

# GEOGRAPHIC VARIATION OF OPIOID USE DISCUSSIONS TRACKS GEOGRAPHIC VARIATION IN OPIOID-ASSOCIATED USE

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## INTRODUCTION

- ▶ Rates of opioid-associated mortality and coingestants historically vary between rural and urban milieus.
- ▶ Social media can be an early warning system for spikes in opioid use.

## RESEARCH QUESTIONS

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

## METHODS

Publicly available tweets from 2012-2022 via *snsrape* ( $n = 24,342,393$ )

Inclusion Criteria—tweet contains

1. Explicit latitude & longitude co-ordinates ( $n = 686,184$ )
2. keywords related to opioids ( $n = 686,184$ )
3. Unique text ( $n = 580,598$ )
4. Co-ordinates within United States ( $n = 351,202$ )

Urbanized Area  
( $n = 220,718$ )

Identify Drugs  
Track Volume

1. Frequency of Opioid Posts  $\times$  Urban or Rural
2. Frequency of Opioid Type  $\times$  Urban or Rural
3. Coingestants  $\times$  Urban or Rural

Figure 1: **Study design.**

- ▶ Used 2020 US Census Bureau boundaries for urbanized areas.
- ▶ Considered everything not urban (pop  $> 10k$ ) to be rural.
- ▶ Keywords for opioids from Sarker et al. (2019),
- ▶ Author MC created keyword lists for novel synthetic opioids, and other coingestants

## FURTHER READING



Scan for

1. Lab Web Page
2. Background Material (incl. Code & Refs.)

## RESULTS

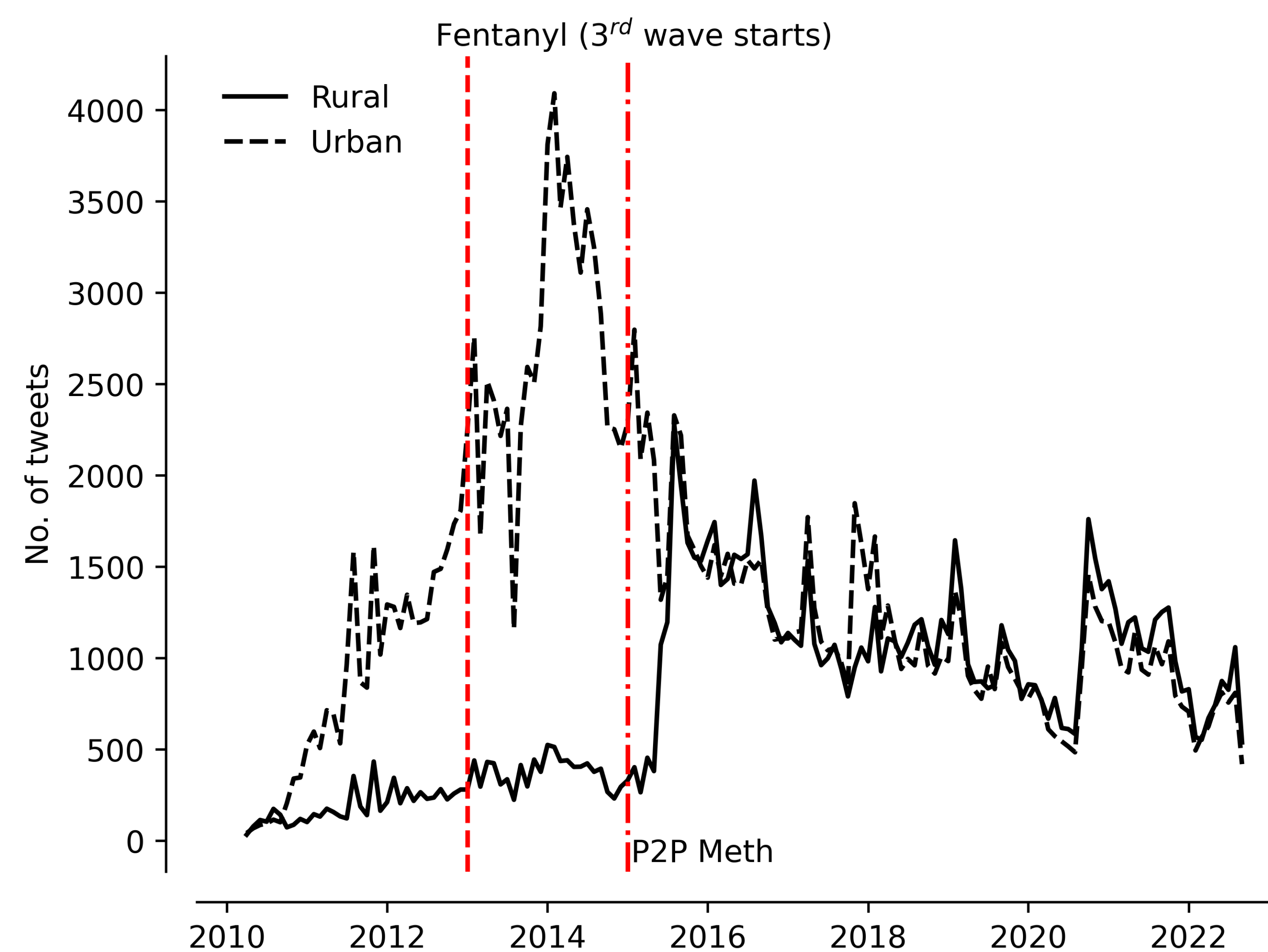


Figure 2: **Frequency of Tweets Emitted from Rural (Solid) or Urban (Dashed) Locations Mentioning Use of Any Opioid.** Y-axis, number of tweets. X-axis, time. Solid line, tweets from areas with fewer than  $10k$  inhabitants per congressional district. Dashed line, from areas with  $> 10k$ . Left red 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.

|       | Mention Any Opioid | <b>Meth</b>   | & Cocaine | & Alcohol | & Water |
|-------|--------------------|---------------|-----------|-----------|---------|
| Rural | 130,484            | <b>90,551</b> | 10,158    | 5,113     | 6,230   |
| Urban | 220,718            | <b>65,773</b> | 13,536    | 6,392     | 7,385   |

Table 1: Frequency of mention of coingestants by geographic milieu. Bold indicates statistically significant difference. Water refers to the drinking liquid, included as a negative control to establish baseline frequency.

## ACKNOWLEDGMENTS

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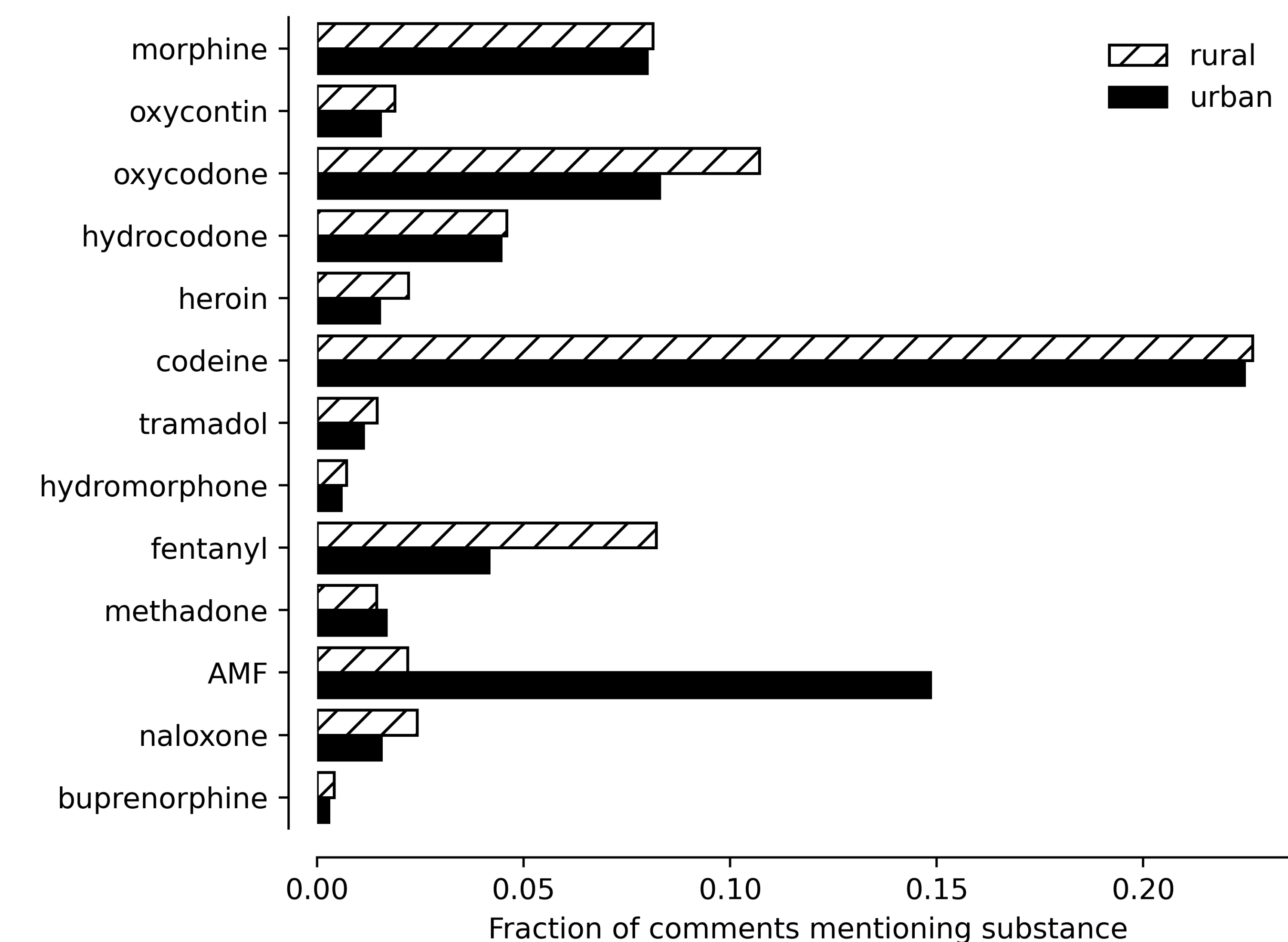


Figure 3: **Count of Substance Mentions by Rhetorical Stance** X-axis denotes number of comments on a logarithmic scale. Y-axis denotes substance groups. Color (hue) of bar indicated rhetorical stance according to legend in upper left. AMF,  $\alpha$ -methylfentanyl.

## 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.
4. Tweets from rural areas are more likely to mention methamphetamine than those from urbanized areas.

## 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)