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## County-Level Opioid Prescribing in the United States, 2015 and 2017

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In the United States in 2016, prescription opioids accounted for 40% of the 42 249 opioid-related overdose deaths.<sup>1</sup> Although the number of opioid prescriptions has been declining over the past several years, prescribing remains elevated relative to 1999 levels.<sup>2</sup> This study examines opioid prescribing at the national and county levels in 2015 and 2017.

### Methods |

Data come from IQVIA's Xponent database, which contains prescriptions dispensed from approximately 50 400 retail pharmacies, representing 90% of prescriptions in the United States. Opioid prescribing at the national and county levels were analyzed for 2015 and 2017. Measures included overall opioid prescribing rates, high-dose prescribing rates, morphine milligram equivalent (MME) per capita, average daily MME per prescription, and

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**Author Contributions:** Dr Guy had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

*Study concept and design:* Guy, Zhang, Schieber.

*Acquisition, analysis, or interpretation of data:* Guy, Schieber, Young, Dowell.

*Drafting of the manuscript:* Guy, Young.

*Critical revision of the manuscript for important intellectual content:* Zhang, Schieber, Dowell.

*Statistical analysis:* Guy, Zhang, Schieber.

*Administrative, technical, or material support:* Guy, Young.

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average and median prescription duration. The MME was calculated using published ratios.<sup>3</sup> To compute MME per capita, total MME was divided by population estimates. Prescribing rates were calculated per 100 persons. Annual population estimates were obtained from the US Census Bureau and included individuals of all ages. High-dose prescriptions were defined as those resulting in 90 or more MME per day. Cough and cold formulations containing opioids and buprenorphine products typically used for opioid-use disorder were excluded. County-level opioid prescribing was examined by quartile. All analyses were performed in Stata, version 14.2 (StataCorp). The Centers for Disease Control and Prevention determined this study to be exempt from human-subject regulations and institutional review board approval.

## Results |

From 2015 to 2017, the amount of opioids prescribed in the United States decreased 20.1%, from 641.4 to 512.6 MME per capita; opioid prescribing rates decreased 16.9%, from 70.7 to 58.7 per 100 persons; high-dose prescribing rates decreased 25.3%, from 6.7 to 5.0 per 100 persons; and the average daily MME per prescription decreased 6.0%, from 48.1 to 45.2 MME (Table). Meanwhile, average and median duration of opioid prescriptions increased by 3.4% (17.7 to 18.3 days) and 33.3% (15.0 to 20.0 days), respectively.

In 2017, the amount of opioids prescribed per capita varied substantially at the county level (Figure and Supplement). The average amount of opioids prescribed in the highest quartile (1061.0 MME per capita) was 5.8 times the amount in the lowest quartile (182.8 MME per capita) (Table). Substantial variation between the highest and lowest prescribing counties was also observed for overall prescribing rates (4.6 times higher) and high-dose prescribing rates (7.1 times higher). From 2015 to 2017, the majority of counties experienced a reduction in the amount of opioids prescribed (2204 [74.7%]), overall prescribing rates (2251 [76.3%]), and high-dose prescribing rates (2259 [76.6%]).

## Discussion |

The reduction in opioid prescribing that began in 2012 has accelerated in the United States. The amount of opioids prescribed decreased an average of 10.0% annually with reductions in 74.7% of counties from 2015 to 2017, compared with 3.6% annually with reductions in 49.6% of counties from 2010 to 2015.<sup>2</sup> However, opioids continued to be prescribed at 512.6 MME per capita in 2017, nearly triple the amount prescribed in 1999.<sup>2</sup>

The duration of opioid prescriptions continues to increase nationally, likely because of greater decreases in shorter-term opioid prescriptions (<30 days) than in longer-term prescriptions.<sup>2</sup> Average duration remained stable in 89.4% of counties from 2015 to 2017, in contrast with 2010 to 2015 in which 73.5% of counties experienced an increase.<sup>2</sup>

Recent reductions could be related to policies and strategies aimed at reducing inappropriate prescribing, increased awareness of the risks associated with opioids, and release of the *CDC Guideline for Prescribing Opioids for Chronic Pain—United States, 2016*.<sup>4-6</sup> Despite reductions in prescribing, opioid overdose rates continue to increase and are driven largely by illicitly manufactured fentanyl.<sup>1</sup> The opioid overdose epidemic is a complex crisis

requiring coordination across multiple sectors, including public health, health care, and public safety.

Limitations of this study include the inability to determine the appropriateness of opioid prescriptions, lack of data on prescriptions dispensed outside of retail pharmacies (ie, mail-order, prescriber-dispensed, and hospital- or clinic-based pharmacies), and the reliance on where the prescription was dispensed, rather than where it was prescribed or used. Nonetheless, this study provides national- and county-level information on opioid prescribing to help inform efforts in improving opioid prescribing in the United States.

## Supplementary Material

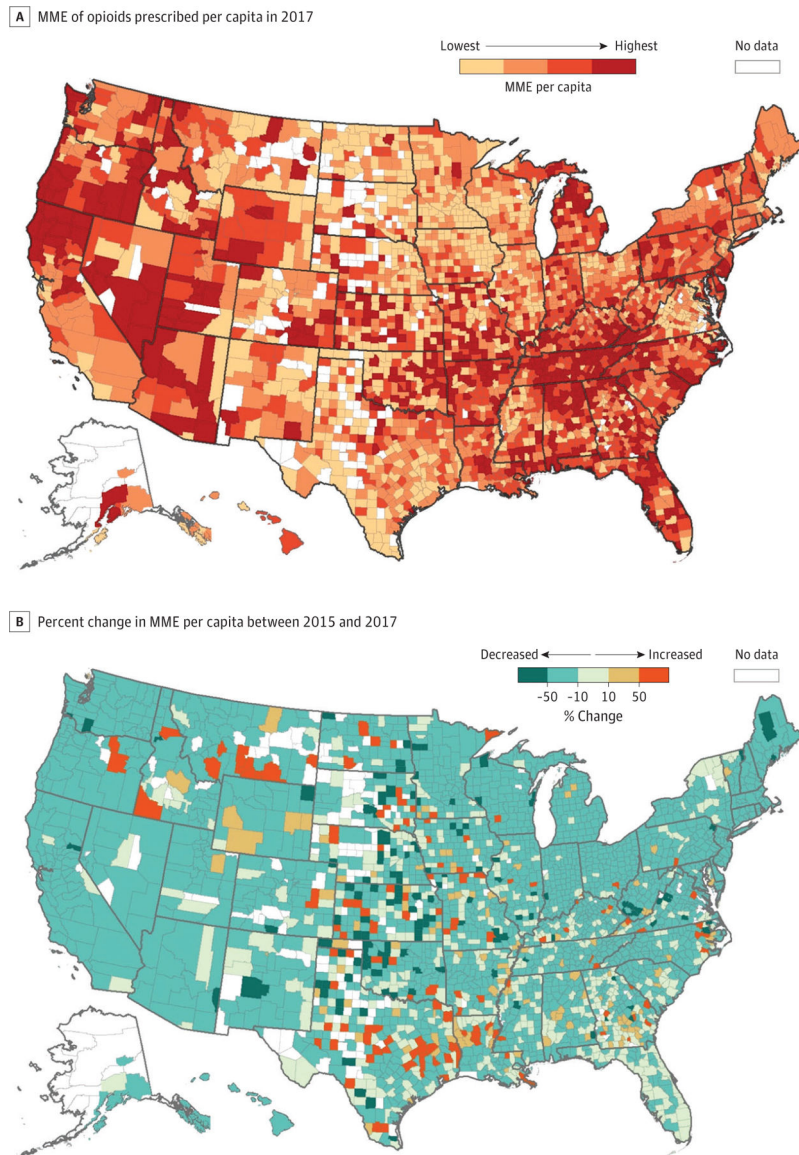
Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

**Disclaimer:** The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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**Figure.** Opioid Prescribing in the United States by County in 2015 and 2017. Although the amount of morphine milligram equivalent (MME) of opioids prescribed per capita varied substantially at the county level in 2017 (A), the amount of opioids prescribed in the United States between 2015 and 2017 decreased overall (B). Image created and published with permission by Randall Young, MA, of the Centers for Disease Control and Prevention.

## National- and County-Level Opioid Prescribing in the United States, 2015 and 2017

Table.

Prescribing Measure	National Level		County Level							
	2015	2017	Change, %	Lowest	Second	Third	Highest	Decrease	Stable	Increase
MME per capita	641.4	512.6	-20.1	182.8	437.3	641.1	1061.0	2204 (74.7)	498 (16.9)	247 (8.4)
Overall prescribing rate <sup>c</sup>	70.7	58.7	-16.9	25.1	55.1	76.0	115.8	2251 (76.3)	499 (16.9)	199 (6.8)
High-dose prescribing rate <sup>c,d</sup>	6.7	5.0	-25.3	1.5	3.9	6.0	10.6	2259 (76.6)	380 (12.9)	310 (10.5)
Average daily MME per prescription	48.1	45.2	-6.0	34.3	40.5	45.1	53.8	583 (19.8)	2235 (75.8)	131 (4.4)
Average duration of prescriptions, d	17.7	18.3	3.4	15.8	18.0	19.7	21.9	50 (1.7)	2636 (89.4)	263 (8.9)
Median duration of prescriptions, d	15.0	20.0	33.3	12.2	17.0	25.5	30.0	193 (6.5)	1634 (55.4)	1122 (38.1)

Abbreviation: MME, morphine milligram equivalent.

<sup>a</sup>Quartiles were created using MME per capita to characterize the distribution of opioids prescribed.

<sup>b</sup>Among the 2949 counties with available data in 2015 and 2017, changes of 10% were considered to represent an increase or decrease, whereas changes <10% were considered stable.

<sup>c</sup>Prescribing rates are presented per 100 persons.

<sup>d</sup>High-dose prescribing rate includes opioid prescriptions with daily dosage ≥ 90 MME.