



Nitrous Oxide in Michigan



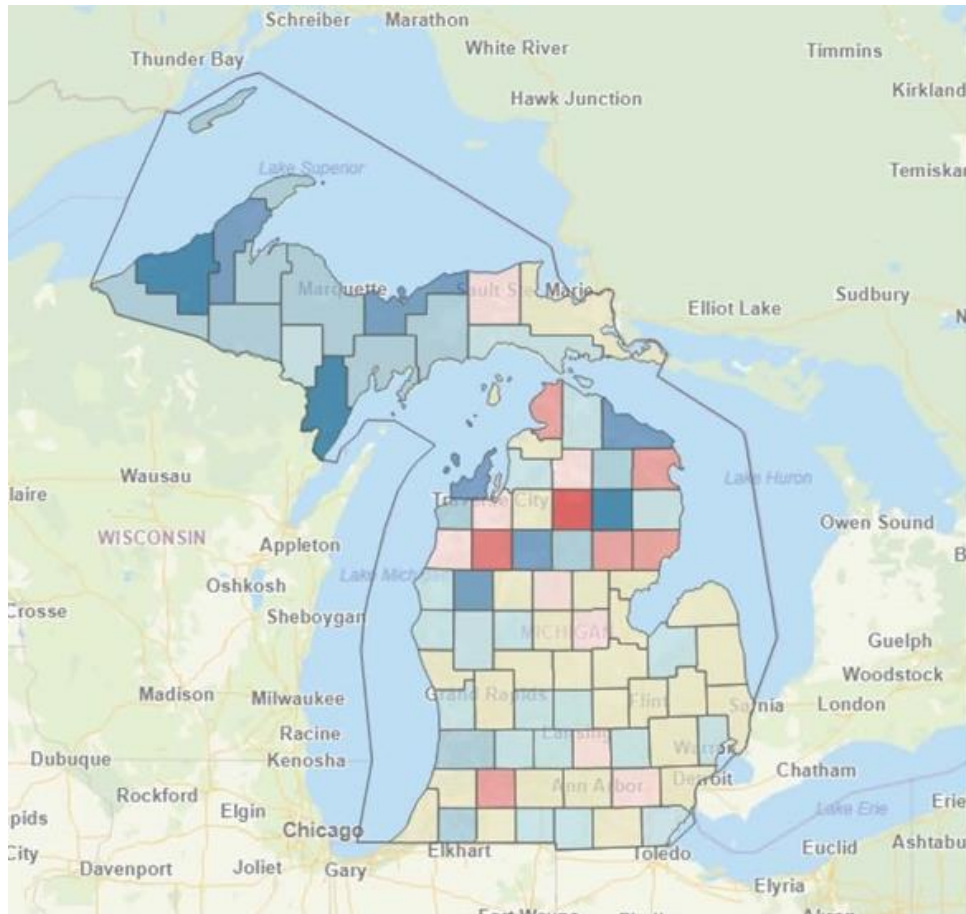
Michigan Poison & Drug Information Center

- Michigan's sole poison center; established 61 years ago
- Service area → state of Michigan, including UP
- Staffed 24/7/365, free-of-charge to public
- Clinical and Medical staff – all board-certified
 - **Clinical Director, Medical Director**
 - **7 Toxicologists (i.e. Clinical Consultants)**
 - **2 Fellows**
- Specialists in Poison Information
 - **Certifying Exam**
 - **RNs, PharmDs, MDs**
- **1 Educator**





MiPDC Caller Distribution by County



Rate per 1MM

County
Area layer

Rate



- Triage, diagnose, and treat exposures to chemicals, drugs, environmental toxins, gases, and envenomations.

- Educate

- The public (“poison proofing”)
- Professionals

Over 60,000 calls annually

Nitrous Oxide (N₂O)

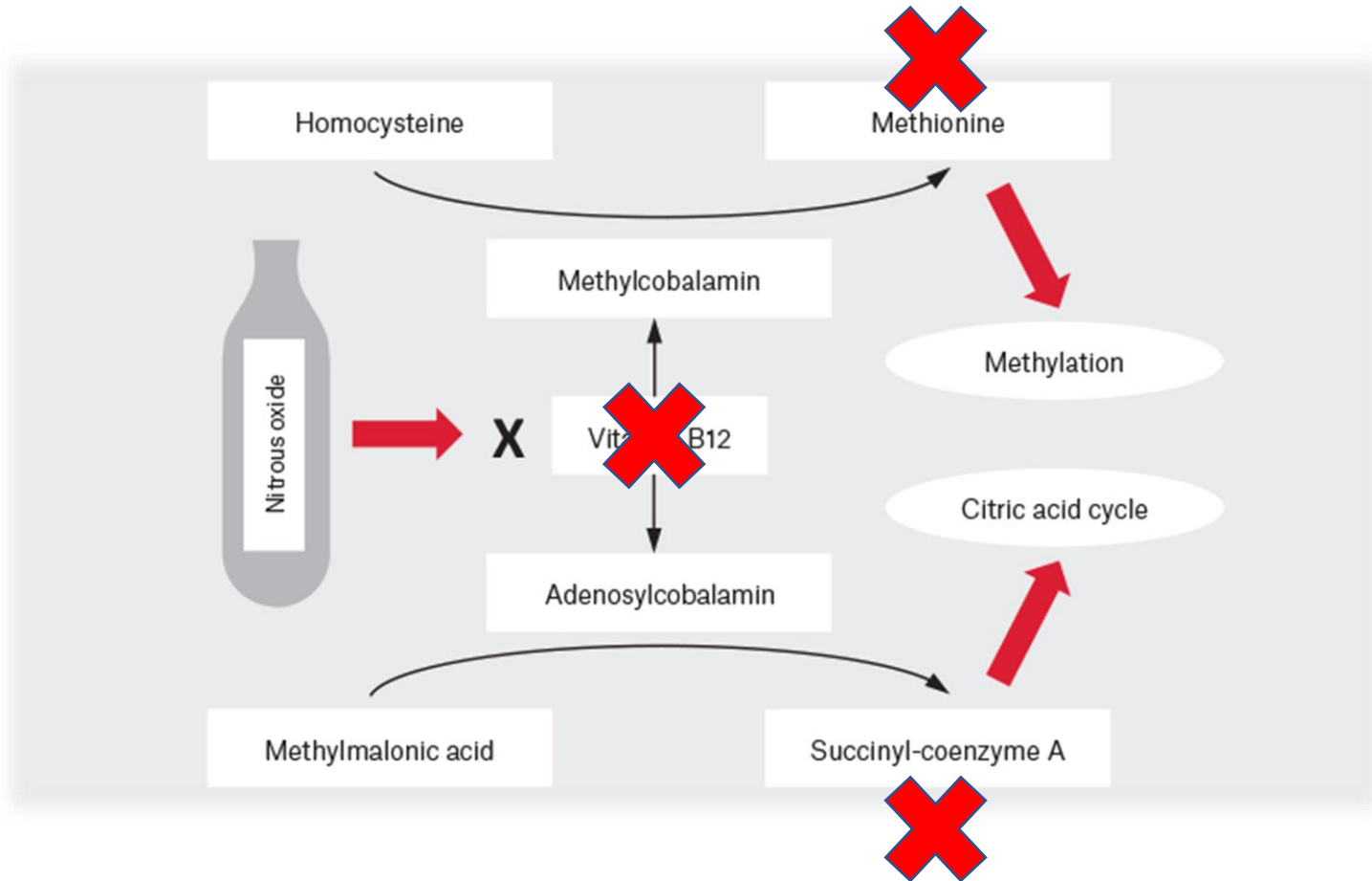
- Misconception that N₂O is harmless
 - **Supported by widespread availability**



Nitrous oxide canisters on sale at local gas station.



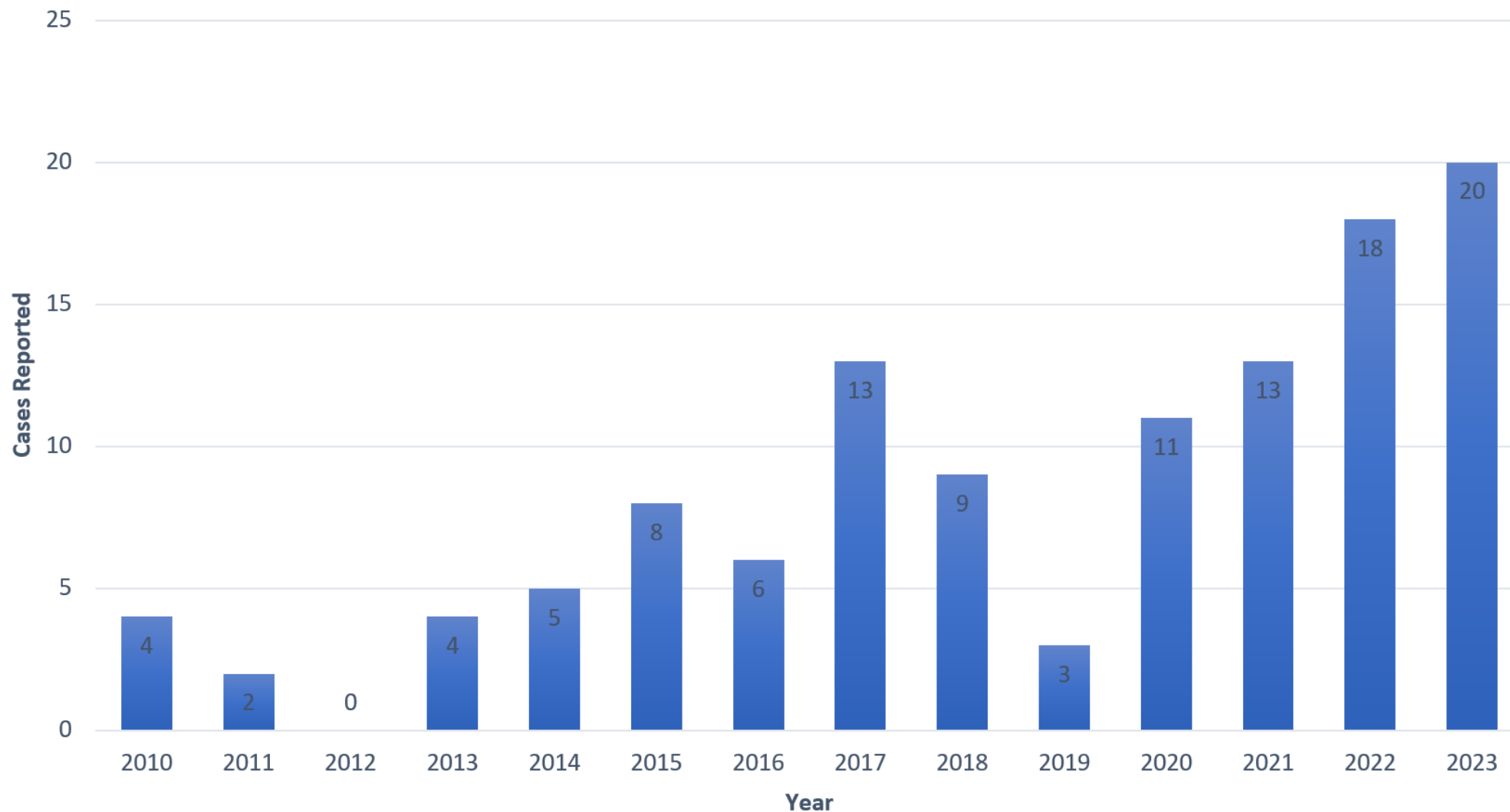
Nitrous Oxide Toxicity



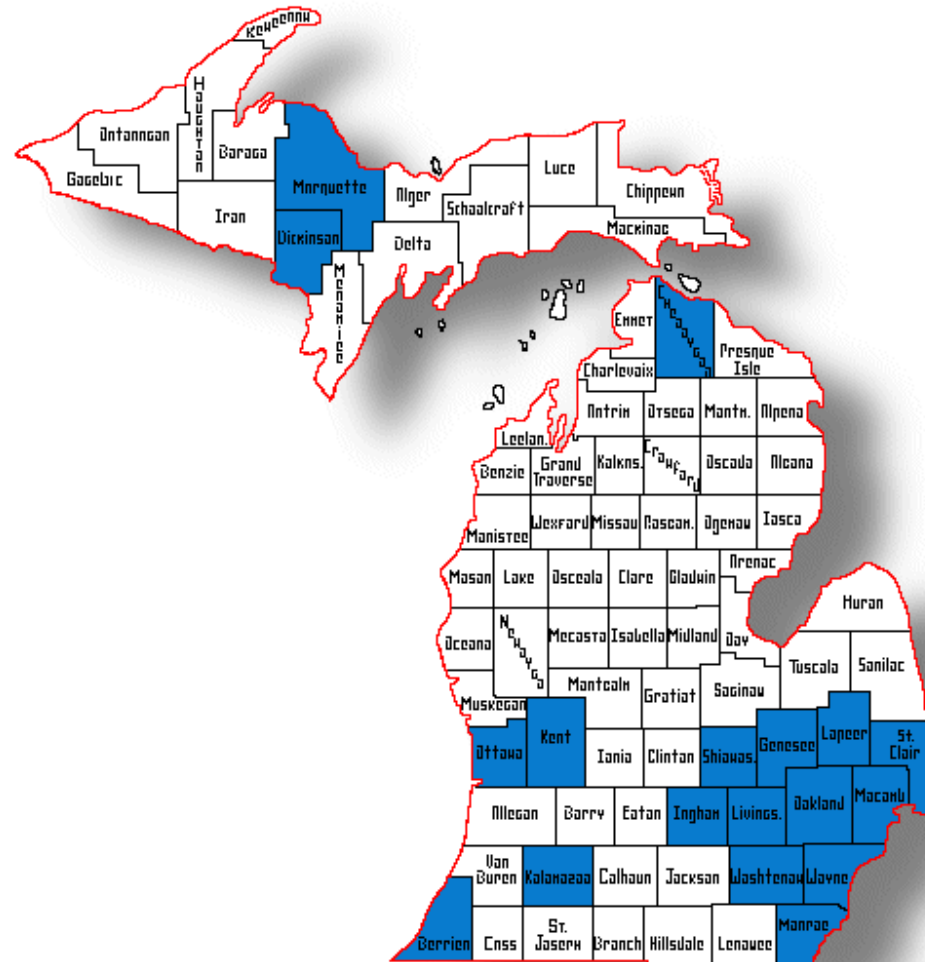
- Inactivates vitamin B12
- Prevents synthesis of
 - **Methionine**
 - **Succinyl-coenzyme A**
- Results in brain and spinal cord dysfunction



Nitrous Oxide Cases Reported to Michigan Poison and Drug Information Center

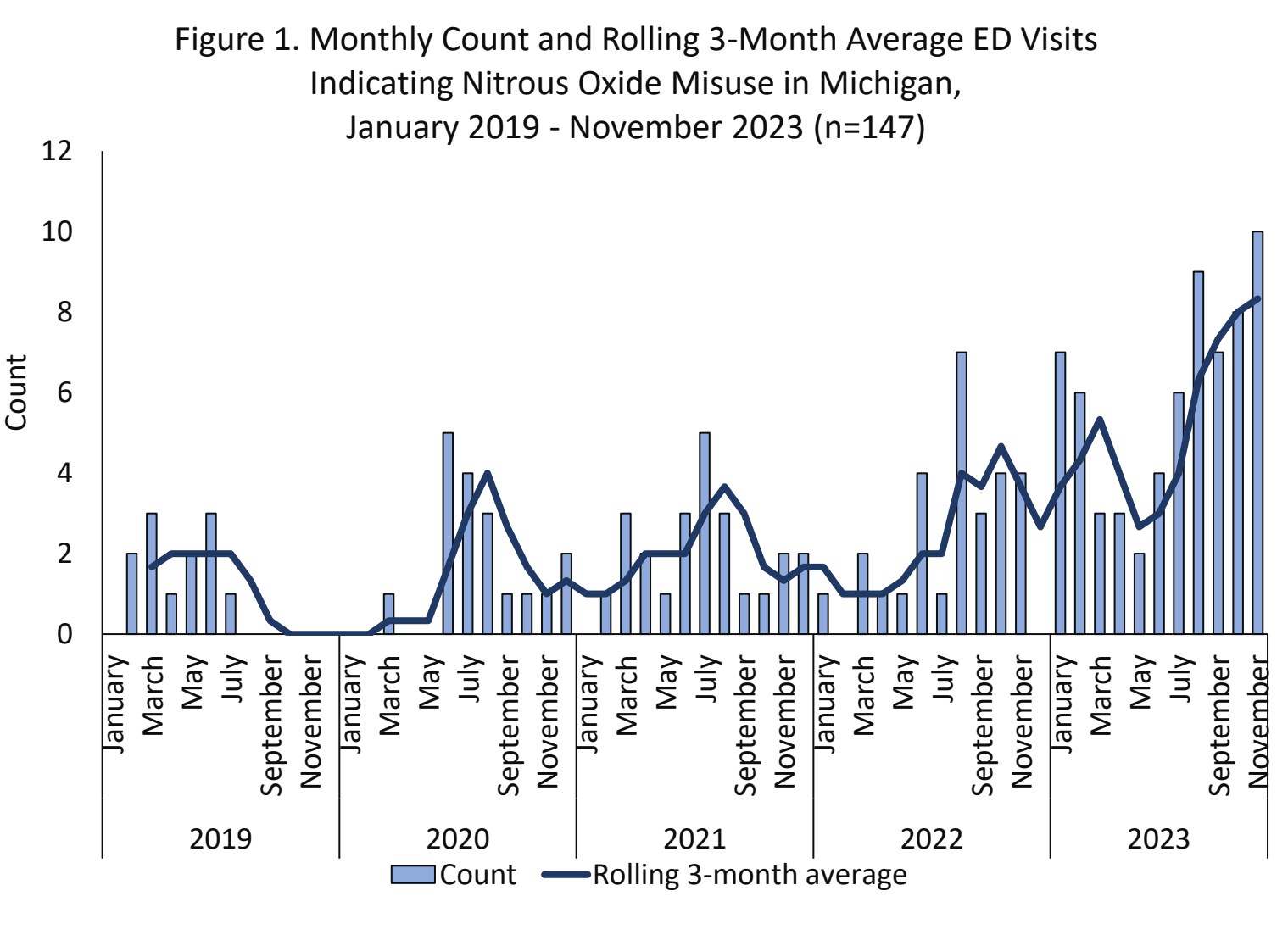


Michigan County Distribution – Calls related to Nitrous Oxide, 2023



Michigan Syndromic Surveillance

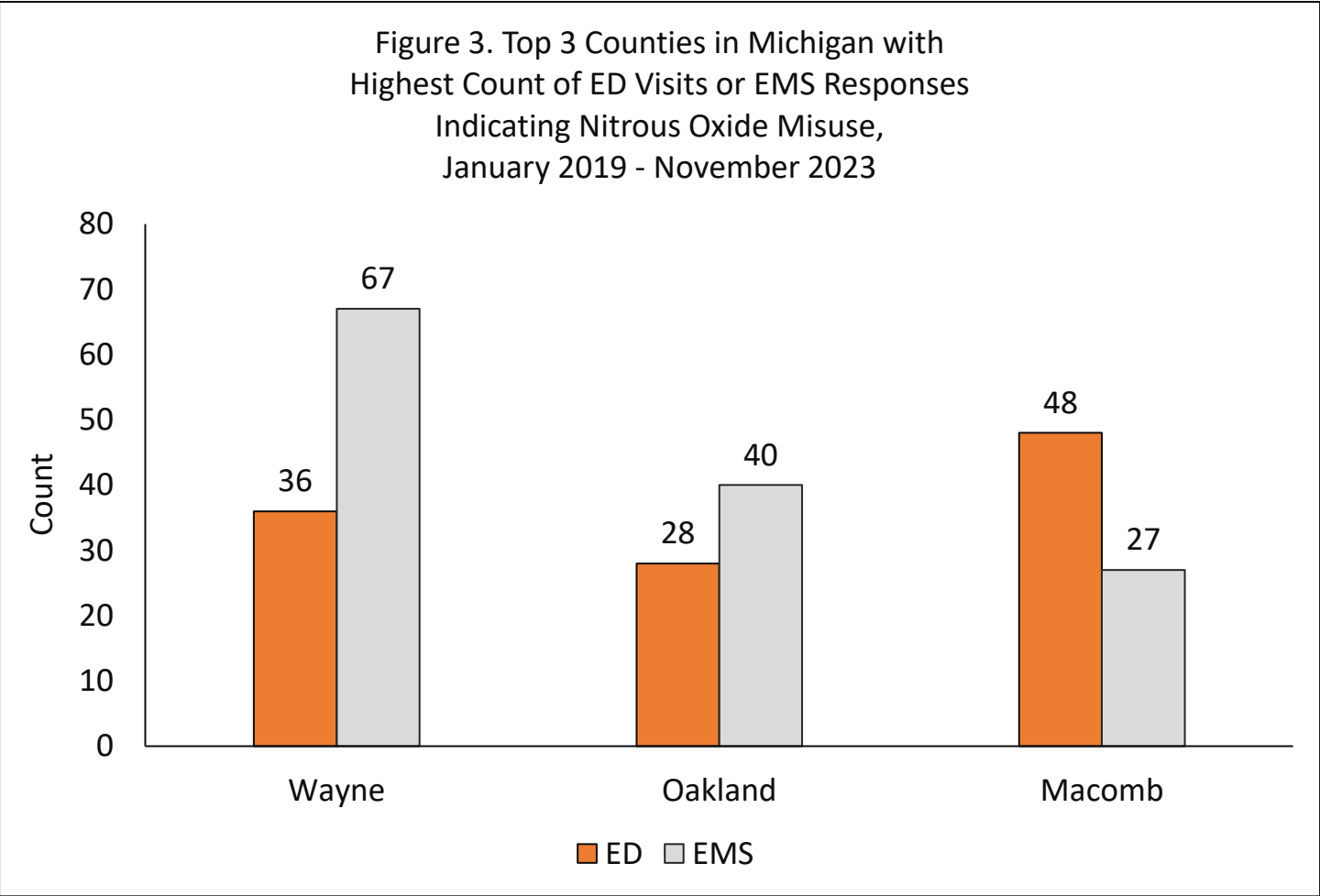
Figure 1. Monthly Count and Rolling 3-Month Average ED Visits Indicating Nitrous Oxide Misuse in Michigan, January 2019 - November 2023 (n=147)



January 2019 - November 2023

**January – November, 2023
132% more ED visits indicating
nitrous oxide misuse in
Michigan, compared to all of
2022**

Michigan Syndromic Surveillance

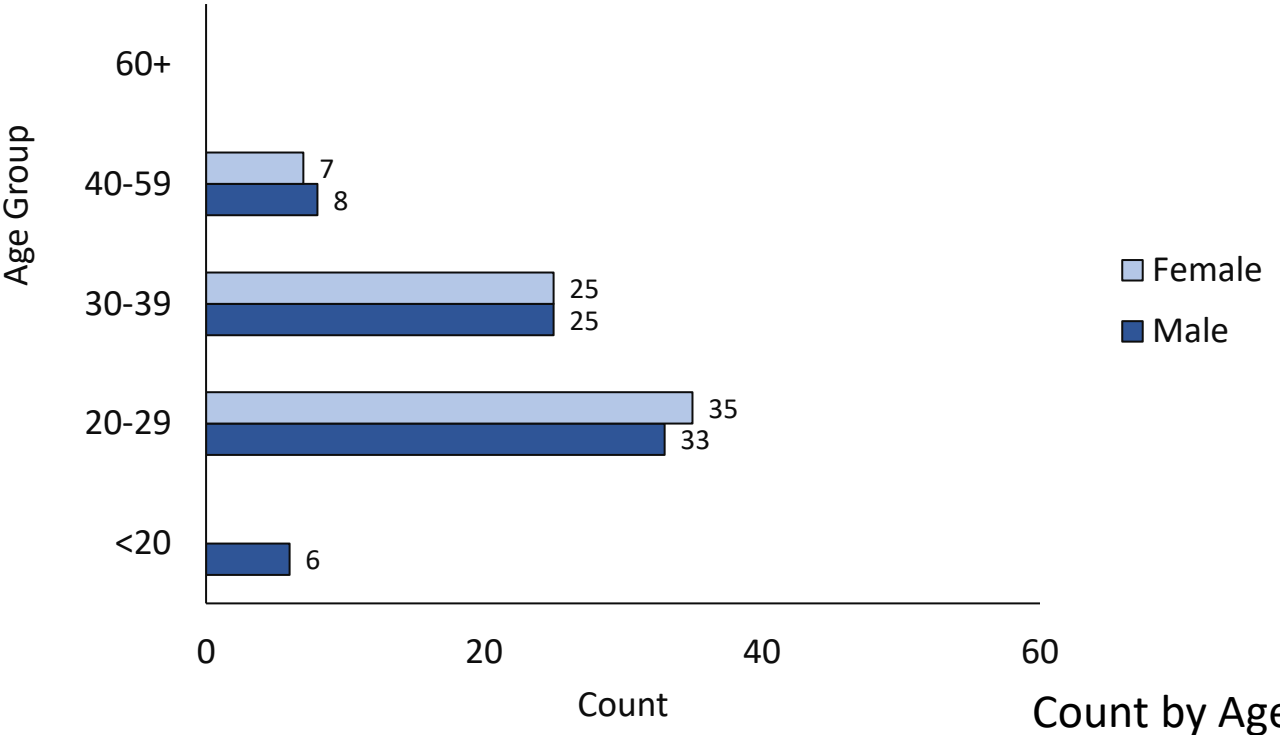


January 2019 – November 2023

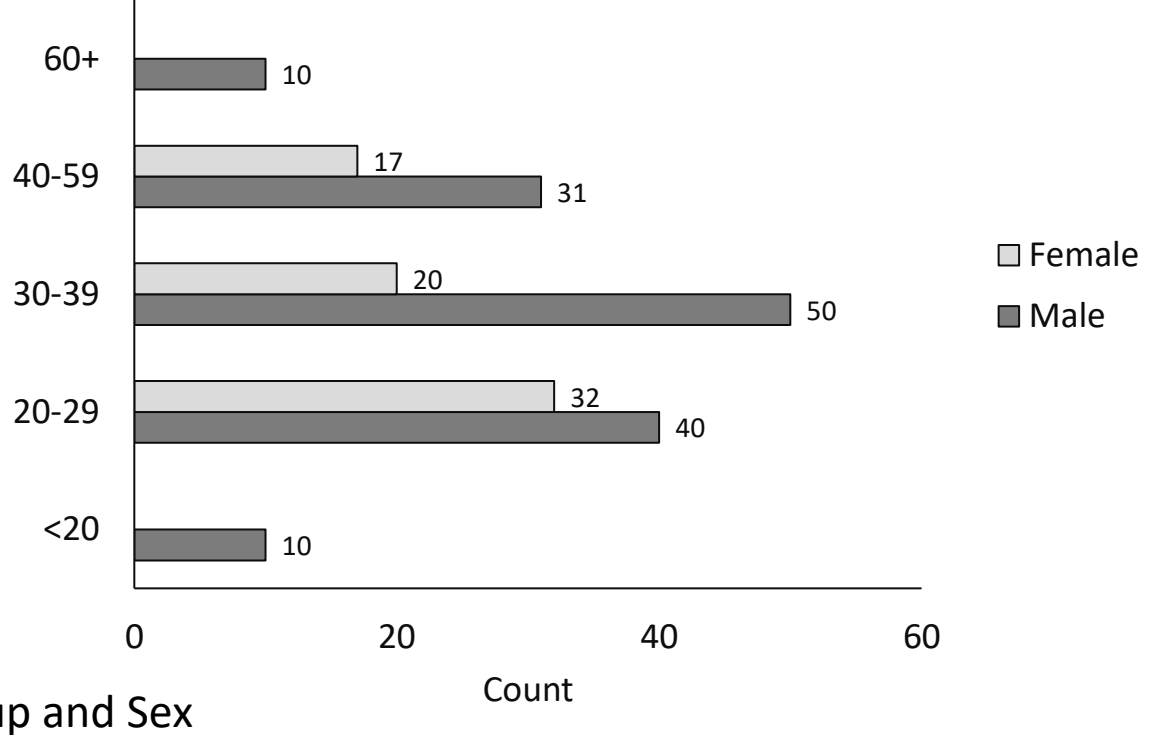
Wayne, Oakland, and Macomb counties had the most ED visits and EMS responses indicating nitrous oxide misuse in Michigan

Michigan Syndromic Surveillance

ED Visits Indicating Nitrous Oxide Misuse in Michigan, January 2019 - November 2023 (n=147)



EMS Responses Indicating Nitrous Oxide Misuse in Michigan, January 2019 - November 2023 (n=225)



January 2019 - November 2023

ED visits and EMS responses indicating nitrous oxide misuse highest among younger age groups (20-29, 30-39 years)



Neuropsychiatric disorders associated with recreational nitrous oxide use

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- Recreational use rising in youth
- Concerns about risks associated with developing brain, specifically prefrontal cortex
- Long-term psychiatric symptoms
 - **Hallucinations, delusions**
 - **Depression, mood changes**
- Nitrous-associated neuropsychiatric symptoms show altered brain activity
 - **Reduced cerebral perfusion in frontal and temporal lobes**
 - **Brain atrophy**

