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Depression and Suicidal Thoughts and Behaviors Among Adolescents Aged 12 to 17 in the Rural and Urban U.S., 2021

KEY FINDINGS

- Nationally, in 2021, there was no difference in the percentage of rural vs. urban adolescents aged 12 to 17 years who reported having experienced a major depressive episode (MDE) in the past year.
- The percentage of adolescents aged 12 to 17 years who reported having an MDE in their lifetime varied significantly across rural-urban subcategories of geography ($p<.05$) with the highest percentage in the rural areas with larger populations (31.9%) and the lowest percentage in less populated rural areas (23.8%).
- A significantly higher percentage of adolescents aged 12 to 17 years in rural compared to urban counties reported that they had serious suicidal ideation in the past year (18.2% vs. 14.8% with serious thoughts of suicide; 8.4% vs. 6.3% with plans of suicide; $p<.05$). Note the specific questionnaire language regarding suicide is reported in Table 1A of the Appendix.
- Nationally, the highest percentage of adolescents who reported serious suicidal ideation (23.1%), planned suicide (11.4%), or attempted suicide (7.0%) in the past year, were from rural counties with larger populations compared to urban counties and more rural counties.
- The percentage of adolescents reporting an MDE (in their lifetime or the past year) varied significantly across Census Divisions, with the highest percentages in the West North Central and Mountain Census Divisions.
- The percentage of adolescents who reported that they had serious suicidal ideation or made suicide plans in the past year varied significantly across Census Divisions. The percentage of adolescents reporting serious thoughts of suicide ranged widely from 9.1% in the New England Census Division to 21.8% in the West North Central Census Division.

BACKGROUND

This study characterizes the prevalence of behavioral health conditions among adolescents in rural and urban counties across the United States (U.S.). Specifically, we report on the percentage of adolescents aged 12 to 17 reporting a major depressive episode (MDE) or suicidal thoughts and behavior in 2021. Some cells of data are suppressed due to small sample sizes, this is discussed further in the limitations section.

METHODS

We used data from the 2021 National Survey on Drug Use and Health (NSDUH), administered annually by the Substance Abuse and Mental Health Services Administration (SAMHSA). The NSDUH measures used, their definitions, and detailed methodology are available in the Appendix. Briefly, we identified adolescents aged 12 to 17 years who reported symptoms consistent with an MDE in the past year or in their lifetime. We also identified adolescents who reported whether they had seriously thought about, made plans for, or attempted suicide in the past year. We categorized respondents into geographic categories based on the 2013 U.S. Department of Agriculture Economic Research Service Rural-Urban Continuum Code (RUCC) county typology. We classified urban counties as those with RUCC 1-3: large metro (RUCC 1-2) and small metro (RUCC 3). Rural counties were those with RUCC codes 4 and higher (urbanized rural, RUCC 4-5; less urbanized rural, RUCC 6-7; and completely rural, RUCC 8-9). We calculated weighted frequencies for urban (metro) and rural (nonmetro) counties overall and the five geographic categories defined by RUCCs and for Census Divisions. We conducted statistical tests (chi-squared tests) comparing distributions across these groups.

RESULTS

Lifetime Major Depressive Episode

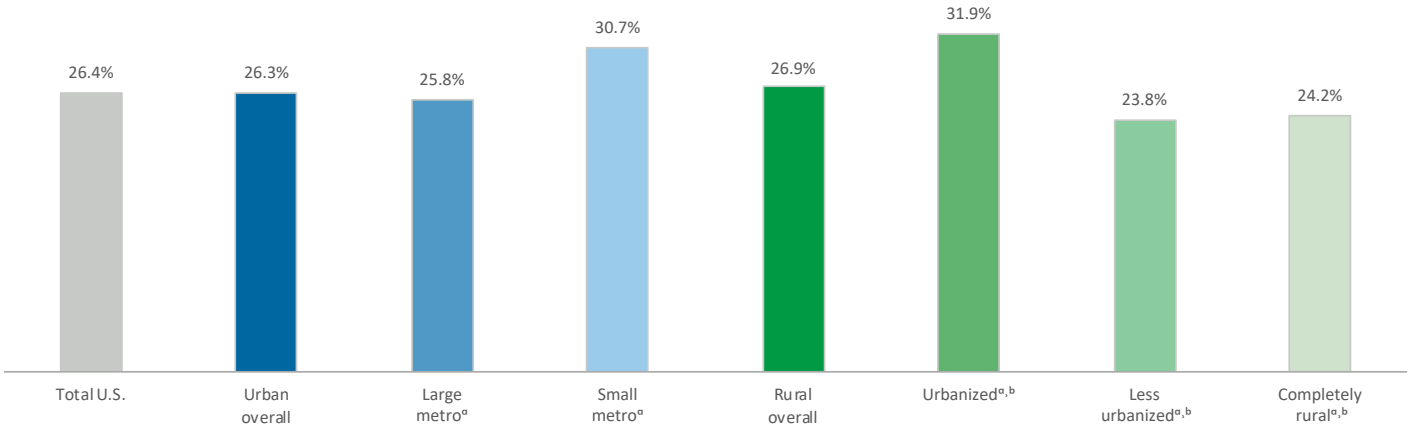
Slightly over one-quarter (26.4%) of adolescents aged 12 to 17 (6.6 million) met the criteria for having experienced an MDE in their lifetime, with similar findings across urban (26.3%) and rural (26.9%) counties. Overall, as shown in Figure 1, rates varied significantly across the five RUCC subcategories of geography ($p<.05$), with the highest percentage of adolescents in small metro (30.7%) and urbanized rural (31.9%) counties reporting having had an MDE in their lifetime and the lowest percentages in less urbanized (23.8%) and completely rural counties (24.2%). Within rural geographies, the percentage of adolescents who had an MDE in their lifetime was significantly different for all pairwise comparisons ($p<.01$) except between less urbanized and completely rural counties ($p=.84$). Across Census Divisions, the overall percentage of adolescents with an MDE in their lifetime varied significantly ($p<.05$) and ranged from 22.6% (New England) to 32.4% (West North Central) (Table 1). Within Census Divisions, there was no difference between urban and rural counties in the percentage of adolescents who had an MDE in their lifetime.

Table 1. Percentage of Adolescents Aged 12 to 17 in Rural and Urban Counties With a Major Depressive Episode (MDE) in Their Lifetime or in the Past Year, by United States Census Division, 2021

	Lifetime MDE (%)			Past-Year MDE (%)		
	Overall[a]	Urban[a]	Rural	Overall[a]	Urban[a]	Rural
National	26.4	26.3	26.9	20.1	20.0	20.8
New England	22.6	22.2	26.1	18.1	17.9	19.6
Middle Atlantic	24.8	24.5	30.0	20.5	20.0	29.2
East North Central	25.8	25.0	29.4	20.7	19.8	24.6
West North Central	32.4	32.9	31.1	24.7	24.6	24.9
East South Central	25.2	27.1	22.0	18.2	18.5	13.7
South Atlantic	25.1	24.5	28.4	18.8	20.9	21.1
West South Central	24.1	24.3	23.3	16.1	15.9	17.3
Mountain	32.0	33.3	26.5	24.9	25.9	20.4
Pacific	27.8	27.9	23.9	21.3	21.2	21.9

Data source: National Survey on Drug Use and Health (NSDUH), 2021. Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2, and Census Divisions and corresponding states are described in Appendix Table A3.
a. Significant difference across Census Divisions (chi-squared test $p<.05$).

Figure 1. Percentage of Adolescents Aged 12 to 17 in Rural and Urban Counties With a Lifetime Major Depressive Episode (MDE), United States, 2021



Data source: National Survey on Drug Use and Health (NSDUH), 2021. Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2.

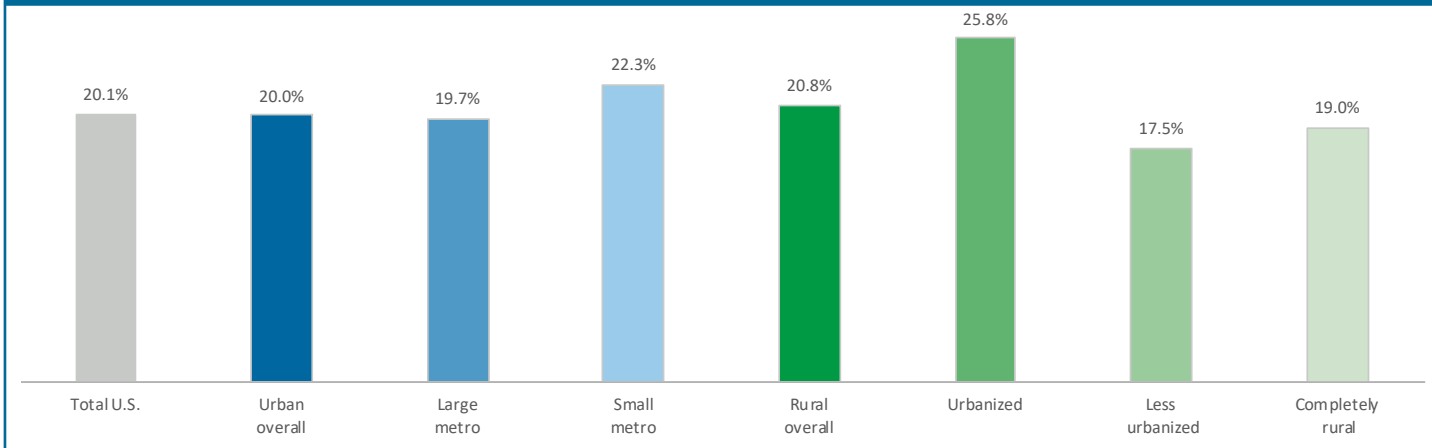
a. Significant difference across the five rural-urban subcategories (chi-squared test p<.05).

b. Significant difference between urbanized counties and both less urbanized and completely rural counties (chi-squared test at p<.001).

Major Depressive Episode in the Past Year

Approximately one-fifth (20.1%) of adolescents aged 12 to 17 years met the criteria for experiencing an MDE in the past year, equating to 5.0 million adolescents. There were roughly equal percentages among adolescents in urban (20.0%) and rural (20.8%) counties (Figure 2). No significant differences were observed across the five RUCC subcategories of geography. Across Census Divisions, significant variation was reported overall (p<.05), with the percentage of adolescents who had an MDE in the past year ranging from 16.1% (West South Central) to 24.9% (Mountain) (Table 1). We observed no significant variation between rural and urban counties within Census Divisions.

Figure 2. Percentage of Adolescents Aged 12 to 17 in Rural and Urban Counties With a Major Depressive Episode (MDE) in the Past Year, United States, 2021



Data source: National Survey on Drug Use and Health (NSDUH), 2021. Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2.

Serious Thoughts of Suicide in the Past Year

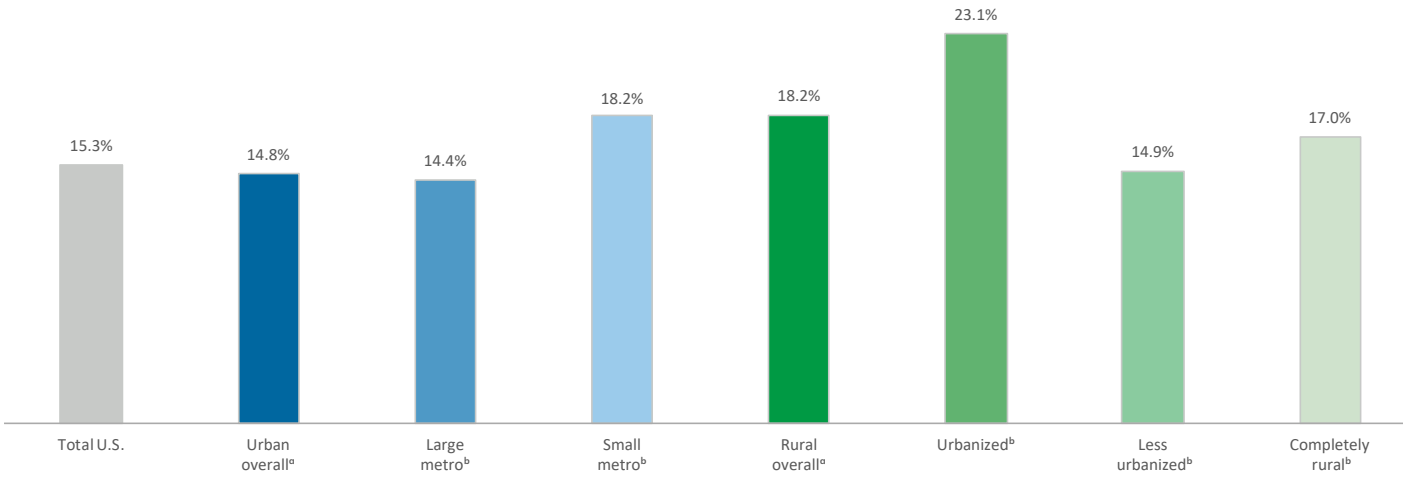
Table 2 shows the percentage of adolescents who reported having serious suicidal thoughts in the past year. A total of 15.3% of adolescents aged 12 to 17 years (3.3 million) reported having serious suicidal thoughts in the past year. More adolescents from rural counties reported serious thoughts of suicide (18.2%) compared with adolescents from urban counties (14.8%, $p<.05$). Figure 3 shows the significant differences across rural geographies ($p<.01$). Nearly one-quarter (23.1%) of adolescents in urbanized rural areas reported having serious suicidal thoughts in the past year, significantly higher than all other geographies. There was also significant variation across Census Divisions ($p<.01$), with percentages ranging from 9.1% in New England to 21.8% in West North Central (Table 2). The lowest percentage was observed in urban New England (8.6%) and the highest in the rural Pacific Census Division (24.6%). The East South Central Census Division had lower percentages in rural (13.8%) compared to urban (20.5%) counties ($p<.05$). In comparison, the West South Central (21.5% vs. 12.1%, $p<.05$) and Pacific (24.6% vs. 15.3%, $p<.01$) Census Divisions had higher percentages in rural compared to urban counties (Table 2).

Table 2. Percentage of Adolescents Aged 12 to 17 Who Had Serious Thoughts of Suicide in the Past Year, by Census Division in Rural and Urban Counties, United States, 2021

	Lifetime MDE (%)		
	Overall[a]	Urban[a]	Rural
National[a]	15.3	14.8	18.2
New England	9.1	8.6	13.6
Middle Atlantic	13.4	12.7	[c]
East North Central	17.8	17.3	20.6
West North Central	21.8	23.0	19.0
East South Central[b]	17.8[a]	20.5	13.8
South Atlantic	13.1	12.6	15.6
West South Central[b]	13.5[a]	12.1	21.5
Mountain	17.7	18.0	16.6
Pacific[b]	15.6[a]	15.3	24.6

Data source: National Survey on Drug Use and Health (NSDUH), 2021.
Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2, and Census Divisions and corresponding states are described in Appendix Table A3.
a. Significant difference across Census Divisions (chi-squared test $p<.05$).
b. Significant difference between urban and rural counties (nationally or within the indicated Census Division; chi-squared test $p<.05$).
c. Data suppressed due to limited sample size.

Figure 3. Percentage of Adolescents Aged 12 to 17 in Rural and Urban Counties With Serious Thoughts of Suicide in the Past Year, United States, 2021



Data source: National Survey on Drug Use and Health (NSDUH), 2021. Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2.

a. Significant difference between urban and rural counties overall (chi-squared test p<.05).

b. Significant difference across the five rural-urban subcategories (chi-squared test p<.05).

Plans for Suicide in the Past Year

Table 3 shows the percentage of adolescents who reported having made any suicidal plans in the past year. Nationally, 6.6% of adolescents aged 12 to 17 years made plans for suicide in the past year, with significantly higher rates in rural (8.4%) than in urban (6.3%) counties (p<.05). Rates varied significantly across rural geographies (p<.001) (Figure 4). Within the West North Central Census Division, the percentage of adolescents who made plans for suicide varied significantly between urban and rural counties, with a larger percentage in urban than rural counties (11.8% vs. 4.6%, p<.001). In contrast, a smaller percentage of adolescents from urban counties in the West South Central Census Division reported having made plans for suicide (5.5%) compared to rural counties (14.9%, p<.01).

Table 3. Percentage of Adolescents Aged 12 to 17 Who Made Plans for Suicide in the Past Year, by Census Division in Rural and Urban Counties, United States, 2021

	Lifetime MDE (%)		
	Overall[a]	Urban[a]	Rural
National	6.6	6.3	8.4
New England	3.2	3.0	5.2
Middle Atlantic	5.2	5.2	[c]
East North Central	7.6	7.1	10.3
West North Central[b]	9.7	11.8	4.6
East South Central	8.6	9.4	7.3
South Atlantic	5.4	5.3	6.0
West South Central[b]	6.8	5.5	14.9
Mountain	7.8	7.2	10.4
Pacific	6.2	6.1	[c]

Data source: National Survey on Drug Use and Health (NSDUH), 2021.

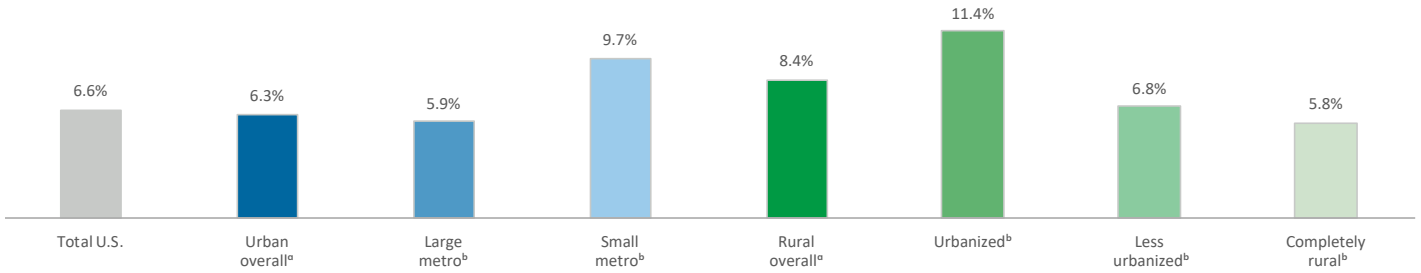
Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2, and Census Divisions and corresponding states are described in Appendix Table A3.

a. Significant difference across Census Divisions overall (chi-squared test p<.05).

b. Significant difference between urban and rural counties (within the indicated Census Division; chi-squared test p<.05).

c. Data suppressed due to limited sample size.

Figure 4. Percentage of Adolescents Aged 12 to 17 in Rural and Urban Counties Who Made Plans for Suicide in the Past Year, United States, 2021



Data source: National Survey on Drug Use and Health (NSDUH), 2021. Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2.

a. Significant difference between urban and rural counties overall (chi-squared test p<.05).

b. Significant difference across the five rural-urban subcategories (chi-squared test p<.05).

Suicide Attempt in the Past Year

Table 4 and Figure 5 show the percentage of adolescents aged 12 to 17 years who reported having attempted suicide in the past year. Nationally, 3.7% reported that they had attempted suicide in the past year. The percentage was slightly but not significantly higher in rural (4.9%) compared to urban counties (3.6%); however, it did vary significantly across subcategories of geography (p<.001): a higher percentage of adolescents in small metro counties reported a suicide attempt in the past year than those in large metro counties (6.6% vs. 3.2%, p<.01). The percentage in urbanized rural counties (7.0%) was two times higher than in large metro counties (3.2%, p<.001) and in less urbanized counties (3.7%, p<.01). Data for completely rural counties was unavailable due to small sample sizes. Across Census Divisions, the percentage of adolescents who attempted suicide in the past year ranged from 2.3% (New England) to 5.0% (West North Central). Within the West North Central Census Division, three times as many adolescents from urban counties (6.2%) reported attempting suicide in the past year than their peers from rural counties (2.1%) (p<.001).

Table 4. Percentage of Adolescents Aged 12 to 17 Who Attempted Suicide in the Past Year, by Census Division in Rural and Urban Counties, United States, 2021

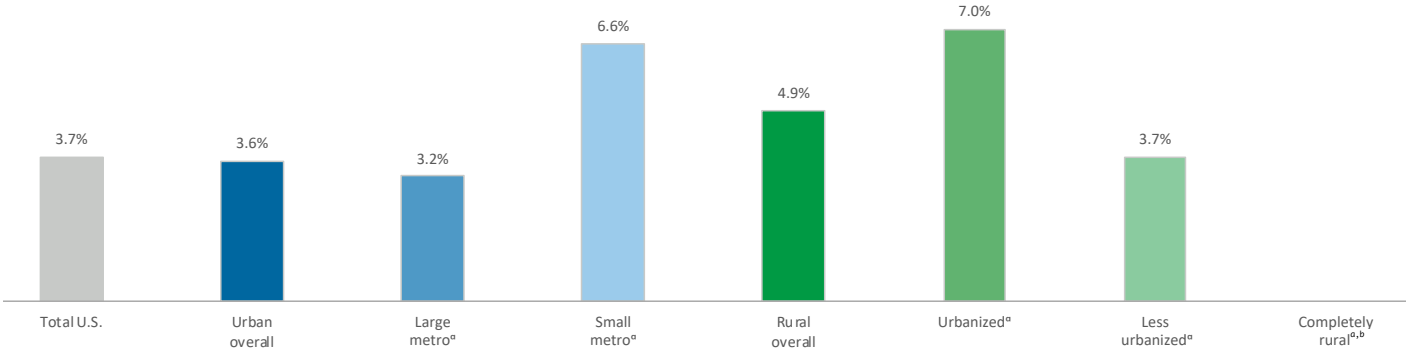
	Past-Year Suicide Attempt (%)		
	Overall[a]	Urban[a]	Rural
National	3.7	3.6	4.9
New England	2.3	2.1	[b]
Middle Atlantic	2.4	2.5	[b]
East North Central	4.4	4.2	5.4
West North Central[a]	5.0	6.2	2.1
East South Central	4.2	3.6	5.1
South Atlantic	3.8	3.8	4.4
West South Central	3.9	3.2	[b]
Mountain	4.6	4.6	4.6
Pacific	3.1	3.0	[b]

Data source: National Survey on Drug Use and Health (NSDUH), 2021.
Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2, and Census Divisions and corresponding states are described in Appendix Table A3.

a. Significant difference between urban and rural counties within the indicated Census Division (chi-squared test p<.05).

b. Data suppressed due to limited sample size.

Figure 5. Percentage of Adolescents Aged 12 to 17 in Rural and Urban Counties Who Attempted Suicide in the Past Year, United States, 2021



Data source: National Survey on Drug Use and Health (NSDUH), 2021. Rural-Urban Continuum Codes (RUCCs, 2013) used to determine geographic categories are described in Appendix Table A2. Data for completely rural counties was suppressed due to small sample sizes.
a. Significant difference across the five rural-urban subcategories (chi-squared test $p<.05$).
b. Data suppressed due to limited sample size.

LIMITATIONS

To ensure respondent privacy, data from the NSDUH are suppressed when an individual unweighted cell count is less than 11. This policy disproportionately affects rural places and severely limits what can be reported about behavioral health conditions in rural places from this national data source. Data on behavioral health conditions was suppressed in some rural places at the Census Division level. This inhibits the ability to provide granular data or make comparisons that can inform policymakers seeking to target specific states or regions of the country. Addressing this data limitation will require larger survey sample sizes and oversampling rural populations. Specifically, the Pacific Census Division had among the highest percentage of adolescents reporting having serious thoughts of suicide in the past year, with significant differences between urban and rural counties, yet data for this Division, along with the Middle Atlantic Census Division, was redacted for both plans of suicide and past year suicide attempts.

The NSDUH data rely on self-reporting, and adolescents may not accurately recall or may choose not to report mental health services received in the past year. This differential reporting may vary geographically due to factors such as stigma, potentially affecting the validity of rural-urban comparisons. NSDUH's efforts to mitigate these concerns include the use of audio computer-assisted self-interviewing, which allows adolescents to respond privately without direct interviewer involvement.

DISCUSSION

This study's findings expand our understanding of the percentage of adolescents in rural and urban U.S. counties who had an MDE (in the past year or lifetime) or who seriously thought about, made plans for, or attempted suicide in the past year. The percentage of adolescents reporting having had an MDE in their lifetime varies across rurality, with higher rates in urbanized rural counties and small metro urban counties. Similarly, we observed significant differences in the percentage of adolescents reporting having had an MDE in their lifetime or the past year across Census Divisions in both rural and urban counties. Nearly one in three adolescents in rural counties in the Middle Atlantic and West North Central Census Divisions reported having an MDE in their lifetime; the percentage with an MDE in the past year was also highest in these rural counties. Significant rural-urban variation also exists in the percentage of adolescents who had serious thoughts of suicide, made suicide plans, and attempted suicide.

Although a higher percentage of adolescents in rural counties reported serious suicidal thoughts, plans, and attempts, there are pockets of higher percentages in urban counties in some Census Divisions, most notably, West North Central. The geographic variation observed in the percentage of adolescents with an MDE or serious thoughts of suicide, suicide plans, or suicide attempts may have important implications for policy and program development.

CONCLUSION AND POLICY CONSIDERATIONS

Given the rural-urban and regional variation in the percentage of adolescents with an MDE in the past year or in their lifetime, as well as the percentage with serious thoughts of suicide, suicide plans, or suicide attempts, a one-size-fits-all approach to addressing these concerns may not be effective or practical in the face of the complex relationship between health and place. Instead, the development of flexible, customizable programs that can be adapted to meet the unique needs of different communities may be prudent. Understanding the geographic variation in behavioral health conditions among adolescents may allow for a more efficient and effective allocation of resources needed to provide support and services for this population.

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APPENDIX

Detailed Methodology

We used 2021 data from the National Survey on Drug Use and Health (NSDUH), which is administered annually by the Substance Abuse and Mental Health Services Administration (SAMHSA). The 2021 NSDUH surveyed 13,270 adolescents aged 12 to 17 years to generate prevalence estimates for 25.5 million U.S. adolescents.[6]

Table A1. 2021 National Survey on Drug Use and Health (NSDUH)[6] Measures

Measure	Description
Major Depressive Episode (MDE)	Individuals were classified as having had a *lifetime* major depressive episode (MDE) if they reported at least five or more of the following nine symptoms nearly every day (except where noted) in the same 2-week period in their lifetime, in which at least one of the symptoms was a depressed mood or loss of interest or pleasure in daily activities: (1) depressed mood most of the day; (2) markedly diminished interest or pleasure in all or almost all activities most of the day; (3) significant weight loss when not dieting or weight gain or decrease or increase in appetite; (4) insomnia or hypersomnia; (5) psychomotor agitation or retardation; (6) fatigue or loss of energy; (7) feelings of worthlessness; (8) diminished ability to think or concentrate or indecisiveness; and (9) recurrent thoughts of death or recurrent suicide ideation. Unlike the other symptoms listed previously, recurrent thoughts of death or suicidal ideation did not need to have occurred nearly every day. This definition is based on the definition found in the *Diagnostic and Statistical Manual of Mental Disorders,* 5th edition (DSM-5).7 Individuals were classified as having an MDE *in the past year* if they (a) had a lifetime MDE, (b) had a period of time in the past 12 months when they felt depressed or lost interest or pleasure in daily activities for 2 weeks or longer, and (c) reported during this period of 2 weeks or longer in the past 12 months they had "some of the other problems" they reported for a lifetime MDE. Consistent with the DSM-5 criteria, NSDUH does not exclude MDEs that occurred exclusively in the context of bereavement.
Suicidal Thoughts and Behavior	Adolescents aged 12 to 17 were asked if they seriously thought about trying to kill themselves, if they made plans to kill themselves, or if they had tried to kill themselves in the past 12 months. All respondents aged 12 to 17 were asked if they made plans or tried to kill themselves regardless of whether they reported having seriously thought about trying to kill themselves. We use modified language throughout this brief to reflect suicidal ideation, attempted suicide, and suicide plans.

We categorized respondents into one of five (two urban and three rural) geographic categories based on the 2013 Rural-Urban Continuum Code (RUCC) county typology.[8] The RUCCs distinguish metropolitan counties by the population size of their metro area and nonmetropolitan counties by the degree of urbanization and adjacency to a metro area (Table A2). We classified urban counties as those with RUCC 1-3: large metro (RUCC 1-2) and small metro (RUCC 3). Rural counties were those with RUCC codes 4 and higher (urbanized rural, RUCC 4-5; less urbanized rural, RUCC 6-7; and completely rural, RUCC 8-9). The study population included the U.S. civilian, noninstitutionalized population aged 12 to 17 years old in 2021.

Table A2. Rural-Urban Classification and Sub-Grouping Based on 2013 Rural-Urban Continuum Code (RUCC) County Typology

Rural vs. Urban	Geographic Category	RUCC	Description
Urban	Large metro	1	Counties in metro areas of 1 million population or more
		2	Counties in metro areas of 250,000 to less than 1 million population
	Small metro	3	Counties in metro areas of fewer than 250,000 population
Rural	Urbanized rural	4	Population of 20,000 or more, adjacent to a metro area
		5	Population of 20,000 or more, not adjacent to a metro area
	Less urbanized rural	6	Population of 2,500 to 19,999, adjacent to a metro area
		7	Population of 2,500 to 19,999, not adjacent to a metro area
	Completely rural	8	Less than 2,500 population, adjacent to a metro area
		9	Less than 2,500 urban population, not adjacent to a metro area

We calculated weighted frequencies for urban (metro) and rural (nonmetro) counties overall, as well as for the five geographic categories described above and for Census Divisions (Table A3). All analyses followed SAMHSA's policy for data suppression, wherein the underlying (unweighted) sample size for any table cell must be greater than 10; table cells that did not meet this requirement were suppressed and are indicated as such in this report. We conducted chi-squared tests at the Northwest Research Data Center using SAS version 9.4 statistical software. SAMHSA reviewed and approved all output tables, and the University of Washington Human Subjects Division approved this research.

Table A3. U.S. Census Divisions and Corresponding States

Census Division	State
New England	CT, ME, MA, NH, RI, VT
Middle Atlantic	NJ, NY, PA
East North Central	IL, IN, MI, OH, WI
West North Central	IA, KS, MN, MO, NE, ND, SD
East South Central	AL, KY, MS, TN
South Atlantic	DE, DC, FL, GA, MD, NC, SC, VA, WV
West South Central	AR, LA, OK, TX
Mountain	AZ, CO, ID, MT, NV, NM, UT, WY
Pacific	AK, CA, HI, OR, WA