

# Analysis of wastewater monitoring and vaccine uptake in Chelsea, MA

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## **Summary:**

As COVID-19 funding and policies continue to sunset, we must assess the best direction for our efforts and resources. To answer questions on where communities should invest their resources, CCI conducted an in-depth analysis of wastewater levels and vaccines rates in Chelsea, MA. Our analysis leads us to recommend that we focus on vaccine campaigns, earlier in the year (September) that target younger folks (20 to 49 years old).

## **Key Takeaways:**

- 1. Vaccination campaigns should target residents 20 to 49 years old.**
- 2. Vaccine outreach should start by early September to prepare the community for winter COVID surges.**

**Background:**

CCI has conducted wastewater analysis in Chelsea, MA since November 2020. Wastewater monitoring can detect COVID-19 in sewage up to two weeks before infected individuals become symptomatic, which helps us predict when and where spikes in COVID transmissions will occur. Wastewater data has provided Chelsea's city government and grassroots organizations with an accurate view of COVID prevalence in the city.

In the fall and winter of 2022, we monitored wastewater at two sites: *Crescent at Eastern Ave* and *Hawthorne and Marginal*, which represent the city's most densely populated locations. As in past winter seasons, we observed an increase in COVID levels starting in November. The surge of COVID in wastewater prompted COVID outreach and vaccination efforts among community organizations in Chelsea.

Despite these efforts, Chelsea vaccination rates were much lower than in past years and there was still a significant surge in COVID transmission. Given the current funding and policy constraints around COVID-19, we must determine the best places to put our energy and resources to prevent future surges and transmission.

**Research Questions:**

- Can wastewater rates inform the best timing for vaccine campaigns?
- In order to inform and support community action, where is the best place to focus our funding and efforts for COVID prevention going forward?

**Methods:**

We examined rates of second booster vaccine uptake from September 2022 to February 2023 among different age cohorts in Chelsea. We then analyzed times when rates of COVID increased in wastewater to determine the most appropriate timing for vaccine campaign roll out. Our goal is to encourage vaccination 4-6 weeks before wastewater rates begin to increase. While initial vaccine uptake was very high, we are concerned that rising COVID rates might reflect low vaccine uptake for the second booster.

**Results:****Booster rates in 2022 are much lower than vaccine rates in 2021**

We tracked booster rates in Chelsea following authorization in September 2022 of the bivalent vaccine. Children under 12 were not authorized until December to receive the booster, so we did not include them in our analysis.

By February 2023, the average rate of vaccination in Chelsea reached 16%. By

February 2022 in comparison, almost all age groups had a >95% vaccination rate (The 20-29 age group vaccination rate was 86% and children 5-11 had a vaccination rate of 37%).<sup>1</sup> In 2023, all age groups under 50 have vaccination rates lower than 16%. In a city like Chelsea, which includes a large population of essential workers, this low vaccination rate among people under the age of 50 is particularly concerning, because this group is likely to contribute most to community transmission of COVID due to their increased risk of exposure. Other cities with similar demographics also had low rates of booster uptake.

In Table 1, we compare Chelsea’s vaccination rate in February 2023 to cities of similar demographics. These cities were previously compared to Chelsea to evaluate the impact of vaccine outreach campaigns in 2021.

**Table 1:** Comparing average booster vaccination rates across cities with similar demographics in 2023

City	Vaccine Rate February 2023
Brockton	11%
Chelsea	16%
Fall River	11%
Lawrence	8%
Lowell	14%
Boston	20%

Source: Archive of COVID-19 Vaccination Reports, Massachusetts Department of Public Health, 2023

In response to rising COVID levels in Chelsea’s wastewater, we worked with the city and community organizations on public messaging around rising levels of COVID in wastewater and a vaccination campaign. However, our analysis shows that December was too late to start vaccine campaigns. Figure 1 illustrates that people under the age of 50 had very low vaccination rates and that most people in all age groups did not receive a vaccine until November. Our analysis of the vaccine rate and COVID levels in wastewater in Figure 2 shows that COVID levels were quite high throughout the winter while the vaccine rate remained low. We hypothesize that had more people received a vaccine earlier in the fall, wastewater data would have reflected lower COVID

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<sup>1</sup> <https://www.mass.gov/info-details/archive-of-covid-19-vaccination-reports#february-2023->

prevalence.

Figure 1:

### Vaccination of Chelsea Residents is too low to reduce community spread of COVID in 2022

Average vaccination rate is low, reaching only 16% in February 2022

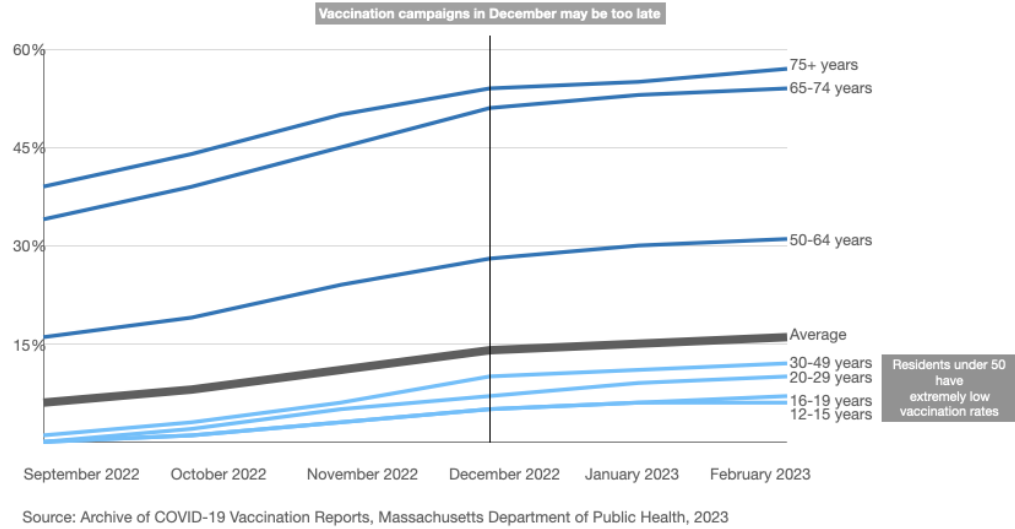
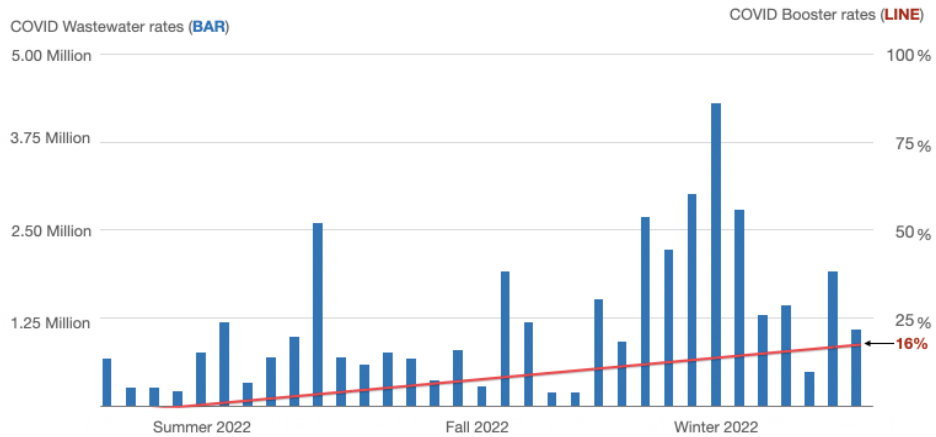


Figure 2:

### Lack of uptake in COVID Booster shots enables COVID transmission

Chelsea residents lack up to date vaccination in 2022



**Conclusion:**

We have considered wastewater monitoring and vaccination campaigns and their impact on COVID transmission. In the early days of the pandemic when we were still learning how COVID spreads, wastewater monitoring served as an essential tool for developing strategies for testing and vaccination campaigns, distributing PPE during a COVID surge, and for making policy decisions such as when to cancel public events or when to pass a mask mandate. However, the facts on the ground have changed. In general, COVID outcomes are less severe because of vaccines, mask mandates are no longer practical from a political or societal standpoint, and resources to support COVID prevention are decreasing. Wastewater monitoring continues to tell us about the prevalence of COVID in the community, but it does not provide the same impetus for action now that COVID transmission patterns are better understood. The past three years of wastewater monitoring have confirmed that COVID levels peak in the winter so COVID awareness and vaccine outreach should begin in the fall.

Given that the public health emergency will end in May and funding will be limited going forward, we believe that the best use of resources for communities like Chelsea will be to focus on vaccine campaigns that begin in September and that target residents who are between 20 and 49 years old.

**Recommendations:**

1. COVID prevention efforts at the community level should focus on vaccinations to reduce severe outcomes and transmission.
2. Data from past years indicates that COVID transmission spikes in November and December. Consequently, vaccination campaigns should start earlier in the fall (August and September) in preparation for winter surges.
3. Vaccination campaigns should target people between the ages of 20 and 50. This group is at higher risk of exposure, and is more likely to contribute to community transmission.