

Increased Number of ALLERGYCAST® Users and Symptoms in the United States During 2023 Canadian Wildfire

Dominique Crudup, PhD¹, Anna Aghajanyan, MD¹, Lia Harrington, PhD¹, Russell Gould, PhD¹, Maira Simoes, PhD¹

¹Kenvue Brand LLC

Introduction

- Climate change is associated with longer pollen seasons and frequent wildfires, which has led to worse air quality worldwide¹.
- Canada's wildfire occurrences significantly surged in 2023, caused by high temperatures and dry weather².
- In June 2023, the wildfire smoke from eastern Canada led to severe air pollution in the northeastern United States (U.S) and particulate matter dominated pollution in the U.S².
- Elevated pollen levels and pollution-related to wildfires may increase symptoms of rhinitis.

Objective

Our study aims to track the number of users and reported nasal, ocular, and throat symptoms through the ALLERGYCAST® app in 2023, coinciding with the impact of Canada's wildfire in the U.S.

Methods

This observational study assessed the number of users and symptoms reported via the ALLERGYCAST® app in areas with high pollution and pollen levels in the Northeast and South-central regions of the U.S between January and September 2023 as well as before (June 14- June 24, 2023), during (June 25-July 5, 2023), and after (July 6-17, 2023) the Canadian wildfire. The symptoms collected from the ALLERGYCAST® app users were nasal (itchy nose, runny nose, sneezing, and congestion), ocular (itchy and watery eyes), and throat (itchy throat) symptoms.

Results

Figure 1: Similar number of unique users in the US Northeastern and South-central from January-September 2023

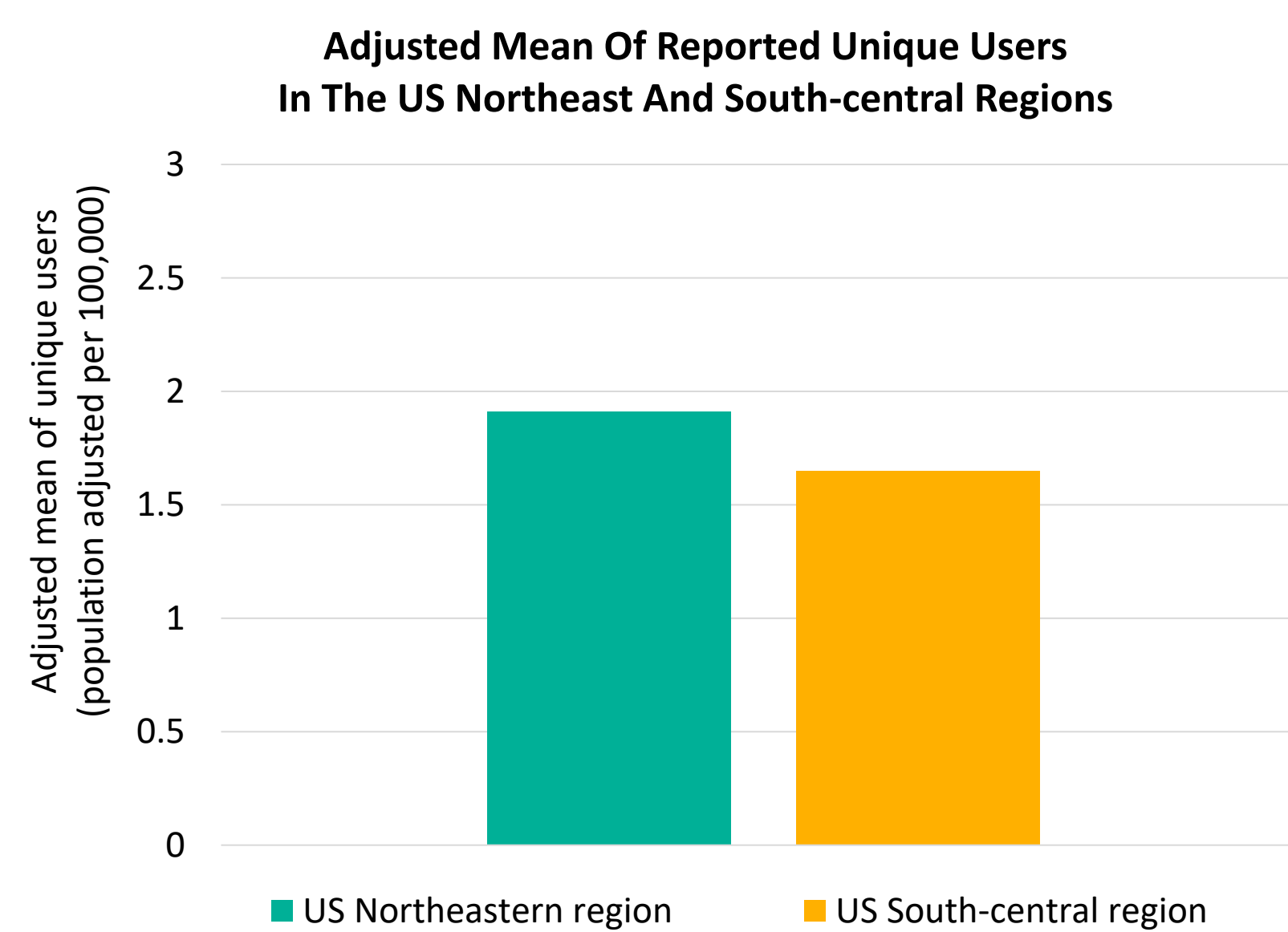


Figure 1: From January 6 to September 22, 2023, the adjusted mean of unique users per 100,000 were similar (p=0.6069) in the US Northeastern (n=1.911) (32 cities) and South-central regions (n=1.65) (9 cities). The statistical analysis was conducted using a Two-Sample t-test.

Figure 2: More reports of nasal, eye, and throat symptoms in the US Northeast vs. South-central from January-September 2023

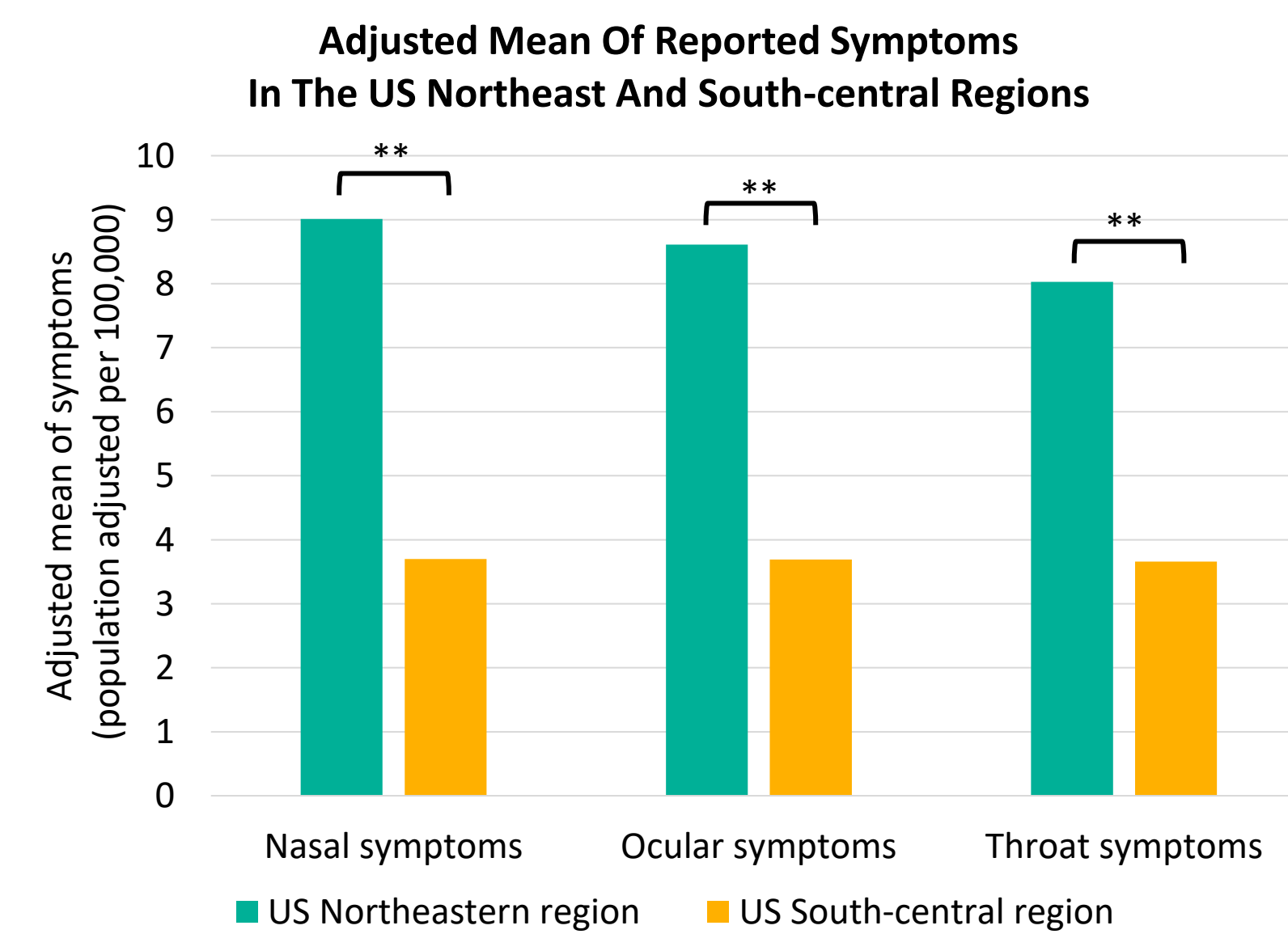


Figure 2: From January 6 to September 22, 2023, more reports of nasal (n=9.01; **p=0.0058), ocular (n=8.61; ** p=0.0099), and throat (n=8.03; **p=0.0161) symptoms reported in the US Northeastern region (32 cities) compared to the US South-Central (9 cities) reports of nasal (n=3.7), ocular (n=3.62) and throat (n=3.66) symptoms. The reported number of symptoms was adjusted per 100,000 population. The statistical analysis was conducted using a Two-Sample t-test.

Results

Figure 3: The US Northeastern region reported significantly more symptoms during the Canada's wildfire compared to the US South-central region

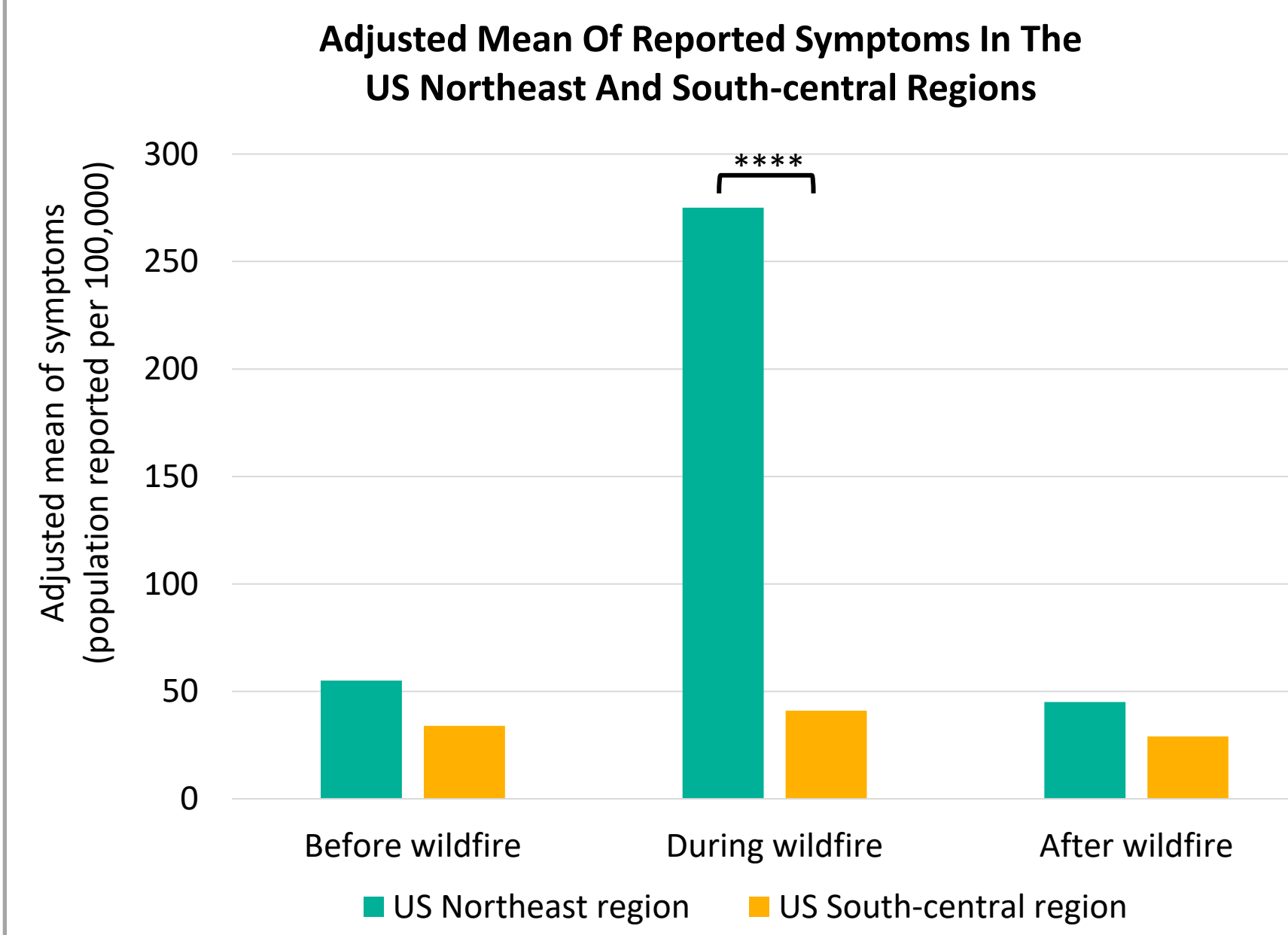


Figure 3: As Canada's wildfire-smoke traveled into the US, the northeastern region reported significantly more symptoms during the wildfires (n=275) compared to the US south-central region (n=41) (****p<0.0001). Before (northeast n=55; south-central n=34; p=0.0718) and after the wildfire (northeast n=45; south-central n=29; p=0.111), symptom reports were comparable. The reported number of symptoms were adjusted per 100,000 population for both regions. Statistical analysis was conducted using the Chi-square test.

Figure 4: Significantly higher number of unique users in the US Northeastern region during the Canada's wildfire compared to US South-central region

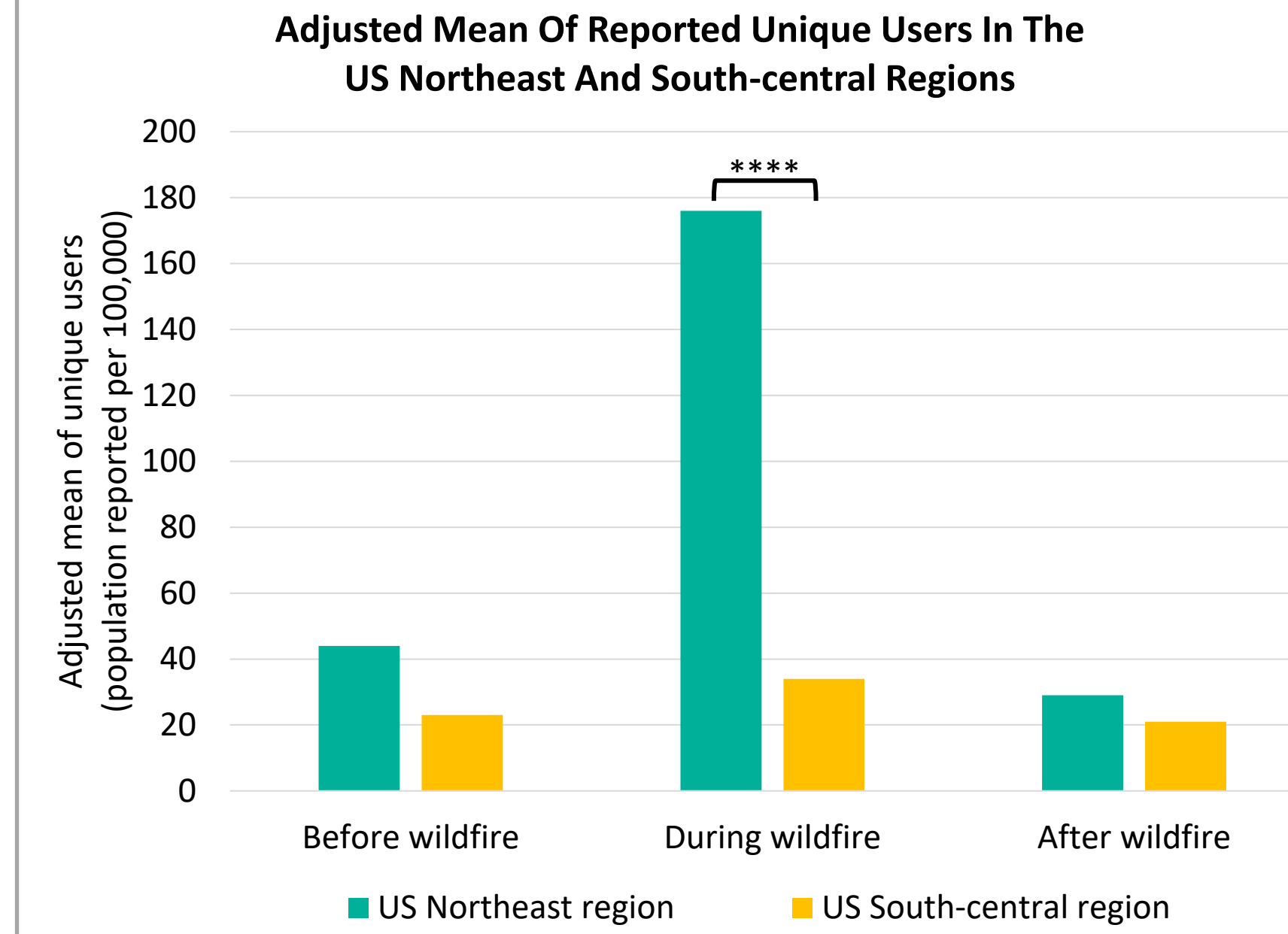


Figure 4: As Canada's wildfire-smoke traveled into the US, the number of unique users of the ALLERGYCAST® app significantly increased in the US northeastern region (n=176) compared to the US south-central region (n=34) (****p<0.0001). Unique number of users were similar before (northeast n=44; south-central n=23; p=0.3861) and after the wildfire (northeast n=29; south-central n=21; p=0.0817) in the US northern and south-central region. The reported number of unique users were adjusted per 100,000 population. Statistical analysis was conducted using the Chi-square test.

Figure 5: Higher levels of particulate matter 2.5 (PM 2.5) in the US Northeast region during the Canada's wildfire period in 2023

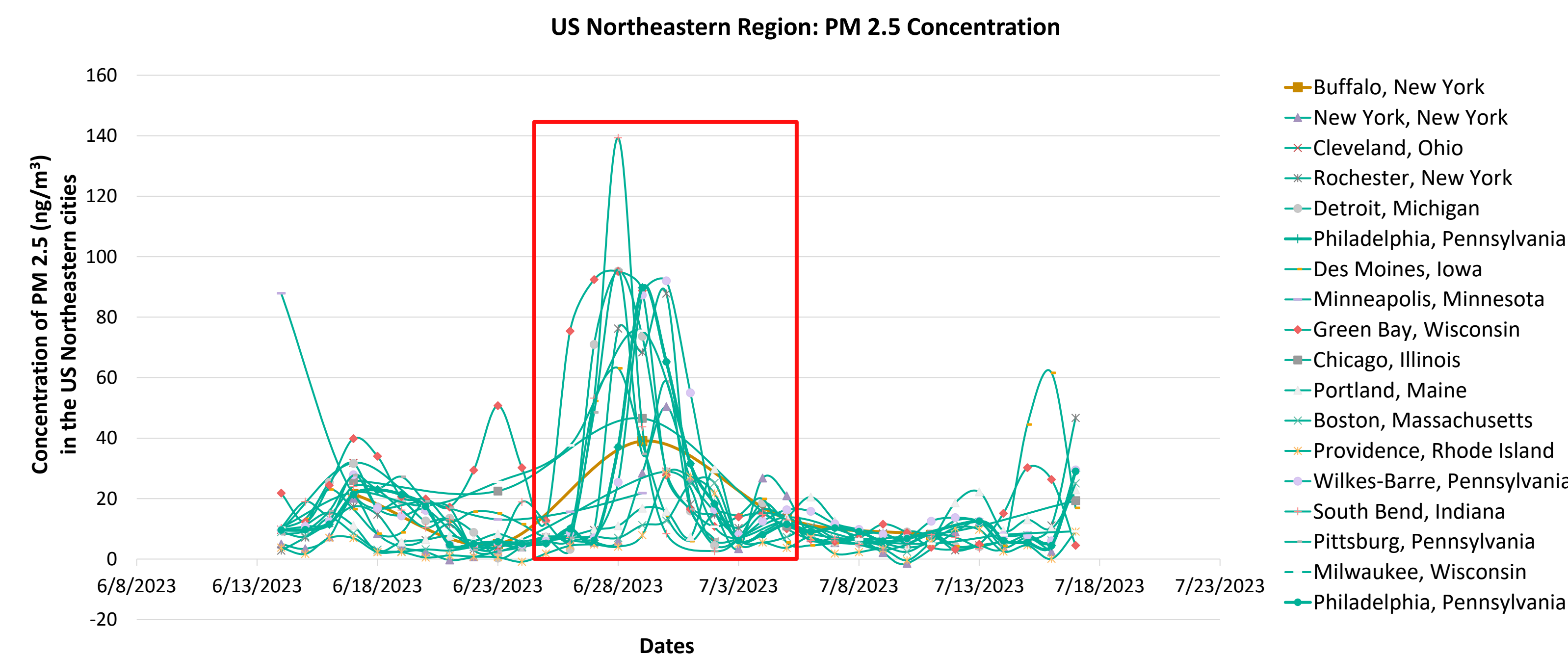


Figure 5: In the Northeast cities of the United States, PM 2.5 highest concentration levels were during the Canada's wildfire period (June 25-July 5, 2023; depicted in the red box) compared to before (June 14- June 24, 2023) and after (July 6-17, 2023). PM 2.5 concentrations for each US northeastern city were collected from the Environmental Protection Agency (EPA). Each line represents a different city in the US northeastern region.

Figure 6: Low concentration levels of PM 2.5 in the US South-central region during the Canada's wildfire period in 2023

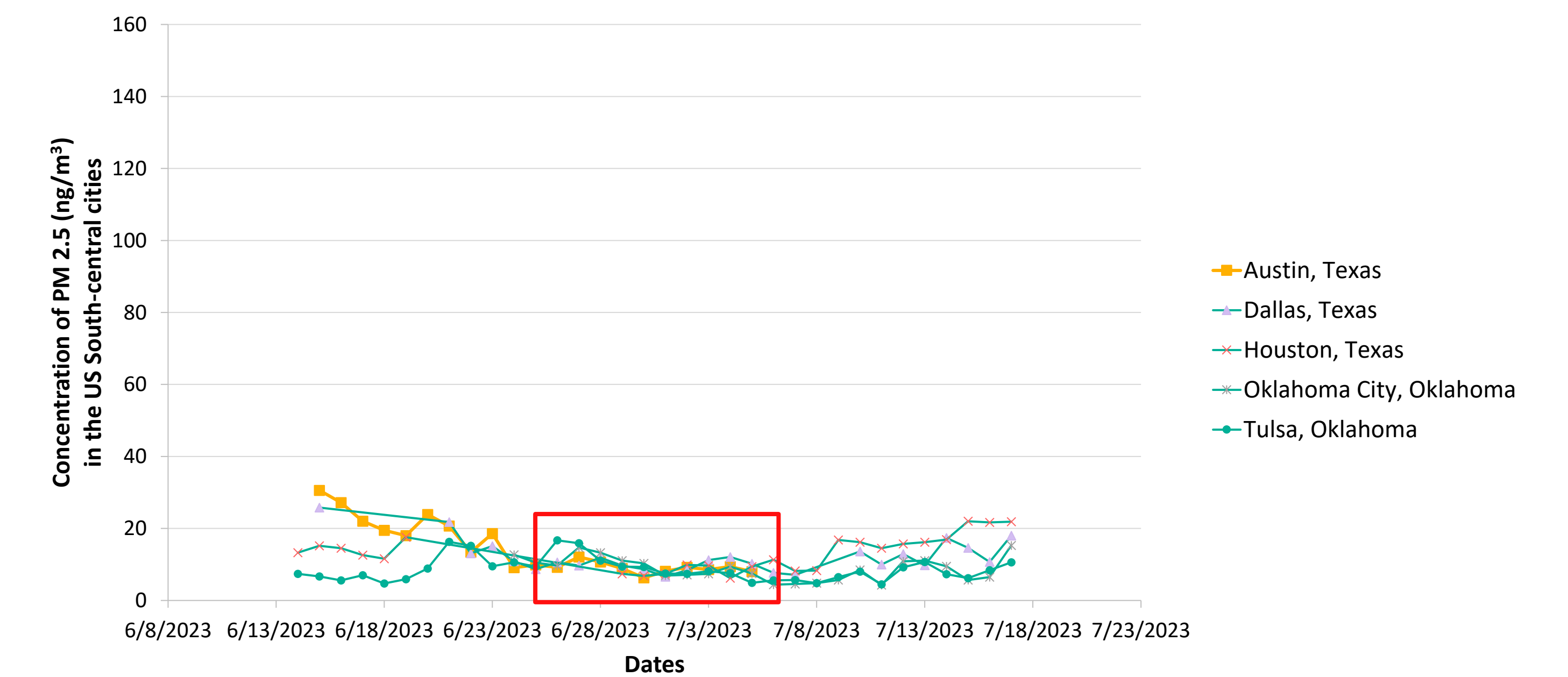


Figure 6: In the south-central region of the United States, PM 2.5 levels were low during the Canada's wildfire period (June 25-July 5, 2023; depicted in the red box) compared to before (June 14- June 24, 2023) and after (July 6-17, 2023). PM 2.5 concentrations for each city in the south-central region were collected from the Environmental Protection Agency (EPA). Each line represents a different city in the US south-central region.

Conclusion

- During 2023 Canadian wildfire period, more users significantly logged in and reported symptoms into the ALLERGYCAST® app in the smoke-affected US northeastern region compared to the US south-central region.
- Unlike US south-central region, higher concentration levels of PM 2.5 were detected in the US northeastern region as Canada's wildfire smoke impacted the area.

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