

# Utilization of Post-Exposure Prophylaxis to Prevent Lyme Disease in a Large US Healthcare Database

Grace E. Marx, MD, MPH<sup>1</sup>; Candace C. Fuller<sup>2</sup>, PhD, MPH; Nicole Haug<sup>2</sup>, MPH; Dave Martin, BSc<sup>3</sup>; Catherine Corey, MSPH<sup>4</sup>; Alyssa Beck, MPH<sup>1</sup>; Amy Schwartz MPH<sup>1</sup>; Alison F. Hinckley, PhD<sup>1</sup>

<sup>1</sup>Centers for Disease Control and Prevention, Fort Collins, Colorado, USA <sup>2</sup>Harvard Medical School, Harvard Pilgrim Health Care Institute, Boston, MA, USA <sup>3</sup>StatLog Econometrics, Inc., Québec City, Québec, Canada <sup>4</sup>US Food and Drug Administration, Silver Spring, MD, USA

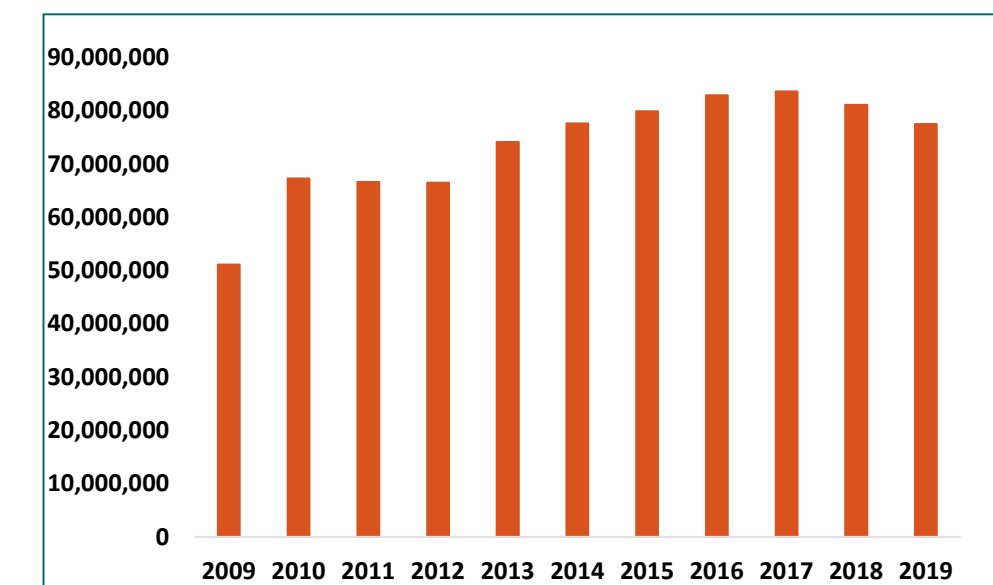
## BACKGROUND

- Lyme disease is the most common vector-borne disease in the US and is on the rise, with ~500,000 people diagnosed and treated annually.
- Ixodes* ticks, which transmit the bacteria that cause Lyme disease, bite humans most often in the late spring to mid-summer and fall.
- Most (>95%) reported Lyme disease cases occur in 15 high-incidence states in the Northeast, MidAtlantic, and Upper Midwest.
- Lyme disease incidence is highest among children aged 5 – 9 years and in older adults.
- Effective prevention methods for Lyme disease are limited and a vaccine is not currently available.
- Post-exposure prophylaxis (PEP) with a single dose of doxycycline can effectively prevent Lyme disease after a high-risk tick bite but patterns of PEP use have not been previously described.

## METHODS

- Single-dose doxycycline (≤200 mg) dispensings during January 2009 – December 2019 in the Food and Drug Administration Sentinel Distributed Database (SDD) were identified and described.
- The SDD is a distributed network of Data Partners that organize medical billing and electronic health record data in a common data model. This query included four national health insurance plans, a large integrated delivery system (CA), a state Medicaid plan (TN), and 100% Medicare Fee For Service.
- Patient and prescription characteristics were described using the first dispensing of single-dose doxycycline among eligible members.

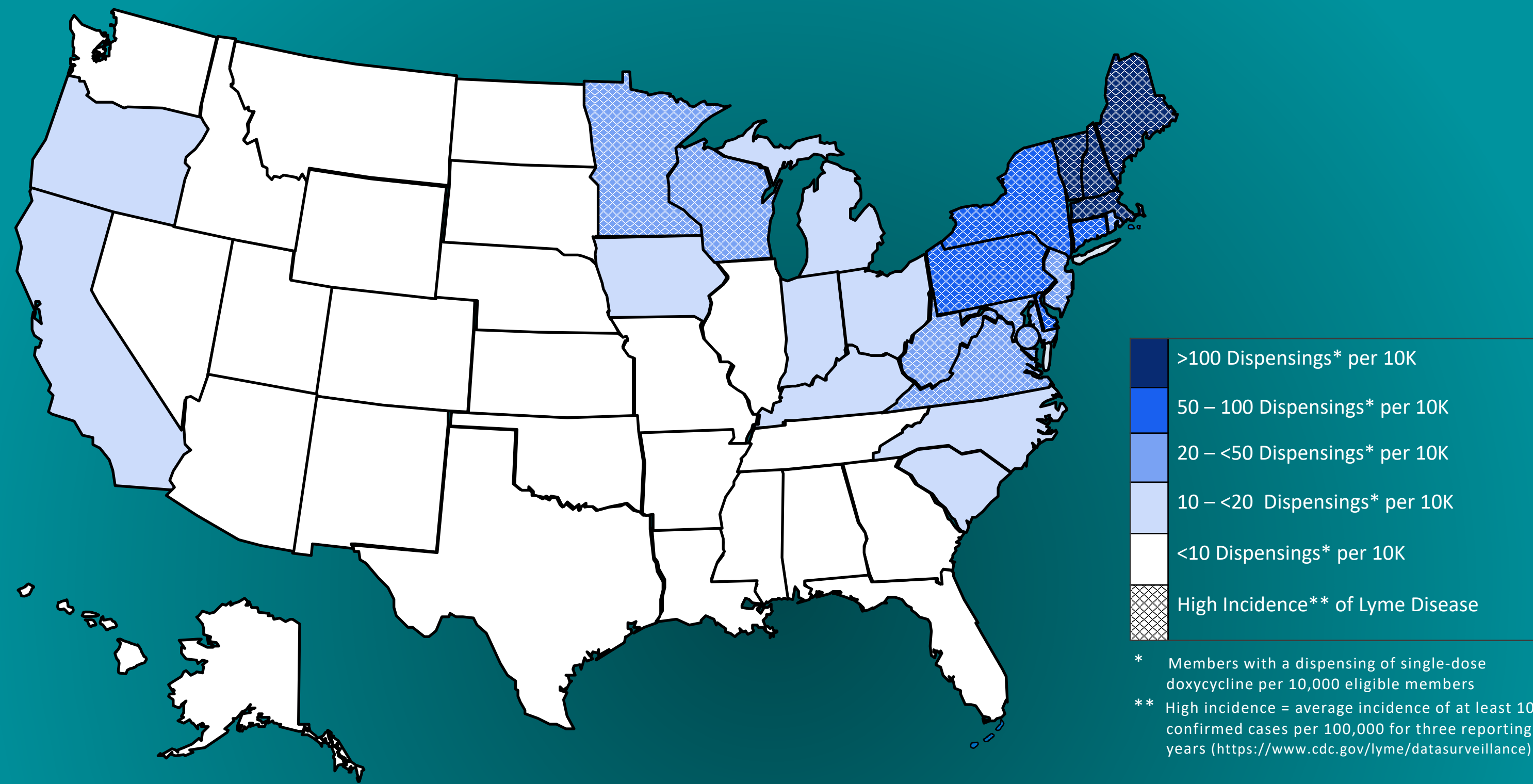
Member Enrollment in the Sentinel Distributed Database (By Year)



## RESULTS

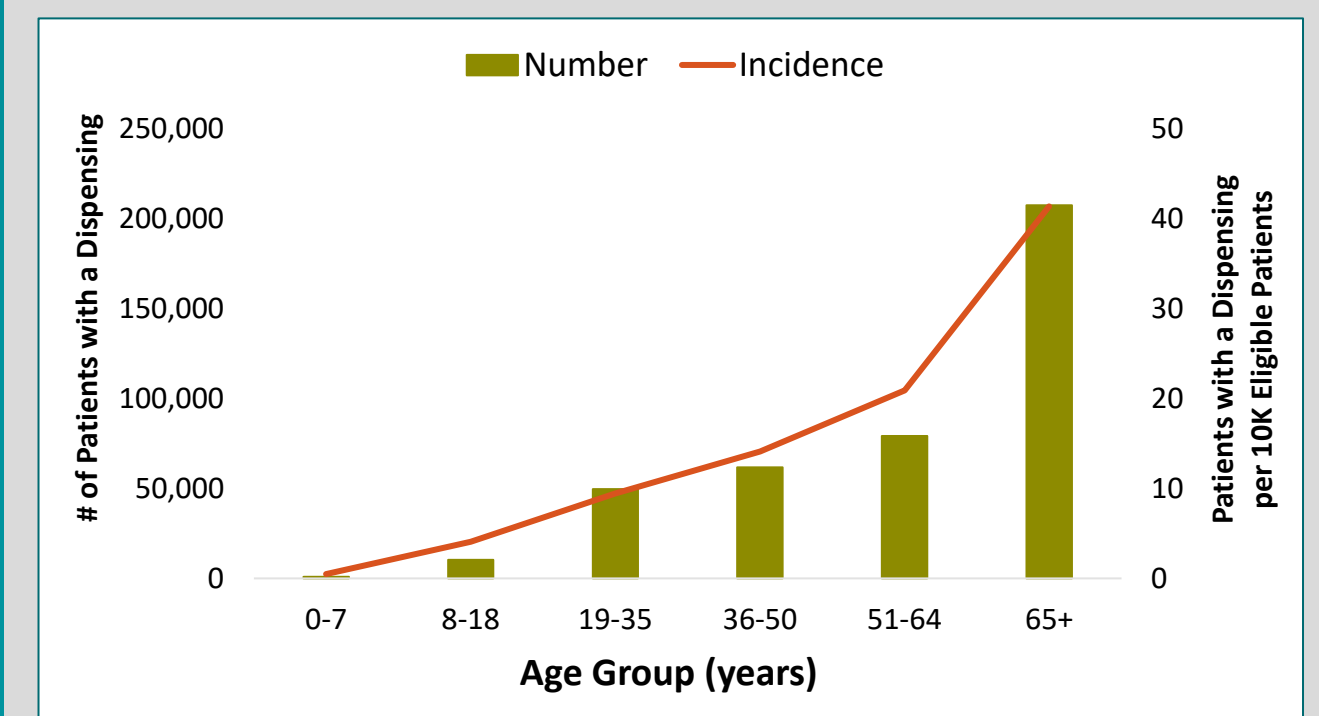
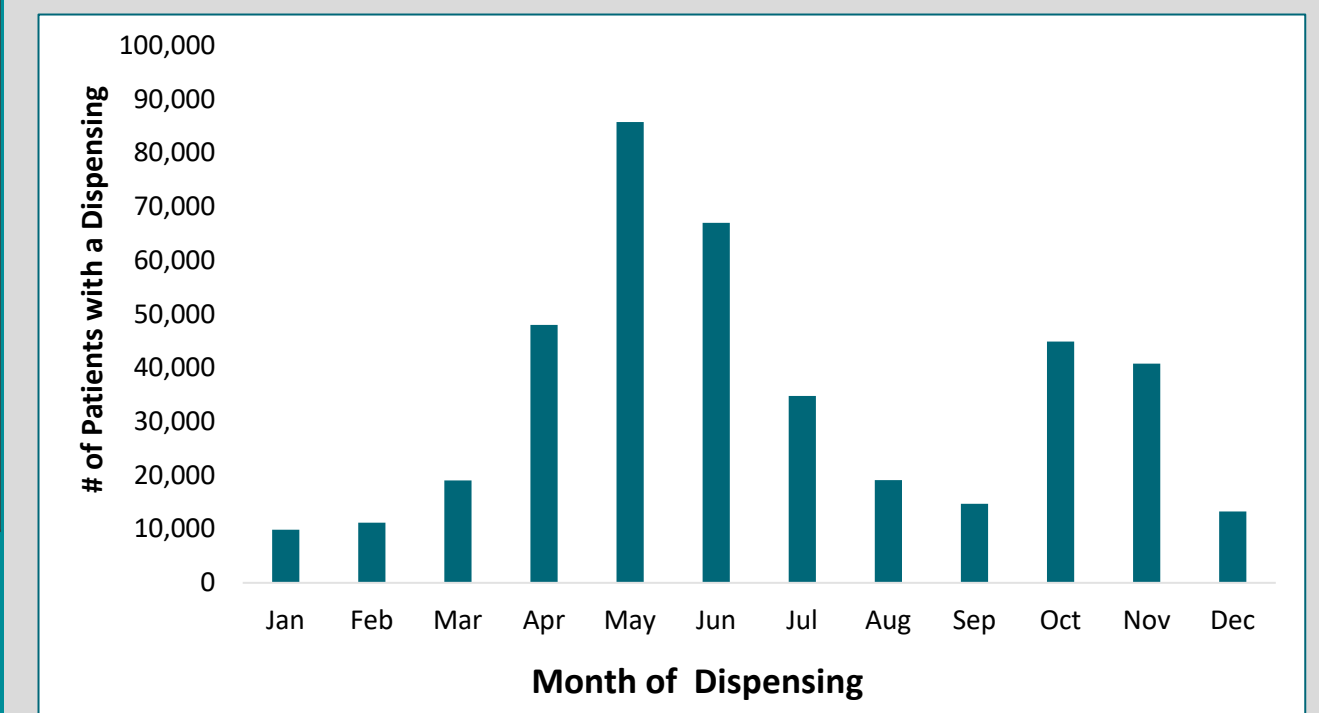
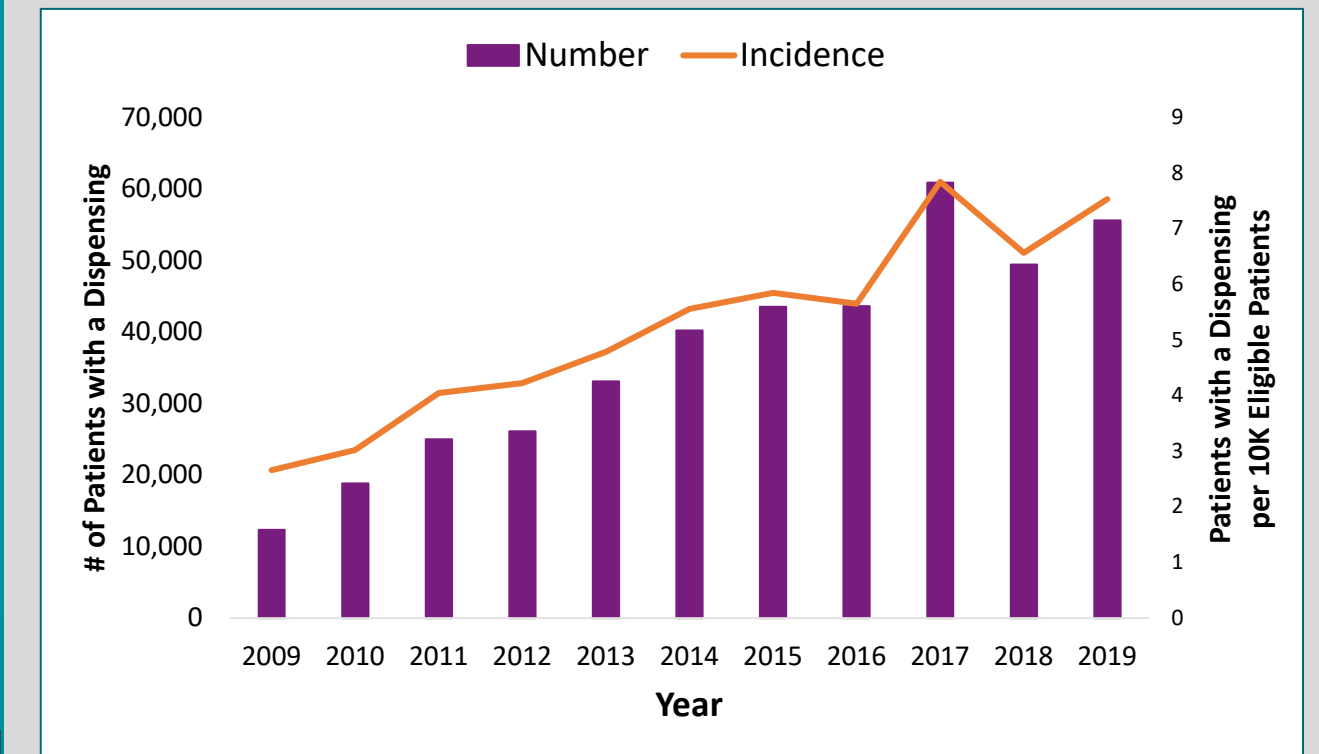
- 474,141 single-dose doxycycline dispensings made for 408,897 unique patients.
- PEP dispensings increased steadily over time, from 12,336 dispensings in 2009 to 55,594 in 2019.
- Patients receiving single-dose doxycycline were more often female (56%) and older (51% in adults aged ≥65 years vs 3% in children aged ≤18 years).
- Among patients with race/ethnicity information reported (49%), 96% were nonHispanic White.
- Dispensings occurred with bimodal seasonality, consistent with *Ixodes* tick host-seeking in the spring/summer and fall, when people are most likely to be bitten.
- Within 7 days of the PEP dispensing, 80% of patients had an ambulatory visit and 3.5% had an emergency department visit.
- Within 7 days of dispensing, 45% of patients had a billing diagnostic code for *arthropod encounter*.

## Dispensings of Single-Dose Doxycycline, by Lyme Disease Incidence



- Single-dose doxycycline dispensings closely mirror Lyme disease epidemiology and likely represent post-exposure prophylaxis.
- Lyme disease post-exposure prophylaxis may be under-prescribed for children, people of color, and men.
- Increasing patient awareness of and accessibility to single-dose doxycycline after a high-risk tick bite should be promoted to reduce the incidence of Lyme disease.

## Number and Incidence of Dispensings by Year (A), Month (B), and Patient Age Group (C)



**CONTACT INFO**  
 Grace E. Marx  
 GMarx@cdc.gov



Many thanks are due to the Data Partners who provided data used in the analyses.