

# Racial and Gender Disparities in Substance Use among Mississippi Adolescents: The Youth Risk Behavior Survey, 2019

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**Abstract Background:** According to the Centers for Disease Control and Prevention, tobacco, alcohol, and marijuana are the most used substances among U.S. adolescents, and racial disparities exist. Data on substance use among Mississippi adolescents is limited. We examined racial and gender disparities in current cigarette, electronic vapor products (e.g., e-cigarette), alcohol, and marijuana use among Mississippi adolescents. We hypothesized that the prevalence of current cigarette, electronic vapor products, alcohol, and marijuana use among Mississippi adolescents differed significantly by race and gender. **Methods:** We analyzed data from the 2019 Mississippi Youth Risk Behavior Survey (YRBS) for 1,417 participants. We examined associations between current cigarette, electronic vapor products, alcohol, and marijuana use by race (non-Hispanic Black and non-Hispanic White) and gender (male and female) using Chi-Square tests. **Results:** Among Mississippi adolescents, the prevalence of current cigarette (9.7% vs. 3.7%), electronic vapor products (30.9% vs. 12.3%), and alcohol (34.6% vs. 18.2%) use were significantly higher among Whites compared to Blacks, respectively ( $p < 0.001$ ). Prevalence of current cigarette (8.7% vs. 4.9%,  $p = 0.0018$ ) and electronic vapor products (23.6% vs. 18.9%,  $p = 0.0409$ ) use were significantly higher among males compared to females, respectively. There was no significant racial difference in marijuana use and no gender differences for marijuana and alcohol use. **Conclusion:** Racial and gender disparities in substance use exist among Mississippi adolescents. Target interventions are needed to address substance use disparities among Mississippi adolescents.

**Keywords:** adolescents, gender disparity, racial disparity, Mississippi, substance use

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## 1. Introduction

In America, substance use among adolescents is a persistent public health problem. Substance use in childhood poses a significant social, mental, and physical health burden on the individual using these substances and their families [1]. The Centers for Disease Control and Prevention (CDC) [2] revealed that tobacco, alcohol, and marijuana are adolescents' most used substances in America. The CDC [3] predicts an estimated 5.6 million adolescent deaths (1 in 13) if the current rate of cigarette smoking continues in this population group. Mortality data show that excessive drinking causes approximately 3,500 deaths in the underage population annually [4]. In 2019, an article by [5] showed that approximately 37% of U.S. high schoolers used marijuana long-term, while about 22% of U.S. high schoolers used marijuana within the past month. Patterns of substance use emerge in adolescence and include racial and gender disparities. Social and economic factors such as income, educational

attainment, and employment status contribute to disparities. Racial disparities in substance use among youths are of concern, and several racial populations have been disproportionately affected. Goings et al. [6] showed that the prevalence of lifetime cigarette, alcohol, and marijuana use in youths was higher among Whites (25.6%) than Blacks (16.1%). According to Kamke et al. [7], "national rates of current smoking among adolescents between 2014 and 2017 were highest among American Indians (10.3%) and Native Hawaiians (9.5%) followed by Whites (6.6%), Latinos (5.7%), Blacks (3.3%), and Asians (2.0%)." Illegal access to drugs contributes to the high prevalence of substance use among adolescents. Youths access drugs through peers, social media, and adult acquaintances. The availability of drugs within the home also provides access to adolescents. A study by Lee et al. [8] revealed that mixed-race adolescents had the most access to marijuana, followed by Whites, Blacks, and Asians. Access to illicit substances correlates with increased substance use which aggravates the problem of substance use. The use of multiple substances in adolescence is of concern. Tobacco serves as a gateway

drug to other illicit drugs. Studies show that non-Hispanic Blacks have a higher prevalence of marijuana use in e-cigarette devices than their non-Hispanic White counterparts [9]. However, there was an increased prevalence in both racial groups between 2017 and 2020 [9].

Cui et al. [10] report a higher prevalence of smoking in boys than girls. Exposure to smoking was higher in girls than boys, while a lower cessation appeared to be higher in boys than girls [11]. Gender minorities are more acceptable today, therefore examining patterns in substance use among LGBTQ individuals is essential. The prevalence of illicit drug use is about two times higher among lesbian, gay, or bisexual teens compared to their heterosexual counterparts [12]. A study by Fish et al. [13] in Canada highlighted a higher prevalence of alcohol use among sexual minority youths compared to heterosexual youths, despite a general decline in alcohol consumption among youths. Fish et al. [13] stated that *"lesbian/gay and bisexual youth in Canada continue to show elevated rates of alcohol use compared with heterosexual youth."* Gender disparity in alcohol use is also higher among boys than girls [14]. Generally, data on gender disparities among adults is better established than youths, indicating a need for more research on this issue in adolescence. As public health providers identify best practices to tackle substance use among adolescents, understanding substance use trends and discerning vulnerable populations is crucial in developing effective target interventions.

The problem of substance use among Mississippi adolescents persists. According to the 2016 Mississippi Youth Tobacco Survey, male and female high school students had comparable differences in current e-cigarette use, at 9.1% and 11.4%, respectively [15]. Furthermore, the percentage of current e-cigarette use among high school students was significantly higher in Whites than Blacks [15]. In Mississippi, several studies focus on substance use among Mississippi adults, but very few studies address substance use in adolescence. Current data on racial and gender disparities in Mississippi is limited, hence this study. We hypothesize that the prevalence of cigarettes, electronic vapor products, alcohol, and marijuana use will be significantly different between non-Hispanic Black and non-Hispanic White youths and between boys and girls in Mississippi. This study aims to examine data from the 2019 Mississippi Youth Risk Behavior survey, to provide insight into the issue of substance use and its associated disparities across gender and racial groups in Mississippi.

## 2. Materials and Methods

### 2.1. Data Source

We analyzed data from the 2019 Youth Risk Behavior Survey (YRBS) for Mississippi. The YRBS is a national survey administered every odd-numbered year to students attending U.S. high schools, to assess health risk behaviors. The YRBS is part of the U.S. Centers for Disease Control and Prevention National Youth Risk Behavior Surveillance System (YRBSS). The National YRBS is administered in all U.S. states, the District of

Columbia, and three U.S. territories (Puerto Rico, Guam, and the U.S. Virgin Islands). The YRBS survey is reliable and valid in assessing health risk factors. The 2019 YRBS used a weighting factor to obtain a representative sample.

The Mississippi 2019 YRBS dataset used a three-stage cluster sample design to generate a sample of high school students that was representative of the state of Mississippi. The source population was 9th - 12th-grade students aged 12 - 18 who attended public, catholic, and other private schools across Mississippi (N = 1,417). The 2019 YRBS for Mississippi collected demographic characteristics such as age, race, sex, and grade level. The CDC's Institutional Review Board obtained approval for the YRBS study. Participation in the YRBS study is voluntary, and all identifiers were removed from the dataset to maintain confidentiality. Data on the current use of cigarette, electronic vapor products, alcohol, and marijuana were collected.

### 2.2. Substance Use - Cigarettes, Electronic Vapor Product, Alcohol, and Marijuana

Respondents were asked, *"During the past 30 days, on how many days did you smoke cigarettes?" "During the past 30 days, on how many days did you use an electronic vapor product?" "During the past 30 days, on how many days did you have at least one drink of alcohol?"* Possible responses were 1 = 0 day; 2 = 1 or 2 days; 3 = 3 to 5 days; 4 = 6 to 9 days; 5 = 10 to 19 days; 6 = 20 to 29 days; and 7 = All 30 days. Each variable was dichotomized into 'Yes' and 'No' responses to compute the prevalence of current use for each substance. Participants who selected 'Yes' had used each substance (cigarette, electronic vapor products, and alcohol) at least once during the past 30 days and therefore were categorized as current users of cigarettes, or electronic vapor products, or alcohol. Participants were also asked, *"During the past 30 days, on how many times did you use marijuana?"* Possible responses were 1 = 0 times; 2 = 1 or 2 times; 3 = 3 to 9 times; 4 = 10 to 19 times; 5 = 20 to 39 times; and 6 = 40 or more times. We calculated the prevalence of marijuana use using a dichotomous variable of 'Yes' and 'No' responses. Current marijuana users who had used marijuana at least once during the past 30 days selected 'Yes.'

### 2.3. Demographic Characteristics

Demographic variables included race (non-Hispanic Black and non-Hispanic White), sex (male and female), grades level (9th, 10th, 11th, and 12th), and age groups (less than 15 years old, 15 - 16 years old, and older than 16 years old).

### 2.4. Statistical Analysis

Current cigarette, electronic vapor products, alcohol, and marijuana use were calculated across racial and gender characteristics using Chi-Square tests to assess associations between the current use of each substance (cigarette, electronic vapor products, alcohol, and marijuana) and demographic characteristics. SAS v. 9.4 was used to conduct this analysis. The level of significance was established based on a p-value less than 0.05.

### 3. Results

We analyzed data from the 2019 Mississippi Youth Risk Behavior Survey (YRBS) for 1,417 participants, to examine associations between substance use and demographic characteristics, specifically race and gender. Participants' age ranged from 12 - 18 years old. There were 691 Blacks and 726 Whites, which comprised 48.8% and 51.2% of the sample, respectively (Table 1). More than half of participants were females (50.6%) compared to males (49.0%).

**Table 1. Demographic Characteristics of Mississippi Adolescents, Youth Risk Behavior Survey, 2019**

Characteristics	Total		Male		Female	
	Total Percentage (n)	Total Percentage (%)	Total Percentage (n)	Total Percentage (%)	Total Percentage (n)	Total Percentage (%)
<b>Race</b>						
Black	691	48.8	320	46.0	369	51.5
White	726	51.2	375	54.0	348	48.5
<b>Grade</b>						
9-	449	31.7	225	32.4	222	31.0
10-	345	24.3	178	25.6	167	23.3
11-	298	21.0	145	20.9	152	21.2
12-	321	22.7	146	21.0	175	24.4
<b>Age</b>						
<15yrs	281	19.8	133	19.1	146	20.4
15-16yrs	692	48.8	335	48.2	355	49.5
>16yrs	444	31.3	227	32.7	216	30.1

Chi-Square analysis showed that among Mississippi adolescents, prevalence of current cigarette (9.7% vs. 3.7%), electronic vapor products (30.9% vs. 12.3%) and alcohol (34.6% vs. 18.2%) use were significantly higher among Whites compared to Blacks, respectively ( $p < 0.001$ ) (Table 2-Table 4).

**Table 2. Analysis of cigarette use within the past 30 days by race and gender characteristics among Mississippi adolescents, Youth Risk Behavior Survey, 2019**

Characteristics	n	%	p-value
<b>Race</b>			
White	68	9.7	<0.001
Black	21	3.7	
<b>Gender</b>			
Male	72	8.7	0.0019
Female	37	4.9	

**Table 3. Analysis of electronic vapor product use within the past 30 days by race and gender characteristics among Mississippi adolescents, 2019 Youth Risk Behavior Survey**

Characteristics	n	%	p-value
<b>Race</b>			
White	187	30.9	<0.001
Black	66	12.3	
<b>Gender</b>			
Male	169	23.6	0.0409
Female	141	18.9	

**Table 4. Analysis of alcohol use within the past 30 days by race and gender characteristics among Mississippi adolescents, Youth Risk Behavior Survey, 2019**

Characteristics	n	%	p-value
<b>Race</b>			
White	225	34.6	<0.001
Black	103	18.2	
<b>Gender</b>			
Male	188	25.9	0.9679
Female	196	26.0	

Prevalence of current cigarette (8.7% vs. 4.9%,  $p = 0.0018$ ) and electronic vapor products (23.6% vs. 18.9%,  $p = 0.0409$ ) use were significantly higher among males compared to females, respectively (Table 2-Table 3). There was no significant racial difference in marijuana use and no gender differences for marijuana and alcohol use (Table 4-Table 5).

**Table 5. Analysis of marijuana use within the past 30 days by race and gender characteristics among Mississippi adolescents, Youth Risk Behavior Survey, 2019**

Characteristics	n	%	p-value
<b>Race</b>			
White	80	13.1	0.1005
Black	112	17.3	
<b>Gender</b>			
Male	123	15.3	0.7331
Female	115	14.5	

Our findings showed that current substance use differed by race for cigarette, electronic vapor products, and alcohol use. Based on the results, we inferred that there was an association between current substance use, specifically cigarette, electronic vapor products, and alcohol, and race. Current substance use of cigarette and electronic vapor products also differed by gender, and so we inferred that there was an association between current substance use, specifically cigarette and electronic vapor products, and gender. Therefore, depending on the substance, current substance use and demographic characteristics (race and gender) were not independent of each other.

Note: Data provided were self-reported by respondents and referred to substance use within 30 days prior to the survey. Percentages are weighted to account for the complex sampling design of the survey.

### 4. Discussion

This study measured White versus Black and male versus female disparities in substance use in the past 30 days, as a mechanism to explain associations between current substance use and demographic characteristics among youths in Mississippi, using data from the 2019 Mississippi Youth Risk Behavior Survey. To our knowledge, this is the first statewide study to assess gender and racial disparities in current substance use among adolescents in Mississippi. Chi-Square analysis

showed that there was an association between current substance use and demographic characteristics (race and gender), and racial disparities in cigarette, electronic vapor products, and alcohol use existed and were higher among White than Black high school students. Results from our study were similar to previous studies [16,17], which showed a higher prevalence of current tobacco use among White adolescents compared to their Black counterparts. According to Keyes et al. [18], “*Black adolescents in the U.S. are less likely to use alcohol, marijuana, and tobacco compared with non-Hispanic Whites.*” Despite using cigarettes much later in life than their racial counterparts, Blacks are more likely to have smoking-related health diseases as well as die from these diseases compared to other racial or ethnic groups, according to [16].

Cigarette smoking is often accompanied by alcohol use, and disparities exist [19,20]. According to the National Institute on Minority Health and Health Disparities (NIMHD) [19], the risk of alcohol use disorder (AUD) in adulthood is associated with cigarette initiation at a younger age and is higher among Whites than blacks [19]. Similar to a previous study [9], our study found no significant racial differences in current marijuana use among adolescents. However, non-Hispanic Blacks (19.4%) reported a higher prevalence of ever using marijuana than non-Hispanic Whites (18.2%) adolescents, and marijuana use between 2017 and 2020 increased significantly among Black and White adolescents [9]. This increase could be attributed to the social acceptance of marijuana and increased access due to the enactment of laws that legalize marijuana use across several U.S. states [9].

Gender disparities in substance use among Mississippi adolescents exist. Our study showed a higher prevalence of cigarette and electronic vapor products use within the past 30 days among males compared to females. However, according to Kong, Kuguru, & Krishnan-Sarin [21], “*girls metabolized nicotine and cotinine faster than boys due to the presence of estrogen.*” Girls also experienced a lesser rewarding effect from nicotine use compared to boys [21]. Historical data report higher use of e-cigarettes in boys than girls, but in recent years, the gap between boys and girls has narrowed [21]. A study by Yimsaard et al. [22] highlighted some reasons behind vaping. According to Yimsaard et al. [22], the most cited reasons for vaping in females and males were that vaping was “*less harmful to others*” (85.8%) and “*less harmful than cigarettes*” (85.5%),” respectively. E-cigarettes are trending among adolescents due to marketing strategies that make these products appealing to youths. Kong et al. [21] explained that marketing companies utilize strategies that focus on sporting events and sex appeal to entice male adolescents into purchasing and using e-cigarettes. E-cigarette companies also promote weight loss effects from e-cigarette use to lure girls into using these products [21]. Accessibility to e-cigarettes is higher in males than females. Kong et al. [21] argue that boys access e-cigarette products by purchasing them online illegally, whereas girls borrow e-cigarette products from their peers. Ownership of e-cigarettes facilitates frequent and continuous use in boys compared to girls who have limited access.

Alcohol consumption alongside tobacco and marijuana use is illegal among adolescents in the U.S. From our findings, there was no significant difference in the prevalence of current alcohol use between males and females. Our study also reported no significant differences in the prevalence of current marijuana use between males and females. Therefore, we inferred that there was no association between current substance use, specifically alcohol and marijuana, and gender. Generally, recent data on gender differences in alcohol and marijuana use among U.S. adolescents is limited. Nonetheless, several studies provide data on racial and gender disparities in alcohol and marijuana use among U.S. adults. Further research is needed to investigate disparities in alcohol and marijuana use among youths in Mississippi as well as the United States.

## 5. Conclusion

Racial and gender disparities in substance use exist among Mississippi adolescents. This study identified a higher prevalence of current cigarette, electronic vapor products, and alcohol use among non-Hispanic White adolescents compared to their non-Hispanic Black counterparts. In addition, a higher prevalence of current cigarettes and electronic vapor product use was reported among males than females. Our study showed no significant racial difference in marijuana use and no gender differences in marijuana and alcohol use. Based on our findings, we concluded that there were associations between current substance use and demographic characteristics, depending on the type of substance used.

## 6. Implication

Substance use among Mississippi adolescents differed considerably across racial and gender groups. Tailored interventions to address disparities in substance use in adolescents are needed in Mississippi.

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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