

# OPINION INFLUENCES CONTENT IN SOCIAL MEDIA DISCUSSIONS ABOUT 2,4-DINITROPHENOL

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## INTRODUCTION

- There is substantial variation in opioid-associated mortality in coingestants between rural and urban milieus.
- We and other groups have demonstrated that social media can be an early warning system for spikes in opioid use.

### The Methodological Challenge

- **Geocoding social media**

## RESEARCH QUESTIONS

Does social media track the geographic variation in opioids use reported by formal surveys?

## METHODS

For each year we calculated the  $\chi^2$  statistic to evaluated the hypothesis that there was no association between geographic milieu and type of opioid mentioned, using the Benjamini-Hochberg procedure to assure a false discovery rate of 0.05. We also assessed the prevalence over time in each milieu of tweets mentioning NSOs or other opioids.

- used 2020 US Census Bureau boundaries for urbanized areas. Considered everything not urban (pop > 10k) to be rural.

Extract publicly available comments from Twitter from 2012-2022 via *snsrape* ( $n = 24,342,393$ )



Inclusion Criteria—tweet contains

Explicit latitude & longitude co-ordinates ( $n = 686,184$ )

keywords related to opioids ( $n = 686,184$ )

Unique text ( $n = 580,598$ )

Co-ordinates within United States ( $n = 351,202$ )

Urbanized Area ( $n = 220,718$ )

Identify Drugs  
Track Volume

Rural Areas ( $n = 130,484$ )

Identify Drugs  
Track Volume

Figure 1: **Study design.**

## RESULTS

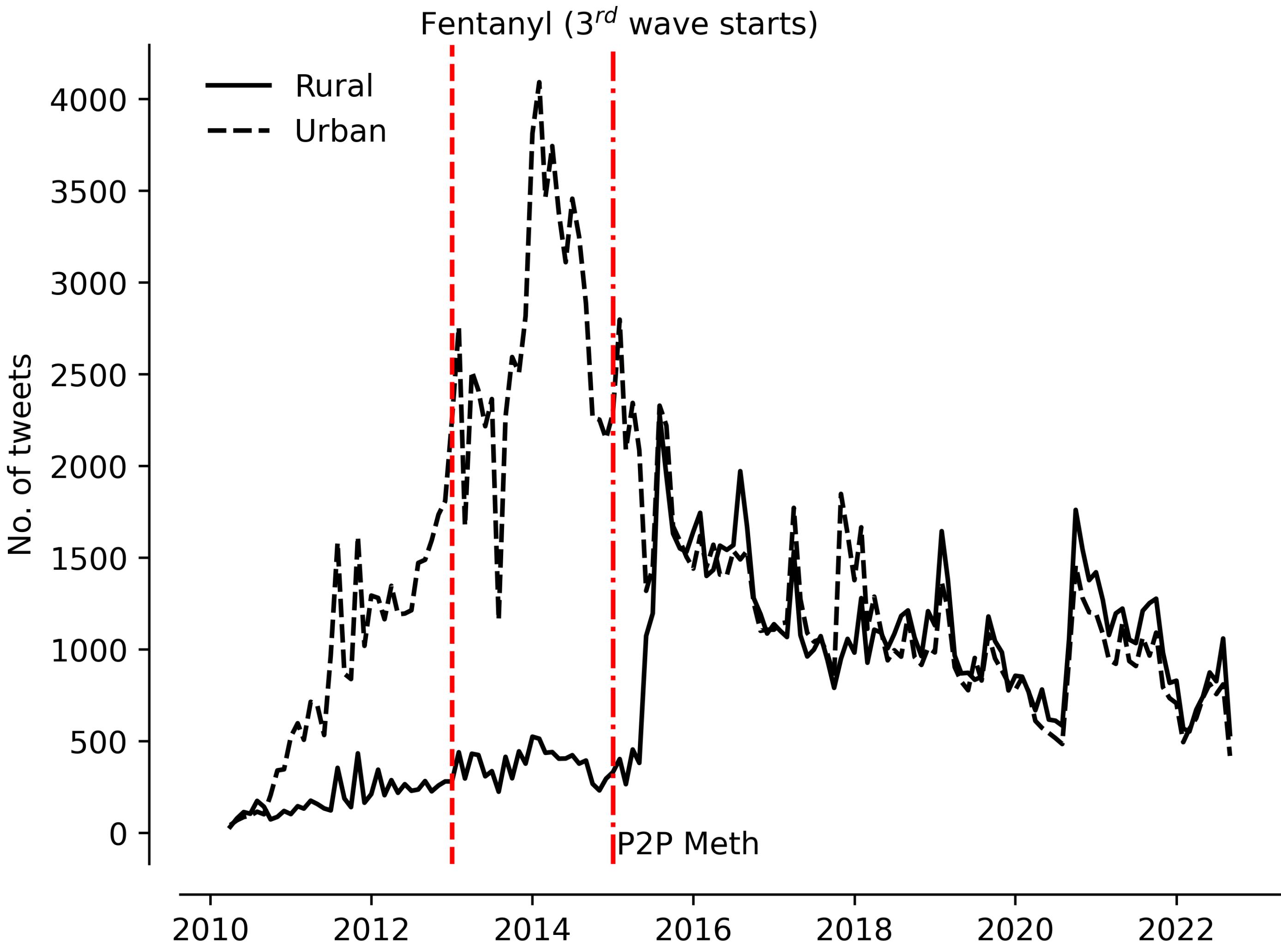


Figure 2: **Frequency of Tweets Emitted from Rural (Solid) or Urban (Dashed) Locations Mentioning Use of Any Opioid.** Y-axis, number of tweets. X-axis, time. Solid line, tweets from areas with fewer than 10k inhabitants per congressional district. Dashed line, from areas with > 10k. Left red dashed vertical line indicates the start of the 3<sup>rd</sup> wave of the opioid epidemic as given by the CDC. Right red dashed dotted line indicates 1<sup>st</sup> spike in mortality reported by CDC of methamphetamine made from phenyl-2-propanone.

*Use SpaCy's bulk labeling to identify themes in rural vs urban divide.  
QR code for both this and Bartell's poster.*

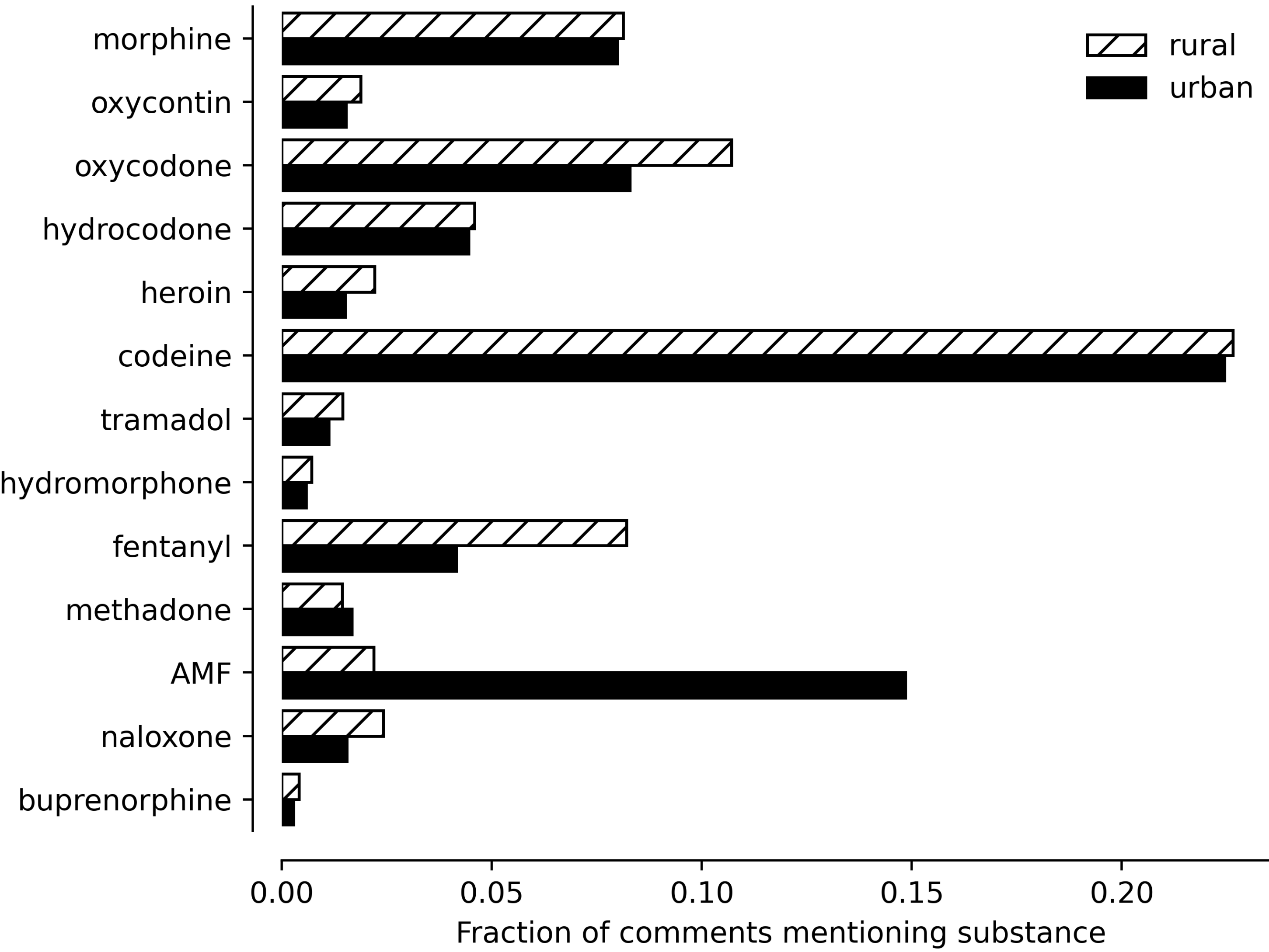


Figure 3: **Count of Substance Mentions by Rhetorical Stance** X-axis denotes number of comments on a logarithmic scale. Y-axis denotes substance groups. Color (hue) of bar indicated rhetorical stance according to legend in upper left. AMF,  $\alpha$ -methylfentanyl.

## CONCLUSIONS

1. The overall dynamics of tweets about opioids from rural and urban areas nearly completely overlap after 2016.
2. Tweets from rural areas were statistically significantly more likely to discuss fentanyl and oxycodone than were tweets from urbanized areas.
3. There was a trend towards rural areas discussing morphine, hydrocodone, tramadol, and naloxone, but these differences were not statistically significant.

## LIMITATIONS

- Place of communication isn't point of manufacture or distribution
- Only 1% of social media posts have geographic information.
- Did not include nitazenes or Janssen's full list of fentanyl derivatives (next step)
- Did not account for migration between rural and urban areas (next step)
- Lacking positive & negative controls (next step)

## ACKNOWLEDGMENTS

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