



# Association of E-Cigarette Use with Oral Health and Dental Visits among Adults in the United States:An NHANES study

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## Background

- E-cigarettes have become a public health concern related to tobacco use, with 1 in 10 U.S. middle and high school students have used e-cigarettes in the past 30 days (Cooper et al., 2022).
- The prevalence of e-cigarette use among adults in the U.S. increased from 4.4% in 2017 to 5.4% in 2018.
- An estimated 11 million people used e-cigarettes in 2017, and 13.7 million in 2018 (Obeissan et al., 2020).
- Nicotine in vape is a major inhibitor of cytodifferentiation and mineralization of dental pulp.
- Toxic aerosols in cigarettes cause cytotoxicity to the oral epithelium and increase oxidative stress of molecular functions (Ji et al., 2016).
- Black mouth and dry mouth have been reported among E-cigarette users based on a survey of 11 countries (Alhajj et al., 2022).

## Objective

To examine the association of e-cigarettes, use with dental visits, and self-perceived oral health status (SPOH) among adults using nationally representative personal-level data.

## Methods

**Study design:** This cross-sectional study utilized data from the National Health and Nutrition Examination Survey from 2013 to 2018.

**Dependent Variables:** Dental visits and SPOH.

**Independent Variable:** Vaping status, age, gender, race/ethnicity, marital status, education status, poverty status, insurance type, the reason for last dental visit, and routine places for healthcare

**Statistical analysis:** Multivariate logistic regression analysis. The statistical significance level was set at 0.05. Statistical analysis was performed using Stata Version 16 (StataCorp)

## Association of vaping status with last dental visit in more than 12 months, NHANES 2013-18

Characteristics	Adjusted Odds Ratio (95% C.I.)	P-Value
<b>Vaping status</b>		
People who do not vape	Reference	-
People who vape	1.22 (1.05, 1.43)	<0.05
<b>Age Group</b>		
Age 18-24 Years	Reference	-
Age 25-44 Years	1.50 (1.17, 1.94)	<0.05
Age 45-64 Years	1.19 (0.90, 1.57)	0.22
<b>Gender</b>		
Male	Reference	-
Female	0.78 (0.68, 0.90)	<0.05
<b>Race-Ethnicity</b>		
Non-Hispanic White	Reference	-
Non-Hispanic Black	0.97 (0.80, 1.17)	0.71
Hispanic	0.92 (0.78, 1.10)	0.36
Non-Hispanic Asian	0.93 (0.74, 1.17)	0.51
Other race/ Multiracial	0.89 (0.62, 1.29)	0.53
<b>Marital Status</b>		
Married	Reference	-
Never married	1.24 (0.98, 1.57)	0.07
Living with Partner	1.70 (1.35, 2.14)	<0.05
Widowed/Separated/Divorced	1.55 (1.27, 1.89)	<0.05
<b>Education Status</b>		
College Graduate or Above	Reference	-
Less than High School	1.78 (1.36, 2.33)	<0.05
HS Graduate/GED Or Equivalent	1.70 (1.28, 2.26)	<0.05
Some college or AA Degree	1.60 (1.34, 1.91)	<0.05
<b>Poverty Status</b>		
Above FPG	Reference	-
Below FPG	1.12 (0.90, 1.39)	0.3
<b>Insurance Type</b>		
Private Insurance	Reference	-
Medicare with Medigap	2.17 (1.35, 3.47)	<0.05

## Association of vaping status with fair/poor self-perceived oral health status, NHANES 2013-18

Characteristics	Adjusted Odds Ratio (95% C.I.)	P-Value
Vaping status		
People who do not vape	Reference	-
People who vape	1.48 (1.25, 1.75)	<0.05
Age Group		
Age 18-24 Years	Reference	-
Age 25-44 Years	2.51 (1.79, 3.52)	<0.05
Age 45-64 Years	2.84 (1.99, 4.05)	<0.05
Gender		
Male	Reference	-
Female	0.96 (0.82, 1.11)	0.55
Race-Ethnicity		
Non-Hispanic White	Reference	-
Non-Hispanic Black	1.17 (1.02, 1.33)	<0.05
Hispanic	1.31 (1.12, 1.53)	<0.05
Non-Hispanic Asian	1.22 (0.96, 1.57)	0.11
Other race/ Multiracial	1.06 (0.65, 1.72)	0.81
Marital Status		
Married	Reference	-
Never married	1.02 (0.84, 1.23)	0.87
Living with Partner	1.11 (0.83, 1.49)	0.49
Widowed/Separated/Divorced	1.08 (0.88, 1.34)	0.44
Education Status		
College Graduate or Above	Reference	-
Less than High School	4.90 (3.79, 6.33)	<0.05
HS Graduate/GED Or Equivalent	2.94 (2.35, 3.67)	<0.05
Some college or AA Degree	2.35 (1.99, 2.78)	<0.05
Poverty Status		
Above FPG	Reference	-
Below FPG	1.34 (1.09, 1.63)	<0.05
Insurance Type		
Private Insurance	Reference	-
Medicare with Medigap	2.91 (1.84, 4.59)	<0.05
Medicaid	1.80 (1.39, 2.33)	<0.05
Other	1.35 (1.07, 1.72)	<0.05
No Insurance	1.77 (1.39, 2.27)	<0.05
Reason for Last Dental Visit		
Non-Routine visit	Reference	-
Routine Visit	0.27 (0.24, 0.31)	<0.05
Routine places for HC		
Has Routine Place for HC	Reference	-
No Place for HC	1.14 (0.96, 1.35)	<0.05

## Results

- The study population consisted of 7,599 participants, of which 26% have used e-cigarettes.
- More than half of e-cigarette users did not visit a dentist in the past 12 months, and about 36% perceived their oral health status as fair or poor.
- Interestingly, people from the 25–44-year age group had consistently higher odds of last dental visits in more than 12 months and reported fair/poor oral health status.
- E-cigarette users had significantly higher odds (22%) of dental visits more than last 12 months ago than participants who do not vape.
- E-cigarette users had a 48% higher odds ratio of having fair/poor oral health status than people who do not vape.
- Compared to non-Hispanic whites, Hispanics and non-Hispanic blacks had significantly higher odds of reporting fair/poor oral health status.

## Discussion

Our study showed that participants who had used e-cigarette products had increased odds of not having a dental visit for more than a year and were also fair to poor oral health status (self-perceived). There also could be a behavioral component that may need to be assessed

## Conclusion

This study provides evidence of a concerning association between vaping and poor hygiene perception, specifically the individuals who reported vaping. Surprisingly, more than half of the people who vape did not visit a dentist in over one year, which indicates that focused policy and health promotion interventions should be planned. Like smoking cessation, vaping cessation should be motivated, and the 5 'A' model could be applied to this population. There is a need for further research into potential oral health risks associated with e-cigarettes.