the access points in this study might lead to a reduction in the use of E-cigarettes by this population of users, however the specific level of policy effectiveness per access point remains uncertain.
- Major access points to e-cigarettes in this analysis include family and friends and it might be difficult to enact policies that can limit access to e-cigarettes through this population (.i.e. family and friends population).

# Recommendations for Practice

School Based Educational Campaigns

Family Based Educational Campaigns



Strict Monitoring of Compliance with Existing Rules Surrounding Access

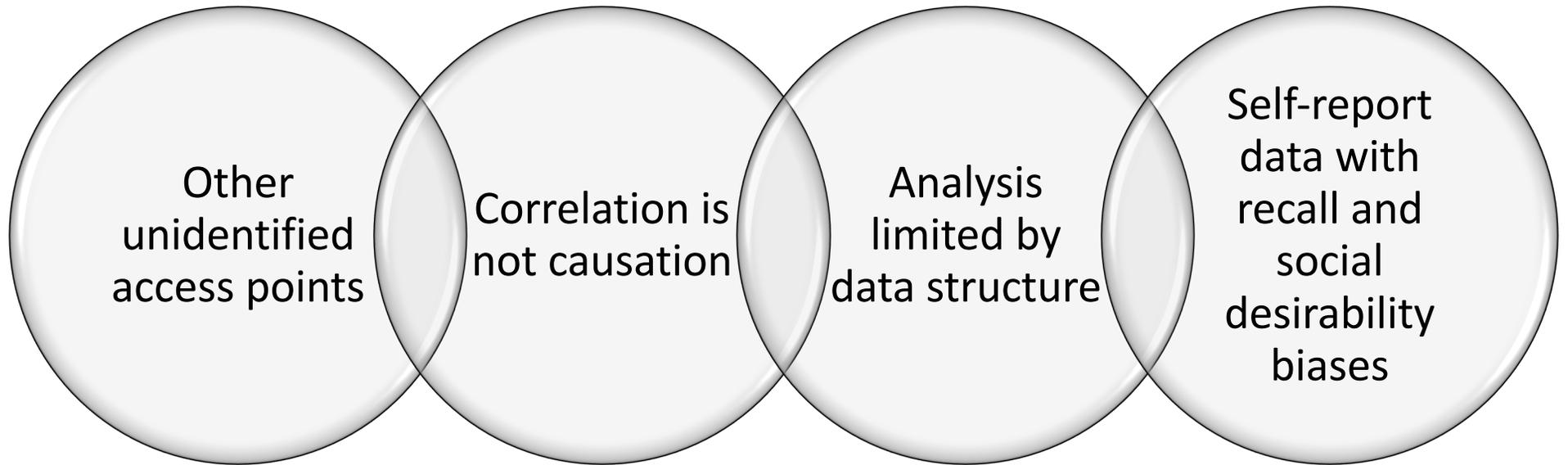


# Recommendations for Policy

Raising the Legal Age for  
Tobacco Access

Strict Monitoring of  
Restriction of Sales to  
Underage Population  
Regardless of the Age Chosen

# Study Limitations



# Recommendations for Further Research

For study results to be more representative of US youths and adolescents, the NYTS survey should include US youths and adolescents that are home schooled, or are in detention or correctional facilities in the sample population and not just US high and middle schoolers.

Further studies are needed to examine the impact of each access point on the use of E-cigarette among US high and middle schoolers.

Further research on school based educational campaign is needed.

# Conclusion

Based on the results of the analysis, there is a moderate association between the amount of e-cigarette used in the last 30 days and access points to e-cigarettes. The survey structure limited a further analysis of tobacco access points which might have showed specific strong associations for some access points. Nevertheless, policies targeted at limiting the sale of and access to e-cigarettes by US high and middle schoolers from the above evaluated access points might have some effect on reducing the prevalence of e-cigarette use within this population.



# References

[1] Wang TW, Gentzke A, Sharapova S, Cullen KA, Ambrose BK, Jamal A. Tobacco Product Use Among Middle and High School Students - United States, 2011-2017. *MMWR Morb Mortal Wkly Rep*. 2018;67(22):629–633. Published 2018 Jun 8. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5991815/>

[2] The New York Times. Vaping Related Lung Disease Climbs to 805 the CDC says. Sept 26, 2019. <https://www.nytimes.com/2019/09/26/health/vaping-illnesses-cdc.html>

[3] The US- DHHS. Surgeon General releases advisory on E-cigarette epidemic among youth. Dec 18, 2018 <https://www.hhs.gov/about/news/2018/12/18/surgeon-general-releases-advisory-e-cigarette-epidemic-among-youth.html>

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Pentz MA, Shin H, Riggs N, Unger JB, Collison KL, Chou CP. Parent, peer, and executive function relationships to early adolescent e-cigarette use: a substance use pathway?. *Addict Behav.* 2015;42:73–78. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4292878/>

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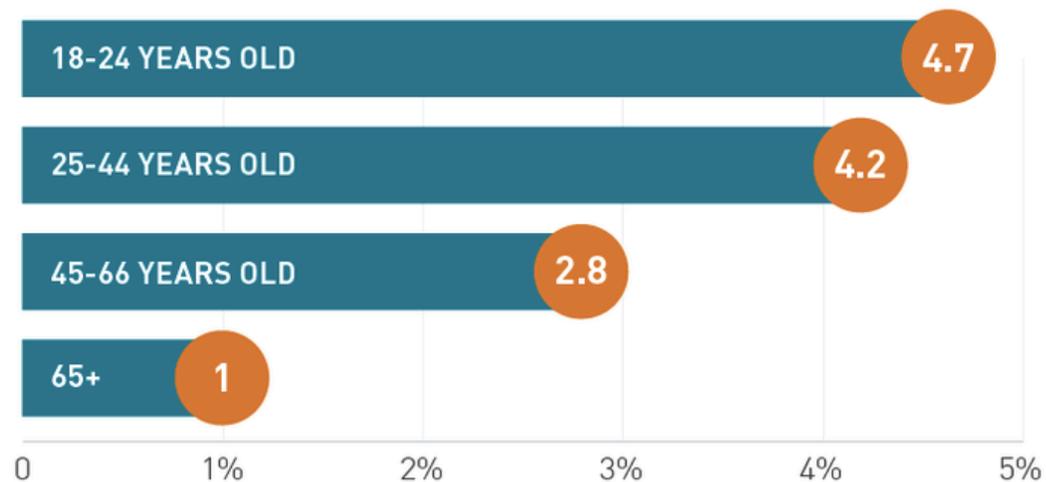
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Wang J, Cao S, Hu R. Smoking by family members and friends and electronic-cigarette use in adolescence: A systematic review and meta-analysis. *Tobacco Induced Diseases.* 2018;16(February):5. <http://www.tobaccoinduceddiseases.org/Smoking-by-family-members-and-friends-and-electronic-cigarette-nuse-in-adolescence,84864,0,2.html>

# Appendix I

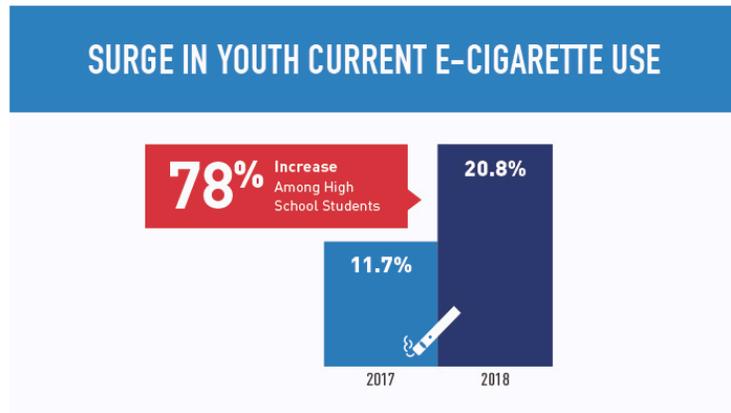
## Adults who currently use e-cigarettes



<https://truthinitiative.org/research-resources/emerging-tobacco-products/e-cigarettes-facts-stats-and-regulations>

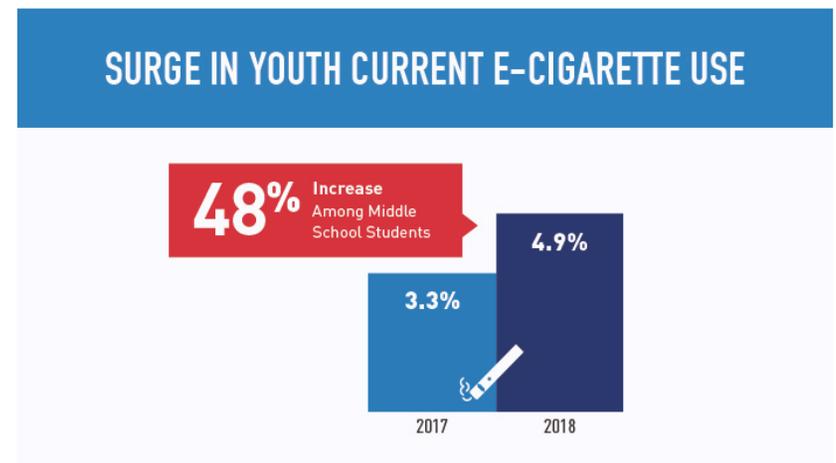
# Appendix II

## E-cigarette Use among High School Students



From 2017 to 2018, current e-cigarette use—defined by use on at least one day in the past 30 days—by high school students increased 78 percent, from 11.7 to 20.8 percent, accounting for a troubling 3.05 million American high school students using e-cigarettes in 2018. In addition, the proportion of current e-cigarette users in high school who reported use on 20 days or more in the past 30-day period increased from 20 percent to 27.7 percent between 2017 and 2018.<sup>1</sup>

## E-cigarette Use Among Middle School Students



E-cigarette use among middle school students is also on the rise, jumping 48 percent from 2017 to 2018. Today, a total of 4.9 percent of middle school students—or 570,000 kids—are current e-cigarette users.<sup>1</sup>

<https://www.fda.gov/tobacco-products/youth-and-tobacco/2018-nyts-data-startling-rise-youth-e-cigarette-use>