Overdoses among Females 11-24 Years-Old

Michigan, 2020-2021

Introduction

From 2019-2020 in Michigan, overdose deaths increased 16% and from 2020-2021, overdose emergency department (ED) visits increased 4%[1]. The COVID-19 pandemic has significantly impacted substance use and mental health, with U.S. adults reporting elevated levels of mental health conditions and substance use[2] and youth reporting increased feelings of disconnectedness/hopelessness, suicidality, and poor mental health[3]. Female youth are vulnerable to mental health struggles, with nearly half of female high school students in 2019 reporting persistent feelings of sadness and hopelessness[4], and adolescent females experiencing increases in mental health-related ED visits in 2020 and 2021[5]. The COVID-19 pandemic may have uniquely impacted mental health and substance use of young women. This report examines all intent (includes unintentional, intentional, assault, and undetermined intent) and intentional overdoses among young females, defined as 11-24 years-old, in Michigan.

Key Findings

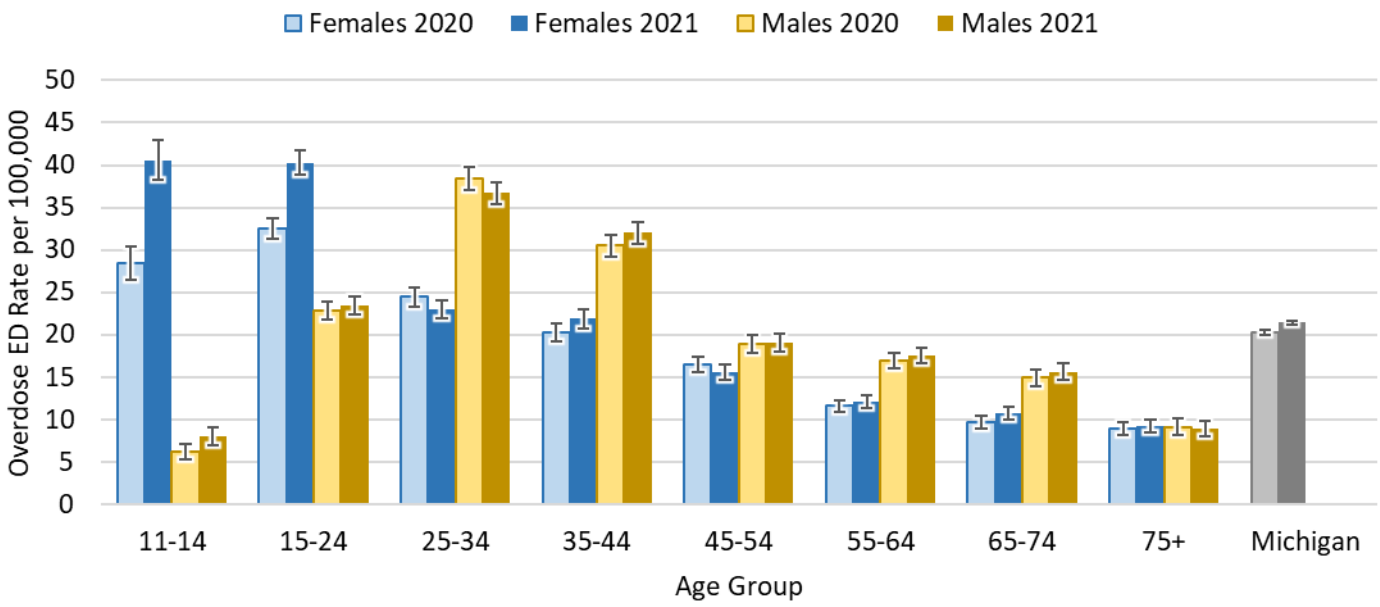
- Females ages 11-24 years had the highest overdose ED visit rates in 2020 and 2021 compared to other age-sex groups.
    - Females 11-14 years old had the largest increases in overdose ED visit rate from 2020-2021 and females 15-24 years old had the third largest increase.
- The majority of overdose ED visits in 2020 and 2021 among young females were intentional.
    - This population's intentional overdose ED visit rate increased from 2020 to 2021 and was significantly higher in 2021 than all other age-sex groups.
- Young females in the northern Lower Peninsula and among the White and Black, non-Hispanic (NH) populations had the highest intentional overdose ED visits rates in 2021.
    - The Northern lower peninsula and the American Indian or Alaska Native, NH populations experienced the largest increases in 2021.
- Although the intentional overdose ED visit rate was highest among females 11-14 years old in 2021, the intentional overdose death rate in 2020 (the most recent year of death data available) is comparatively low in this population, highlighting an opportunity for intervention.
- In 2020, young females were more likely to have used non-opioid analgesics, antirheumatics, or antipyretics and antidepressants in intentional overdoses resulting in ED visits than opioids, psychostimulants, or alcohol.
- Due to the concerning increases in drug overdose ED visits, and particularly intentional overdoses, young females should be targeted for intervention, with emphasis given to the mental health needs of this population.

[1] https://www.Michigan.gov/OpioidsData
[2] https://www.cdc.gov/mmwr/volumes/69/wr/mm6932a1.htm
[3] https://www.cdc.gov/mmwr/volumes/71/su/su7103a3.htm
[4] https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBSDataSummaryTrendsReport2019-508.pdf
[5] https://www.cdc.gov/mmwr/volumes/71/wr/mm7108e2.htm

Results

From 2020 to 2021**,** females between 11-14 years old had the largest increase in drug overdose emergency department visits (+43%) among age-sex groups, followed by males 11-14 years old (+28%) and females 15-24 years old (+24%). Among all Michigan residents, the overdose ED visit rate increased by 6% from 2020 to 2021. In 2021, females 11-14 and 15-24 years old had the highest overdose emergency department rates among all age-sex groups (females 11-14: 28 overdose ED visits per 100,000; females 15-24: 33 per 100,000), with rates statistically significantly higher than all other age-sex groups and significantly higher than their rates in 2020 (**Figure 1**).

Figure 1. Overdose ED Visit Crude Rate per 100,000, 95% Confidence Intervals[1], and Percent Change[2] from 2020-2021 by Age Group and Sex, Michigan

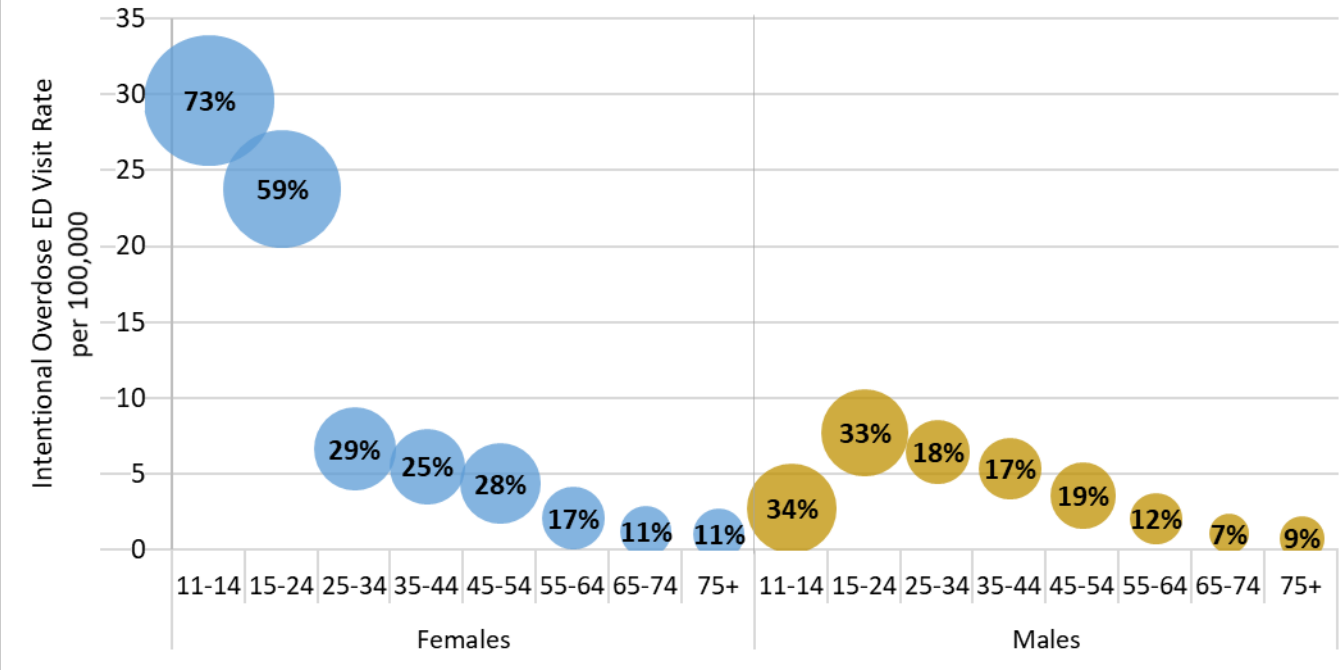


	11-14	15-24	25-34	35-44	45-54	55-64	65-74	75+	All MI Residents
Females	+42.8%	+23.9%	-5.8%	+7.9%	-5.4%	+4.1%	+11.2%	+3.3%	+5.5%
Males	+28.0%	+2.5%	-4.5%	+5.1%	+0.8%	+3.4%	+4.9%	-2.1%	

[1]Error bars in graph represent normal 95% confidence intervals of drug overdose ED visit crude rates.
[2]Percent in table below graph is the relative percent change in drug overdose ED visit rate from 2020-2021.
Data Sources: ED Data: 2020-2021 Michigan Syndromic Surveillance System (MSSS) (Michigan Department of Health and Human Services (MDHHS)), Rate Denominator: National Center for Health Statistics (NCHS) Bridged-Race 2020 Population Estimates, (Centers for Disease Control and Prevention (CDC))

In 2021, young females also in Michigan had the highest rates of *intentional* overdose ED visits (females 11-14: 30 per 100,000, females 15-24: 24 per 100,000), with rates substantially higher than all other age-sex groups which ranged 1 to 7 per 100,000. Young females also had the highest proportion of overdose ED visits that were noted to be intentional/self-harm related (females 11-14: 73%, females 15-24: 59%), again, substantially higher than other age-sex groups (7%-33%) (**Figure 2**).

Figure 2. Intentional Overdose ED Visit Crude Rate per 100,000 and Percent of Total Overdoses that were Intentional[1] by Age Group and Sex, Michigan 2021



[1]Percent in the data bubbles represents the percent of total overdoses of any intent that were coded as intentional/self-harm. Bubble size is proportionate to this percent.
Data Sources: ED Data: 2021 MSSS (MDHHS), Rate Denominator: NCHS Bridged-Race 2020 Estimates (CDC)

From 2020 to 2021, the number of intentional drug overdose ED visits among females 11-14 years old increased by 234 ED visits (+39% in intentional overdose ED visit rate), and the numbers among females 15-24 years old increased by 367 ED visits (+25% in overdose ED visit rate). All other age-sex groups had changes in the number of intentional drug overdose ED visits between negative two and 78. Females 11-14 years old and females 15-24 years old had both substantial increases in the relative percent change and a large increase in the absolute number of intentional overdose ED visits (**Table 1**).

Table 1. Absolute Change in Number of Intentional Overdose ED Visits and Relative Percent Change[1] in Intentional Overdose ED Visit Rate from 2020-2021 by Age Group and Sex, Michigan

	Male		**Female**	
	Change in Number of ED Visits	*% Change in ED Visit Rate*	*Change in Number of ED Visits*	*% Change in ED Visit Rate*
11-14	+14	+21%	+235	+39%
15-24	+11	+2%	+367	+25%
25-34	+40	+8%	+24	+5%
35-44	+78	+26%	-15	-4%
45-54	+4	+2%	-43	-12%
55-64	+3	+2%	-28	-14%
65-74	+28	+76%	-2	-2%
75+	+11	+65%	+5	+10%

[1]Color scale of cells in table is based on change estimate, with blue color cells representing a decrease in estimate from 2020 to 2021, red representing an increase, and a darker hue representing a larger change.

Data Sources: ED Data: 2020-2021 MSSS (MDHHS), Rate Denominator: NCHS Bridged-Race 2020 Estimates (CDC)

The intentional drug overdose rates among females 11-24 years-old were highest in the northern Lower Peninsula and on the northwest side of Michigan (Region 6: 397 overdoses per 100,000, Region 7: 386 per 100,000) as compared to other regions of the state (232 to 362 per 100,000). The northern Lower Peninsula also had the largest increase in intentional drug overdoses among females 11-24 years old (+116%) as compared to other regions (+8% to +52%) (**Figures 3A and 3B**).

Figure 3A. Intentional Overdose ED Visit Crude Rate per 100,000 among Females 11-24 years old by Emergency Preparedness Region, Michigan 2021

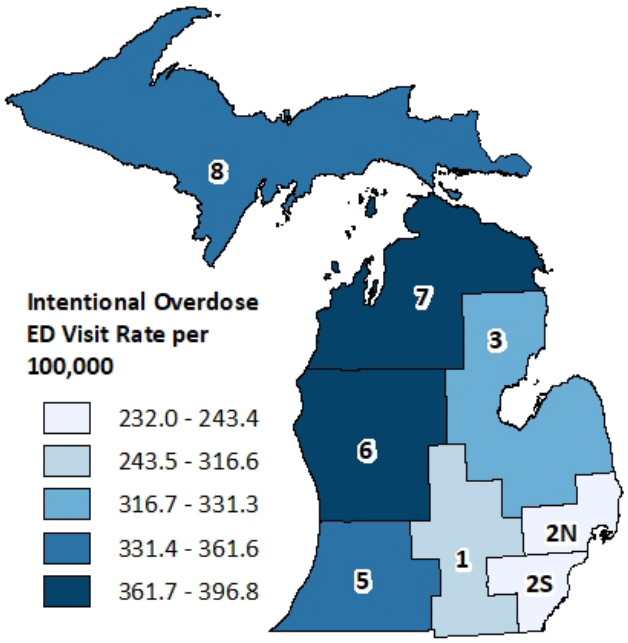
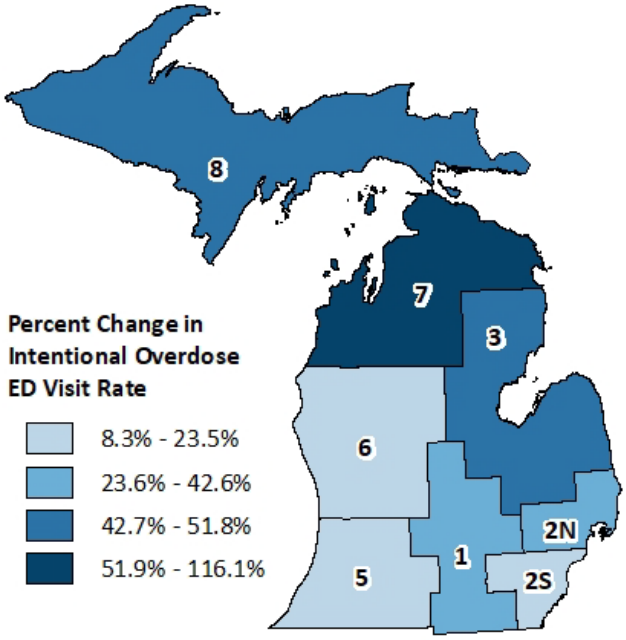


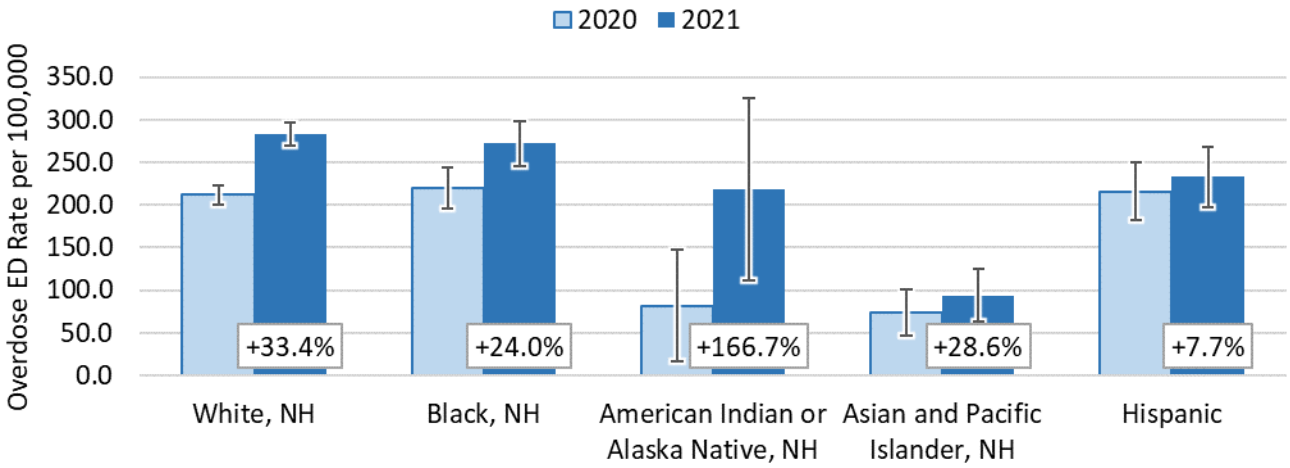
Figure 3B. Percent Change from 2020-2021 in Intentional Overdose ED Visit Crude Rate among Females 11-24 years old by Emergency Preparedness Region, Michigan



Data Sources: ED Data: 2021 MSSS (MDHHS), Rate Denominator: NCHS Bridged-Race 2020 Estimates (CDC)

White, non-Hispanic (NH) and Black, NH females 11-24 years old had the highest intentional overdose ED visit rates (White: 283 per 100,000, Black: 272 per 100,000) compared to other race-ethnicity groups (94-233 per 100,000). From 2020 to 2021, American Indian or Alaska Native, NH females 11-24 years old had the largest relative increase in intentional overdose ED visit rate (+167%), although the rate increase from 2020-2021 was not statistically significant. Intentional overdose ED visits in this group increased by 10 ED visits in 2021 (from 6 to 16) (**Figure 4**).

Figure 4. Intentional Overdose ED Visit Crude Rate per 100,000, 95% Confidence Intervals[1], and Relative Rate Percent Change[2] (2020-2021) among Females 11-24 Years-Old by Race/Ethnicity Group[3], Michigan



Abbreviations: NH=non-Hispanic

[1]Error bars in graph represent normal 95% confidence intervals of drug overdose ED visit crude rates.

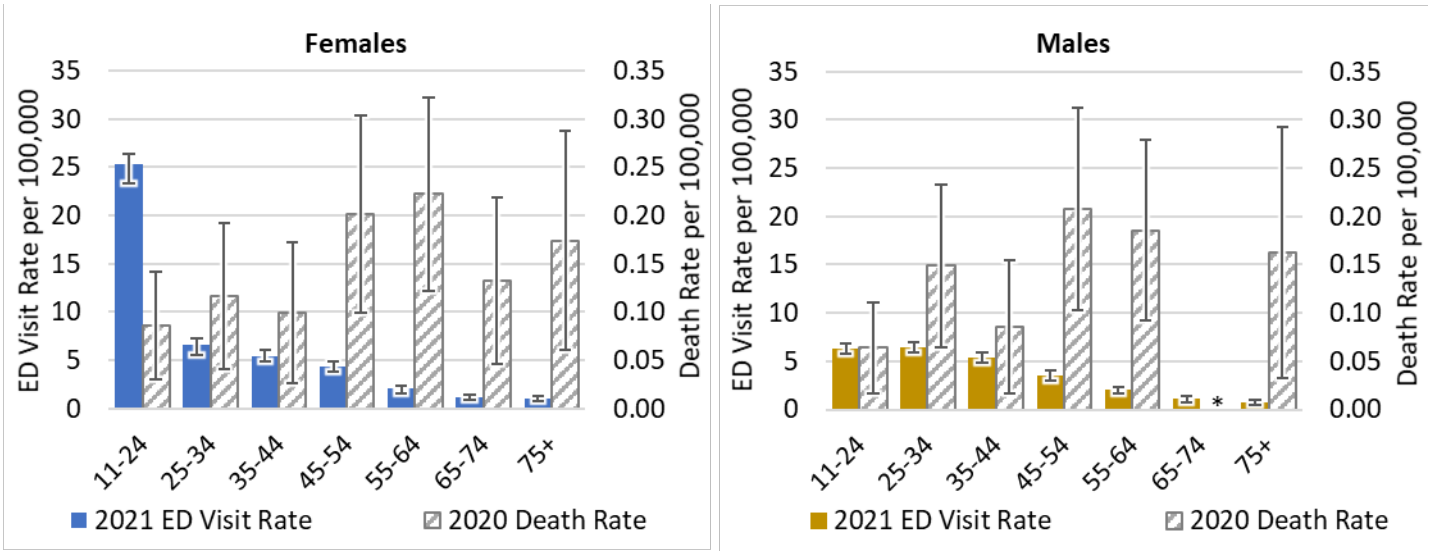
[2]Percent in the data label on the graph represents the relative percent rate change from 2020 to 2021.

[3]In 2020/2021, eight percent of ED visits among females 11-24 were "Unknown" and four percent were "Other"

Data Sources: ED Data: 2020-2021 MSSS (MDHHS), Rate Denominator: NCHS Bridged-Race 2020 Estimates, (CDC)

While females 11-24 years old had significantly higher rates of intentional overdose ED visits in 2021 (25 per 100,000) than all other age-sex groups, young females ages 11-24 years did not have the highest intentional overdose death rate in 2020 (the most recent year of death data available). Females and males 45-64 years-old had the highest intentional overdose death rate (0.1 to 0.2 per 100,000), although the death rates were not significantly higher than females 11-24 years-old (**Figure 5**).

Figure 5. 2021 Intentional Overdose ED Visit and 2020 Intentional Overdose Death Crude Rates and 95% Confidence Intervals[1] by Sex and Age Group[2], Michigan



[1]Error bars represent normal 95% confidence intervals of intentional overdose ED visit and death crude rates. ED and death rates should not be compared visually for statistical significance, as they are on different axes.

[2]Age categories for 11-14 and 15-24 were combined to create statistically reliable death rates.

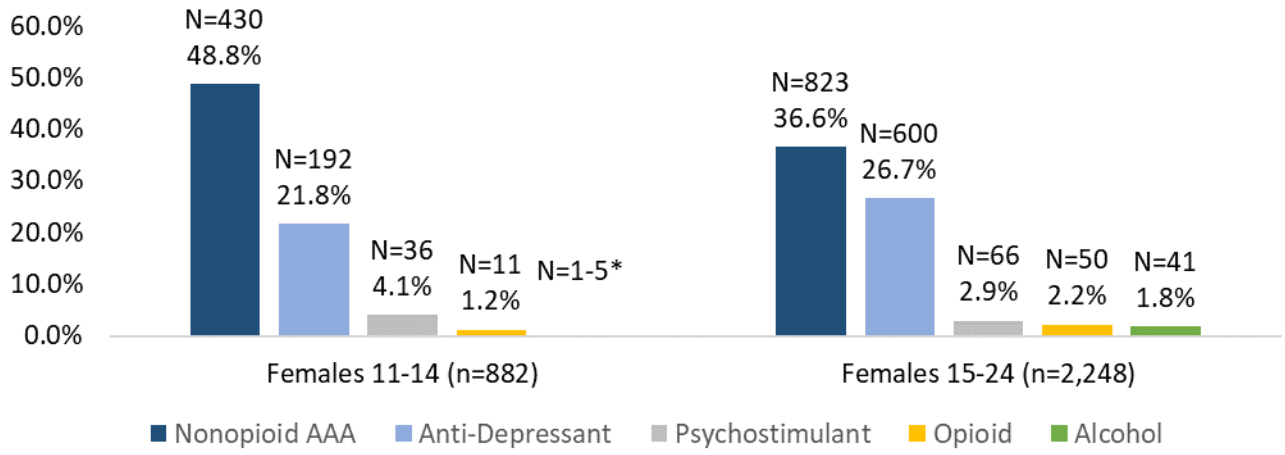
*Data is suppressed when numerator of rate is between 1 and 5 for statistical stability.

Data Sources: ED Data: 2021 MSSS (MDHHS), Death Data: 2020 Michigan Resident Death Files (MDHHS), Rate

Denominator: NCHS Bridged-Race 2020 Population Estimates (CDC)

In 2020, among 5 drug categories of interest (non-opioid analgesics, antirheumatics, or antipyretics; antidepressants; psychostimulants; opioids; and alcohol), non-opioid analgesics, antirheumatics, or antipyretics were the most common drugs listed as involved in the intentional overdose resulting in an ED visit for women 11-14 and 15-24 years-old in 2020 (37%-49% of intentional overdose ED visits), followed by antidepressants (22%-27%). Psychostimulants, opioid, and alcohol were not commonly listed as drugs involved in intentional overdoses in young females (2%-4%) (**Figure 6**).

Figure 6. Percent of Intentional Overdose ED Visits[1] by Specific Drug Categories of Interest[2] Included in Diagnosis, Michigan 2020



Abbreviations: AAA=Analgesics, antirheumatics, and antipyretics

[1]The ED data in this figure is based on Michigan Inpatient and Outpatient Databases (MIDB/MODB); All other figures utilize MSSS ED data.

[2]Substances displayed in graph are not exhaustive; some intentional overdose ED visits may have been attributed to other substances not displayed on the graph. Substance categories are not exclusive.

*Counts for alcohol data for females 11-14 are between 1-5 and are suppressed for statistical stability.

Data Sources: ED Data: 2020 Michigan Inpatient and Outpatient Databases (MIDB/MODB) (Michigan Health and Hospital Associations (MHA)

Conclusions

Young females (ages 11-24 years) in Michigan are experiencing concerning increases in overdose ED visits compared to other age-sex groups and the general Michigan population. In 2021, young females had the highest rates of overdose ED visits among all age-sex groups in Michigan. Additionally, females 11-14 years-old had the largest increase in overdose ED visits from 2020 to 2021, with females 15-24 years-old having the third largest increase.

The data in this report demonstrate that most overdose ED visits (59-73%) in the young female population in Michigan are for intentional overdose (self-harm). Young females have substantially higher intentional overdose rates and proportions of total overdoses that are intentional as compared to all other age-sex groups. Additionally, between 2020 and 2021, young females had considerable increases in both the counts and rates of intentional overdose ED visits. In the young female population, intentional overdose ED visit rates were highest in the northern Lower Peninsula and among the White, NH and Black, NH population. The largest increases among young females in 2021 were seen in the

northern Lower Peninsula and the American Indian or Alaska Native, NH population. Non-opioid analgesics, antirheumatics, or antipyretics (this category includes common painkillers such as Tylenol and Advil) and antidepressants were more likely to be listed as involved in intentional overdose ED visits among young females than psychostimulants, opioids, or alcohol.

While young females have the highest intentional overdose ED visit rates, the most recent death data available (2020) demonstrate that the intentional overdose death rate in this population is lower than all other age-groups except males 11-24 and males 35-44. This suggests that while young females may attempt suicide or self-harm by overdose more frequently than other groups, those attempts may result in death less frequently. ED visits for intentional overdose among young females suggest an opportunity for intervention.

Young females 11-24 years-old experienced concerning, disproportionate increases in intentional overdose ED visits from 2020-2021. SUD and mental health challenges such as anxiety and depression are strongly correlated in women; SUD and mental health interventions should be emphasized in the young female population. Resources that should be made available to this population include: the 988 Suicide and Crisis Lifeline, widespread naloxone availability (able to be ordered through NEXT distro), and SUD treatment and harm reduction services. Additionally, the Surgeon General's Youth Mental Health Advisory provides valuable mental health recommendations for concerned families and individuals, communities, and schools to work on improving mental health outcomes among youth. The Trevor Project provides mental health resources for LGBTQ+ adolescents and The Society for Adolescent Health and Medicine has a comprehensive list of youth friendly mental health online resources.

Data Notes

Data Sources

- **ED Data**: 2020-2021 Michigan Syndromic Surveillance System, Michigan Department of Health and Human Services (MDHHS)
- **Death Data**: 2020 Michigan Resident Death Files, MDHHS
- **Drug Specific ED Data**: 2020 Michigan Inpatient and Outpatient Databases, Michigan Health and Hospital Association
- **Rate Denominators**: 2020 National Center for Health Statistics Bridged-Race Population Estimates (Vintage 2020), Centers for Disease Control and Prevention

Case Definitions

ED Data (MSSS)

ED visits for drug overdose were identified by querying the visit's diagnosis field for the following International Classification of Disease, 10th Version, Clinical Modification ICD-10-CM) codes: T36-T50, limited to initial visits for poisonings. Intentional drug overdose codes were a subset of this category, in which a 2 was assigned in the 5th of 6th digit of the ICD-10-CM. All ED data were restricted to visits among Michigan residents occurring within a Michigan ED.

Death Data (Resident Death Files)

Intentional drug poisoning deaths are deaths of Michigan residents, including deaths that occurred outside Michigan, with an underlying International Classification of Disease, 10th Version (ICD-10) code of X60-X64.

Drug Specific ED Data (MHA)

Intentional drug specific overdose ED visits were identified by the following ICD-10-CM codes (restricted

to initial visits for drug poisonings with a 5th of 6th digit of 2 among Michigan residents treated in Michigan EDs):

- Opioid: T40.0-T40.4 and T40-6
- Psychostimulant: T40.5, T43.6
- Antidepressants: T43.0-T43.2
- Alcohol: T51
- Nonopioid Analgesics, Antipyretics and Antirheumatics Poisonings: T39

Statistical Methods

All rates shown in this report are crude rates per 100,000 residents, utilizing 2020 NCHS bridged-race population estimates as denominators. Rates are suppressed when the numerator is between 1 and 5 to preserve statistical stability. Count data between 1 and 5 are suppressed to protect confidentiality of the data. All confidence intervals in figures represent normal 95% confidence intervals. Where confidence intervals do not overlap, a statistically significant difference ($p<0.05$) exists.

Limitations

ED Data (MSSS)

ED data represent de-identified event-level data. If an individual sought care in a Michigan ED multiple times during the study period, he or she would be represented in this data multiple times during the study period. Ninety two percent of EDs in Michigan report diagnosis code data to MSSS; the remaining EDs were not included in this analysis. The northern Lower Peninsula had the lowest coverage of EDs reporting to MSSS, with 73% of EDs reporting diagnosis data. All other areas of the state have at least 80% of EDs reporting diagnosis data to MSSS.

Drug Specific ED Data (MIDB/MODB)

ED data represent de-identified event-level data. If an individual sought care in a Michigan ED multiple times during the study period, he or she would be represented in this data multiple times during the study period. The following hospitals did not submit data to the MIDB in 2020: Pontiac General Hospital, Sheridan Community Hospital. The following hospitals did not submit data to the MODB in 2020: University of Michigan Health System, C.S. Mott Children's Hospital, Sheridan Community Hospital.