

Effects of Michigan 2018 Controlled Substances Legislation on the Utilization of Safe Medication Disposal Boxes

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Introduction

- Michigan has been disproportionately affected by the opioid crisis: In 2017, Michigan's rate of deaths involving opioid overdose was **21.2 deaths per 100,000 persons**, compared to the national average of 14.6 deaths per 100,000 persons.¹
- In June 2018, Michigan lawmakers passed new legislation requiring prescription writers to review the **Michigan Automated Prescribing System (MAPS)**, among other requirements, before issuing controlled substances in an effort to combat the opioid crisis.²
- Safe medication disposal boxes have become commonplace in many hospital systems, police departments, and pharmacies, **yet the amount of controlled substance deposited in these boxes has not been studied.**
- The effects of the 2018 controlled substance legislation on safe medication disposal practices in Michigan, as a means to investigate patient behavior, warrants investigation.



Figure 1. Example Safe Medication Disposal Boxes

Aims and Objectives

1

- To **analyze utilization trends** of Michigan State Police safe medication disposal boxes before and after the 2018 controlled substance legislation

2

- To **investigate changes in opioid prescribing rates** throughout Michigan before and after the 2018 controlled substance legislation

3

- To **examine the correlation** between the rate of opioid prescribing and safe medication disposal box utilization across Michigan

4

- To **describe the areas** served by Michigan State Police safe medication disposal boxes using demographic characteristics

Methods

We completed a retrospective review using data from three main data sources:

- Michigan State Police (MSP) Take-Back Data Reports (Oct. 2016 – Sept. 2019)**
 - Includes 32 total disposal box sites encompassing all Michigan counties
 - Data was available for **29/32 MSP sites**
 - Obtained data reported weight of returned medication, in pounds (lbs.), collected at each disposal box site per fiscal year (FY) quarter
 - Delineation of drug type within the boxes was requested, but unable to be provided by the MSP
 - Routine collaboration over a 3-year period with the MSP was required for the most up-to-date and accurate data

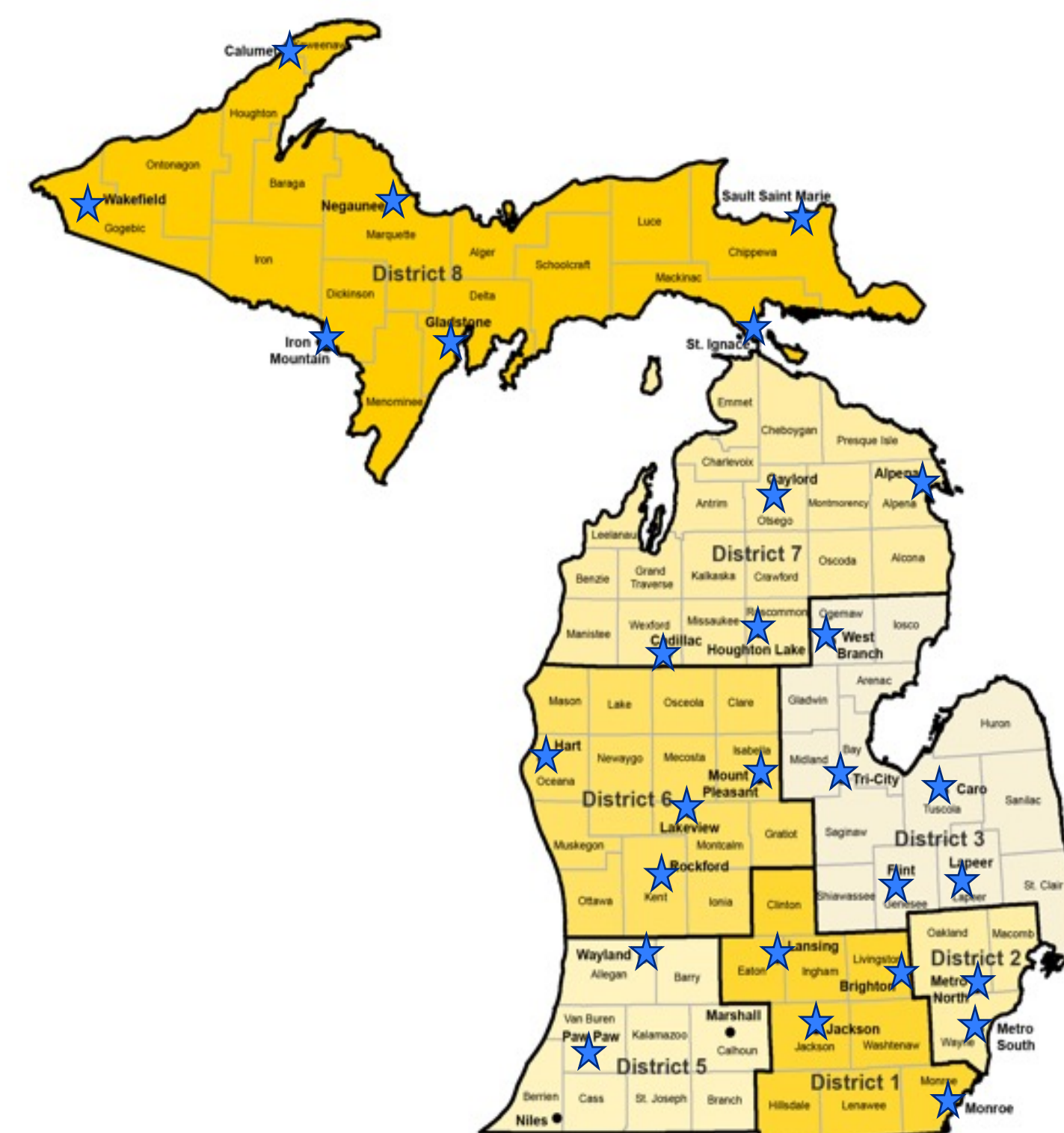


Figure 2. Map of MSP Disposal Box Sites and Respective Counties³
★ Location of MSP disposal box for which data was available

2. Michigan Automated Prescription System (MAPS) Annual Drug Utilization Reports (2016 – 2019)⁴

- Total of Schedule 2-5 drugs dispensed over a calendar year, which includes detailed information on drug type, drug dose, patient age, and patient/provider zip code

3. United States 2020 Census Data⁵

- Variables examined included age, gender, race, education level, employment rate, and median household income

Statistical Analysis

- Two Samples Independent T-Tests were used to compare MSP average disposal box weights throughout the Pre-Policy and Post-Policy periods.
- Trend models were used to predict the change in prescription rates by year over the study period.
- A logistic regression model was built to compare demographics between counties.

Results

- Between Oct. 2016 and Sept. 2019, **a total of 15,025.97 lbs. of medication** were returned via MSP disposal boxes.

- Assuming the average pill returned into the dropbox weighs approximately 0.5g, the total estimated amount of pills returned throughout the study period was **13.631 million pills.**

Estimated Returned Pill Count

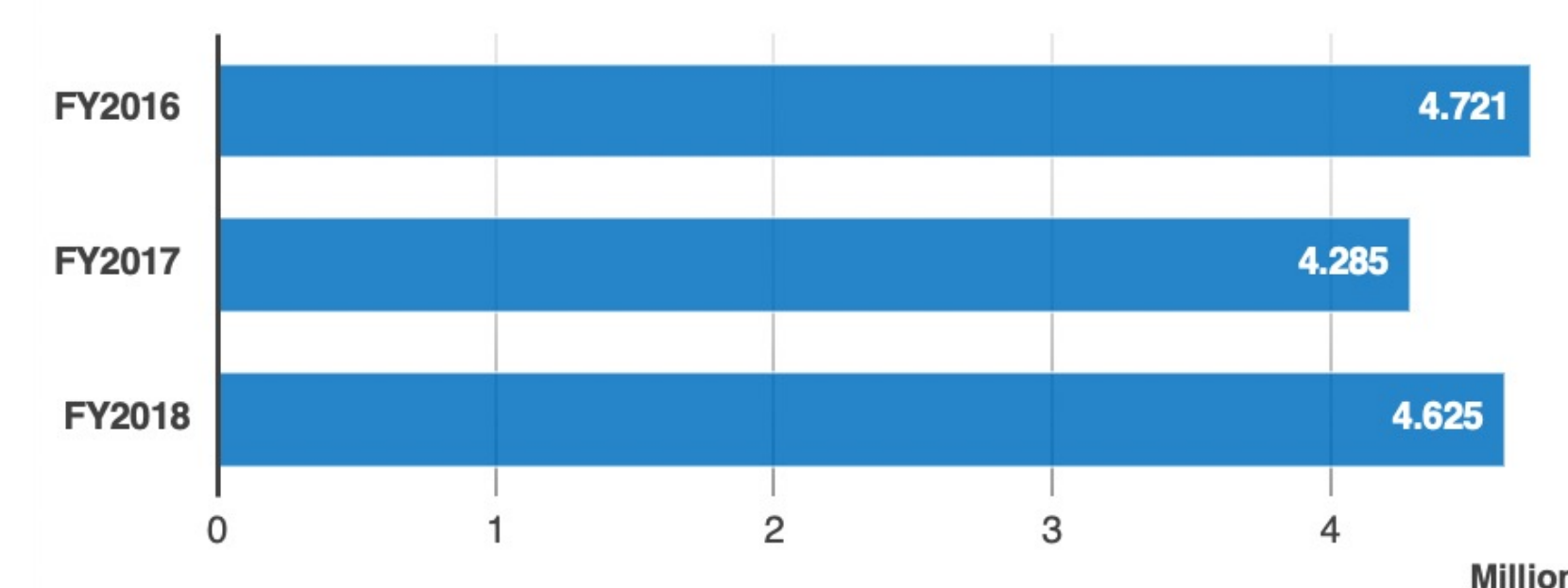


Figure 3. Estimated Number of Pills Returned in the MSP Safe Medication Disposal Boxes (in millions) per Fiscal Year

- The average weight of medication in MSP disposal boxes across the state was **not significantly different** before and after the 2018 legislation.

| Post | Pre-Legislation Mean (SD) | Post-Legislation Mean (SD) | P-Value |
|------------|---------------------------|----------------------------|---------|
| State-Wide | 1,243.44 (226.12) | 1,264.38 (102.31) | 0.8520 |
| Brighton | 76.00 (17.28) | 105.40 (23.14) | 0.0298* |
| Gladstone | 31.70 (19.66) | 8.70 (10.07) | 0.0429* |

Table 1. Effects of Legislation on Average Disposal Box Return (weight in lbs.) Mean calculated per FY quarter. *statistically significant

- No significant demographic differences** were found between the Brighton areas (**significantly increase** in MSP return weight) and the Gladstone areas (**significantly decrease** in MSP return weight).

- On average, the rate of opioid prescriptions across Michigan **decreased by 18.75% per year** between 2016-2019.

| | EAPC (95% CI) | P-Value |
|------------------------------|----------------------------|----------|
| Rate of Opioid Prescriptions | -18.75% (-21.69%, -15.70%) | < 0.0001 |

Table 2. Trend in Opioid Prescription Rates, State Level 2016-2019
EAPC: Estimated Annual Percentage Change

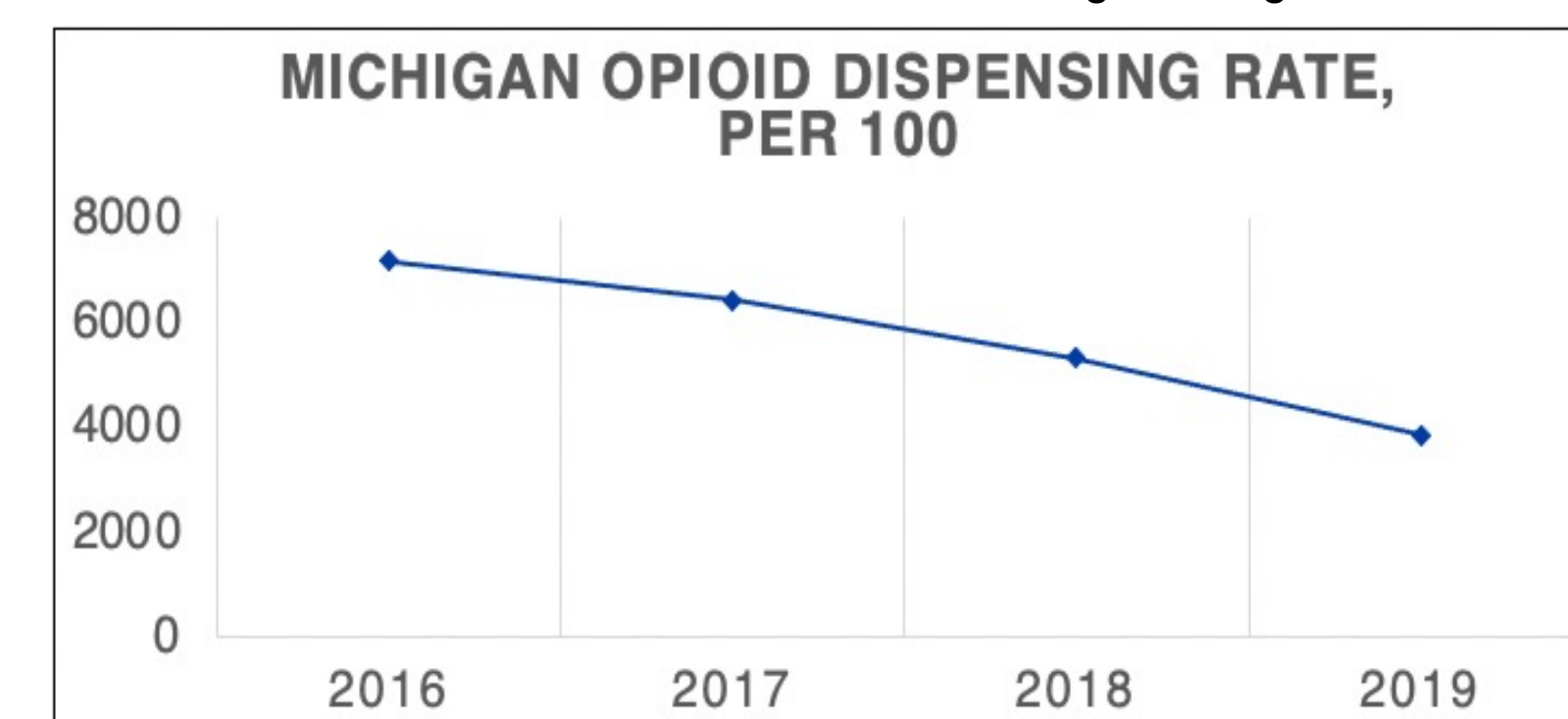
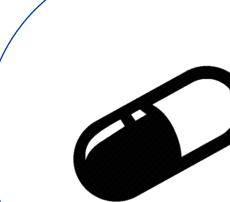


Figure 4. State Opioid Prescription Dispensing Rate Over Time (2016-2019), per 100 residents

- No significant demographic differences** were identified between **19 high-prescribing** and **13 low-prescribing** counties, as identified using CDC criteria.

Conclusions



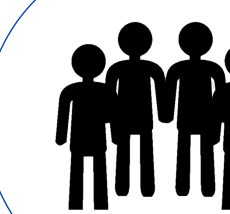
MSP safe medication disposal boxes collect a **substantial amount of medication**, including narcotics and non-narcotics.



The implementation of prescribing legislation in Michigan was **not associated** with a change in the amount of medication in MSP disposal boxes in most counties.



The rate of opioid prescribing across Michigan **decreased significantly** over the entire study period, which was not changed with the implementation of the prescribing legislation.



No significant demographic differences were found between high- and low-prescribing counties or between counties that significantly increased/decreased their MSP disposal box weights after the implementation of the prescribing legislation.

Limitations

- MSP data on disposal box medication weight is not specific to opioids or even controlled substances
- MSP data do not account for medications returned at other commercial medication disposal sites (e.g. pharmacies)

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