



EXPLORING DENTAL CARE AFFORDABILITY VIA TWITTER

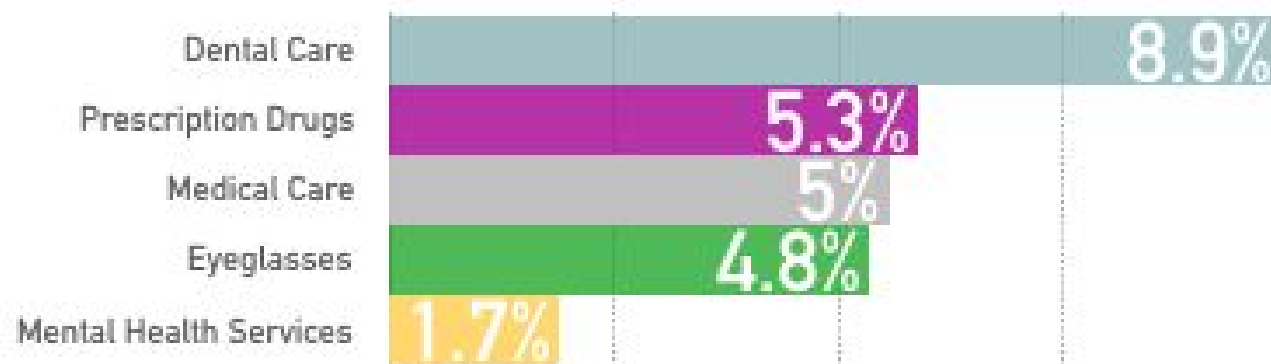
Introduction to Biomedical Informatics
12/13/17

Lorel Burns
Isabel Metzger
Ana Raghunath

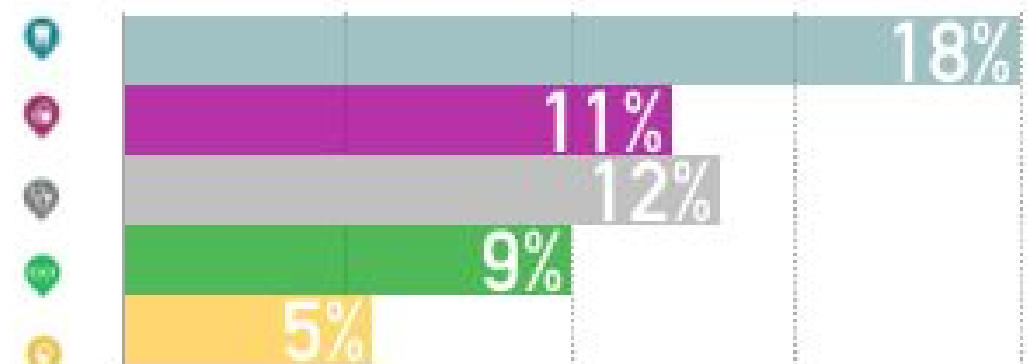
GOAL

To explore individuals' experience with financial barriers to needed dental care, quantitatively and qualitatively, using Twitter (an online microblogging service).

SIGNIFICANCE



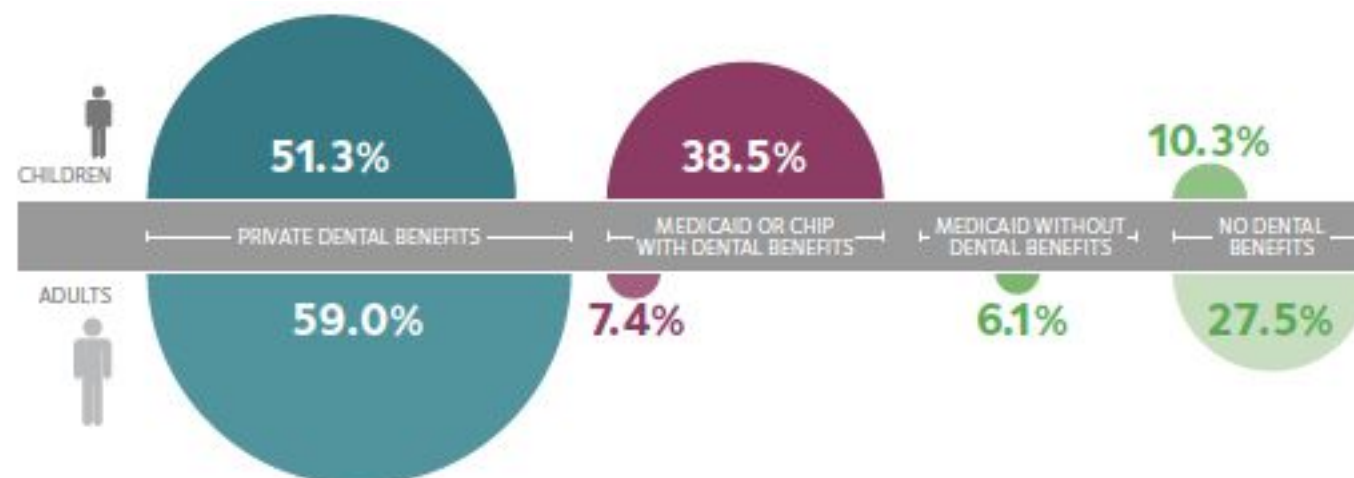
National Health Interview Survey 2016, CDC



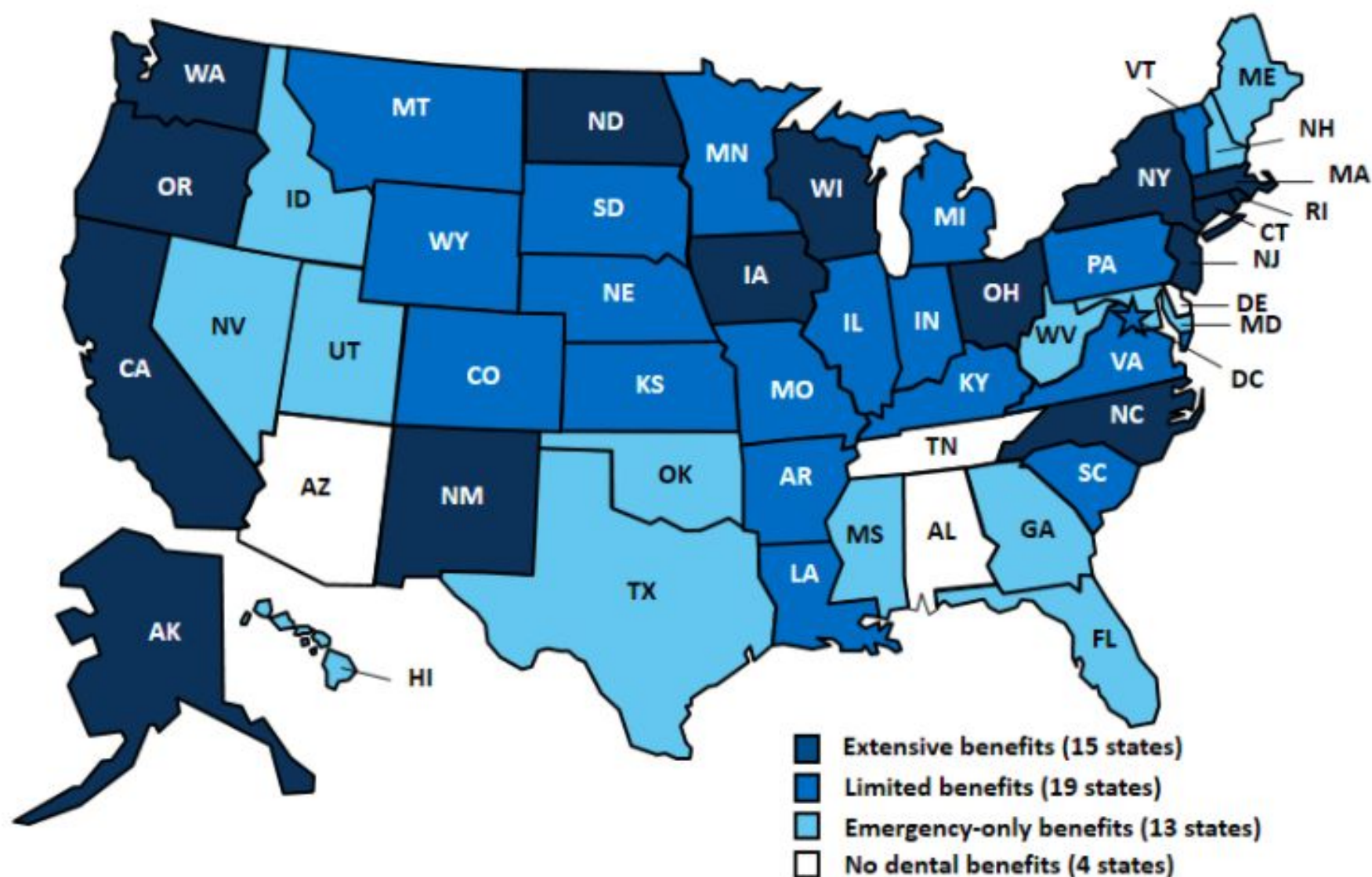
Economic Well Being US Households Survey 2016, Federal Reserve

Percentage of population reporting they needed but did not obtain select health care services during previous 12 months due to cost, 2016

Dental Benefits Coverage in the U.S., 2015



American Dental Association Health Policy Institute, 2017



SOURCE: *Medicaid Adult Dental Benefits: An Overview*, Center for Health Care Strategies, Inc., February 2016, <http://www.chcs.org/resource/medicaid-adult-dental-benefits-overview/>

.....

1 *GetOldTweets*
(webscraper)

Search Terms
Can't Afford + dentist, toothache, tooth ache, root canal, extraction
No Money For + dentist, toothache, tooth ache, root canal, extraction

No Money For + dentist, toothache, tooth ache, root canal, extraction

Tweets 2008-2017

Total: 16,152 Pilot Study: 6,000

1: 2,010 | 0: 3,982

Pilot Study: 6,000



Excluding: Afford, Dentist, Teeth, Tooth

RESULTS/ ANALYSIS

Sept. 2011:

“ In such horrible dental pain. Have good insurance but still can't afford root canal. Keep popping 3 Tylenol constantly. This sucks! #tears”

March 2015:

“ on other news I am probably going to Mexico for a few weeks just to go to the dentist since I can't afford one of those over here at all”

March 2016:

“ Half a molar just shattered out...Lovely. No money for a dentist. Looks like it's a job for whiskey and pliers. #messyfriday”

March 2017:

“ I need a root canal and a crown but I can't afford those so I guess it's two extractions instead”

May 2017:

“I can't afford a dentist appointment so I'm literally just popping painkillers like they're going out of fashion”

August 2017:

“Do people go to the hospital for severe tooth pain? Idk what to do. I can't afford a dentist visit”

METHODS/ INNOVATION

Located Users

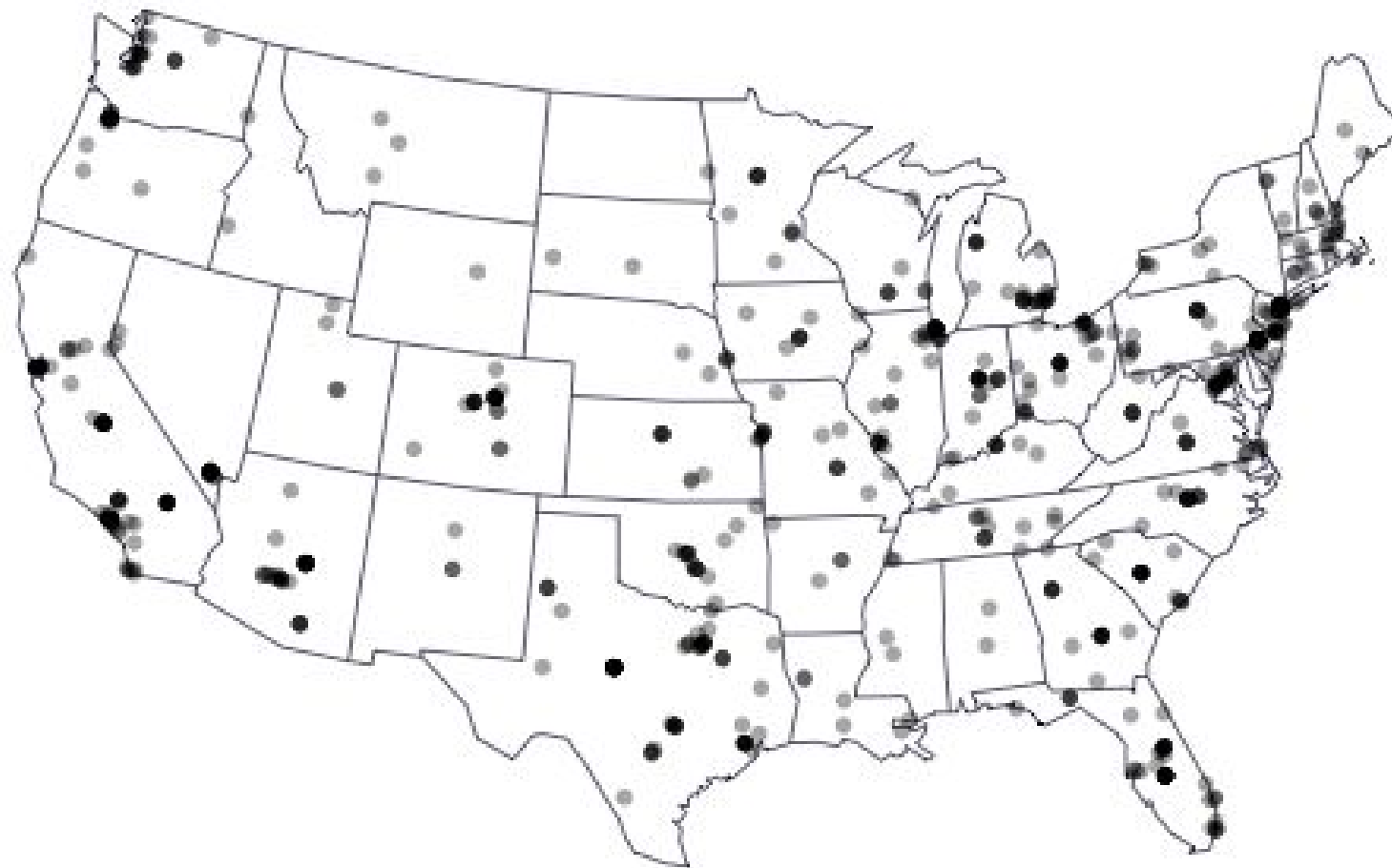
² (Twitter API/ TwitterR)
(Google Maps Geolocation
API)

Tweets coded "1" (valid content)

Extracted userframes → Selected for USA. → Located State

Tweets

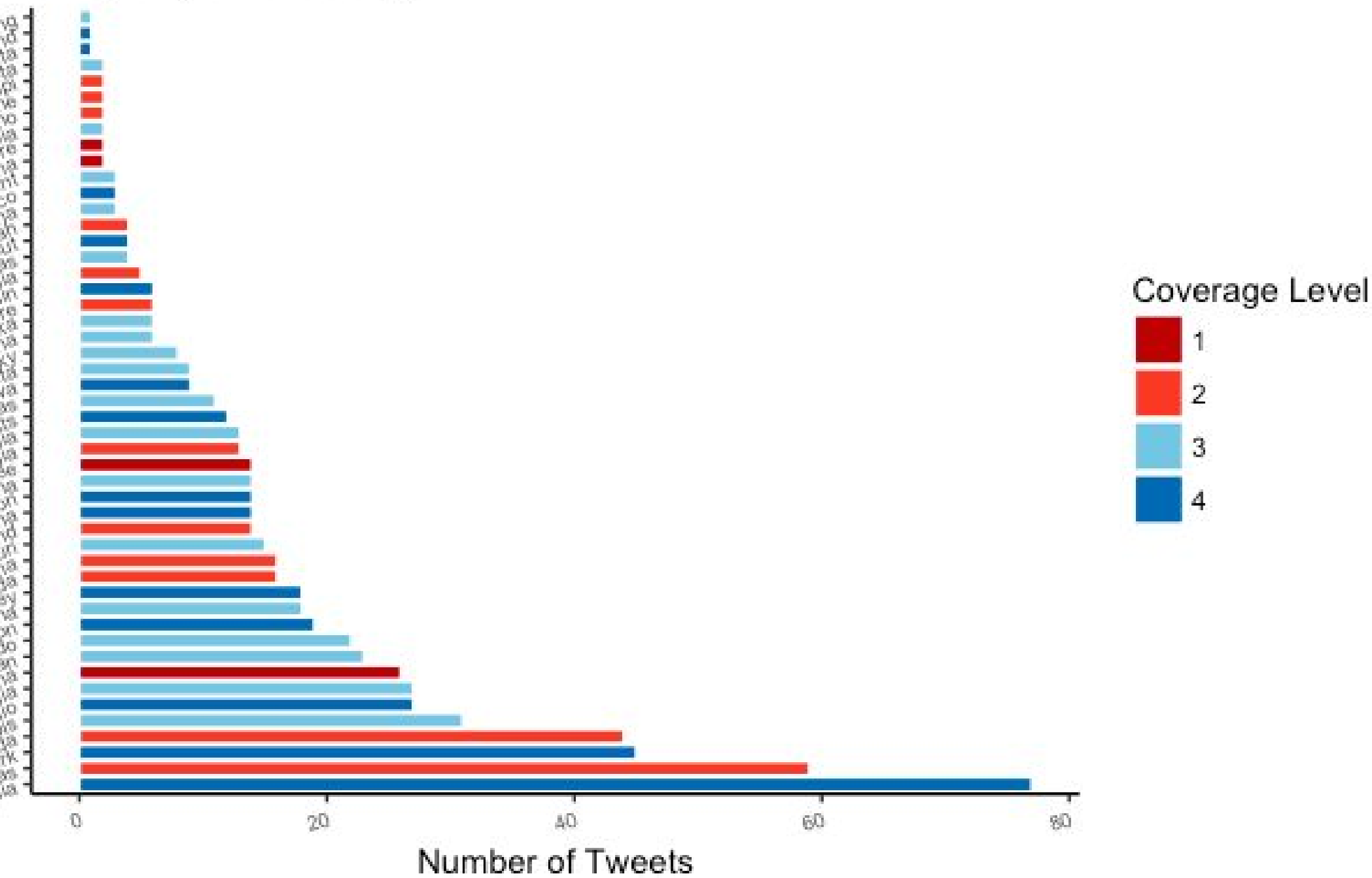
Valid: 2,010 → Located: 678



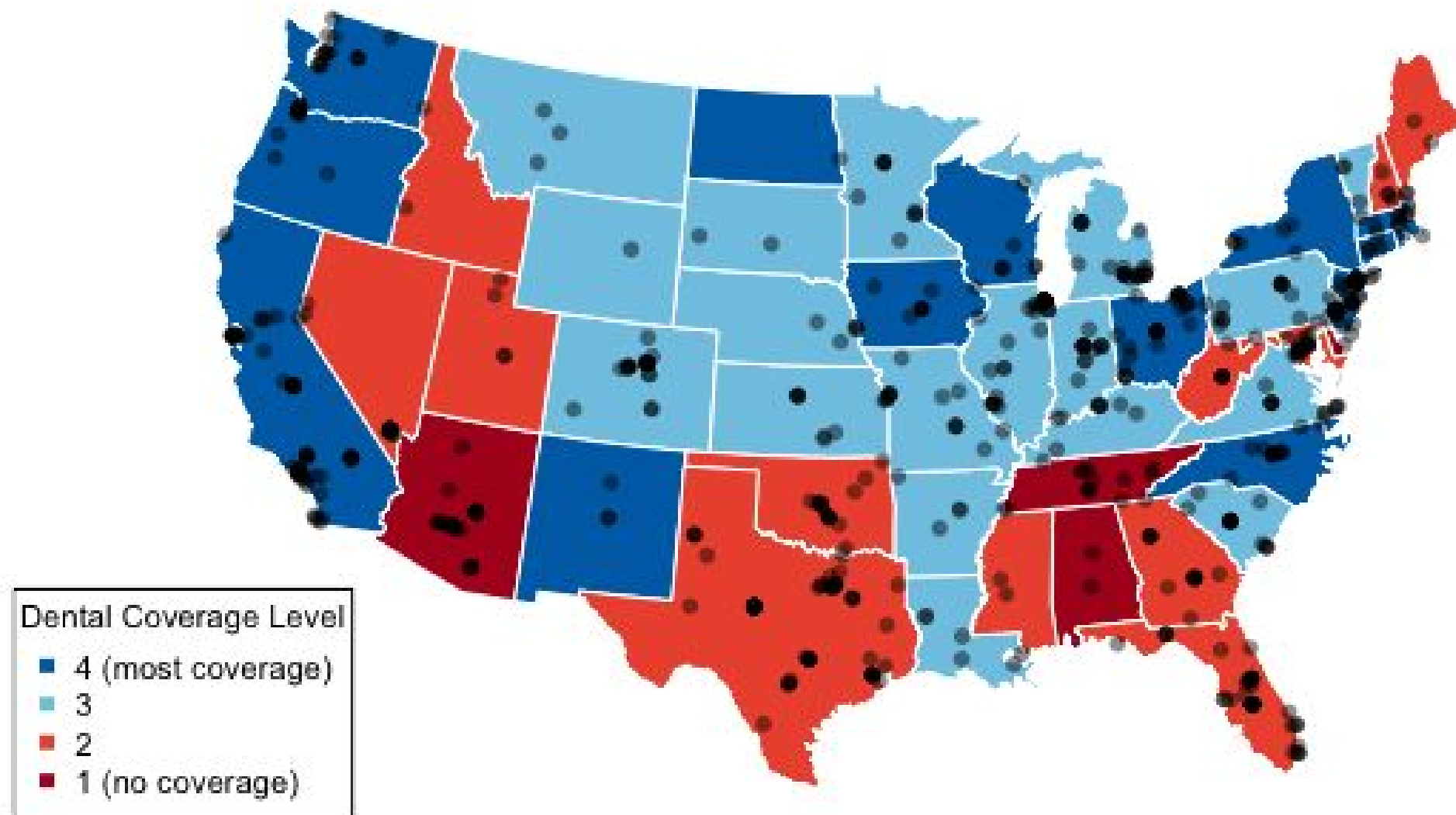
Mapped Dental Pain and Affordability Tweets

Raw Counts of Dental Affordability and Pain Tweets by State

Grouped by Dental Coverage Level

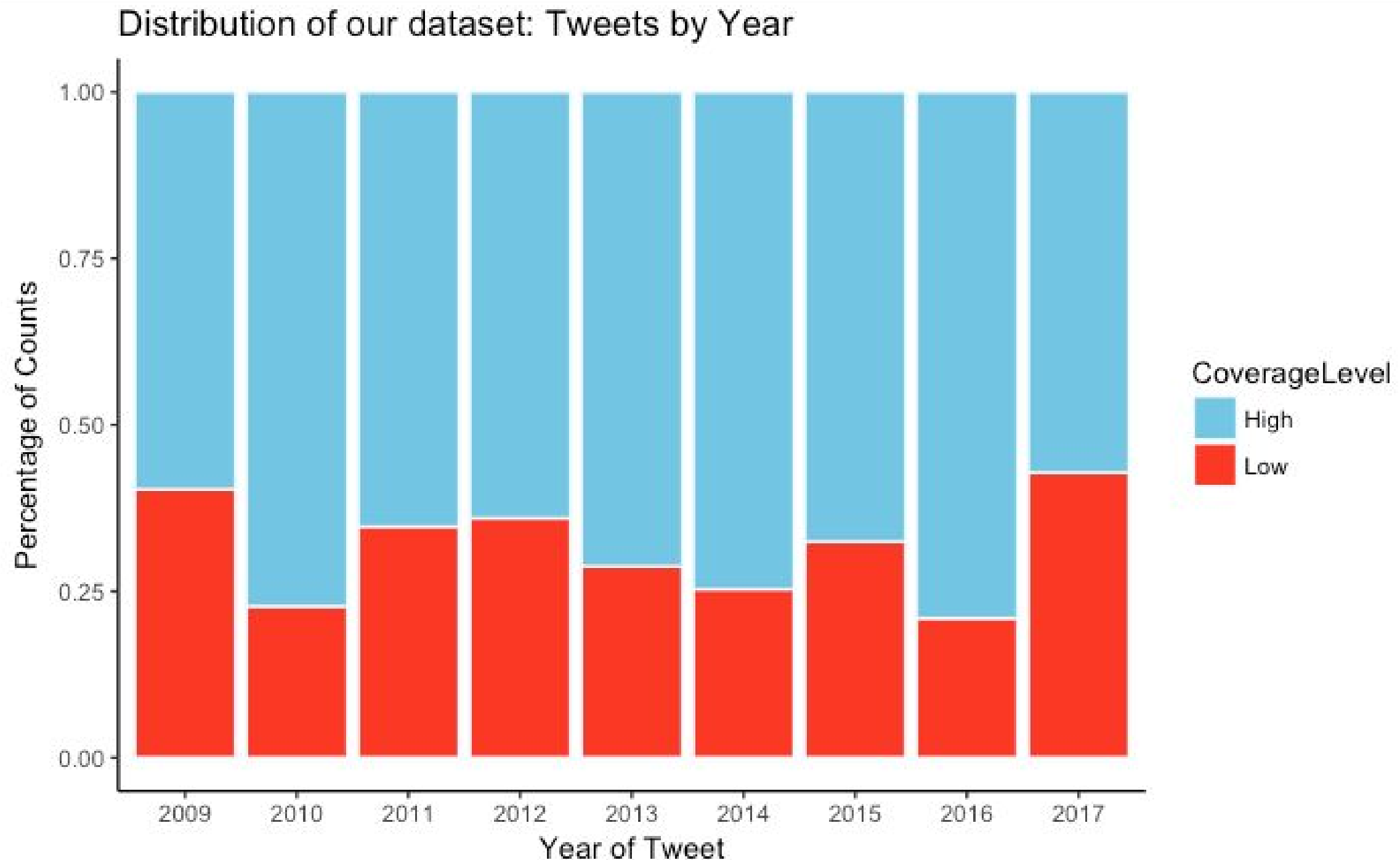


RESULTS/ ANALYSIS



Geography of Dental Care non-affordability Tweets
Displaying Medicaid State Dental Coverage Level

RESULTS/ ANALYSIS



METHODS - counts

NLP

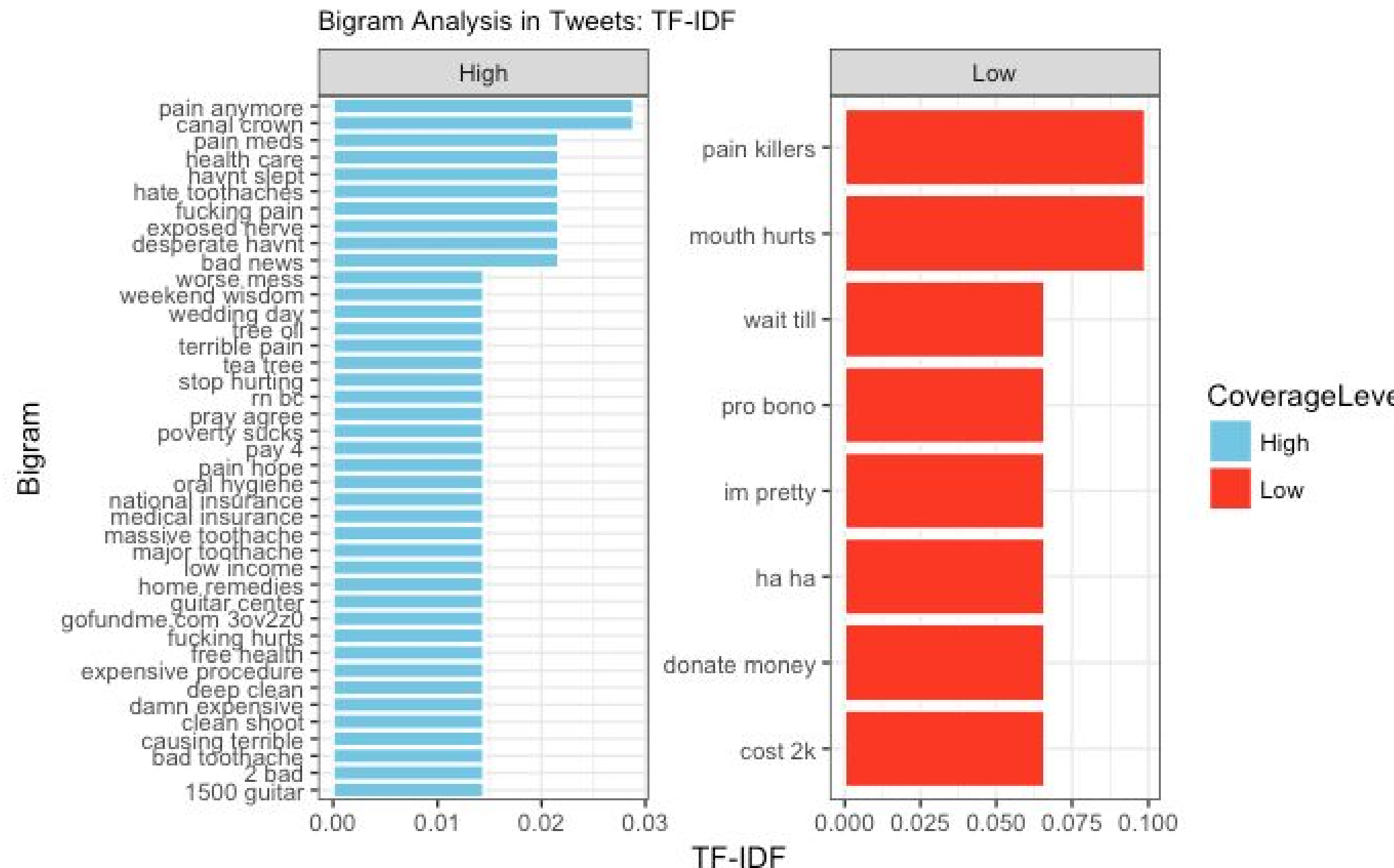
Analysis

Prevalence of Pain, Coping Mechanisms, Economic Descriptors

Tweets

NLP: 678

-Pliers
-Self Medication
-Alcohol
-Mexico
-Pain
-Hurt
-Ache
-Sore
-Agony
-Killing me



METHODS

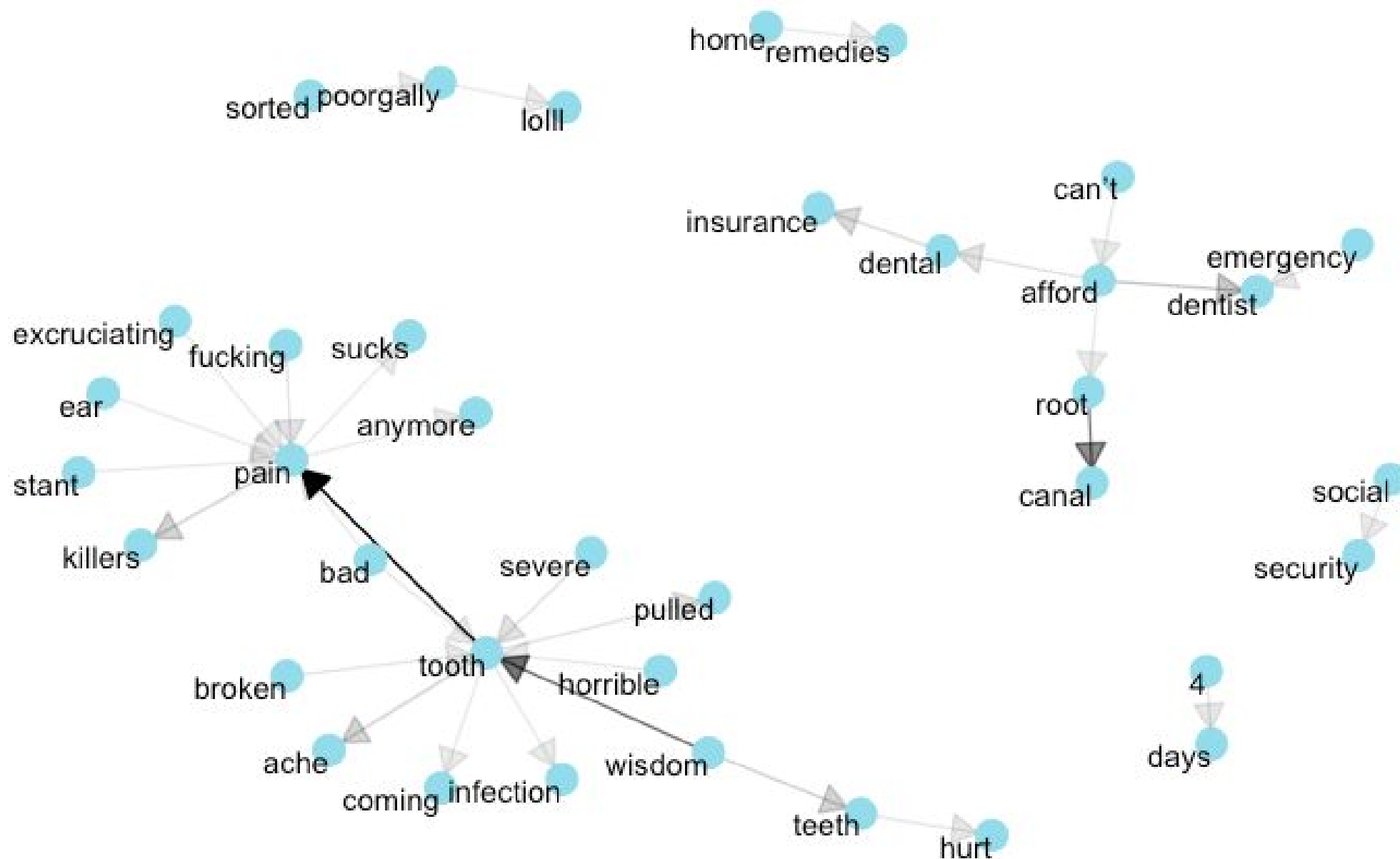
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METHODS

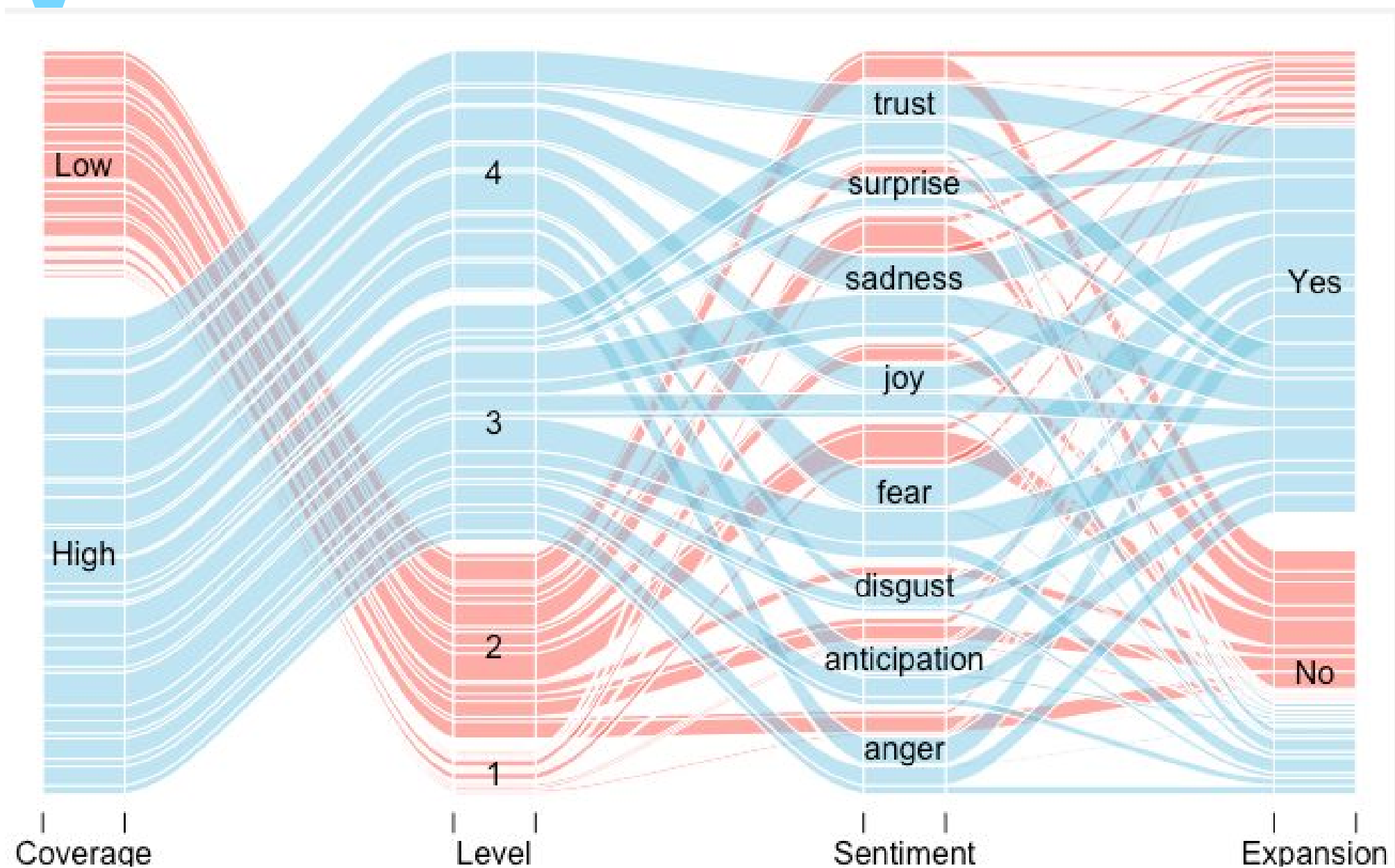
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METHODS

NLP

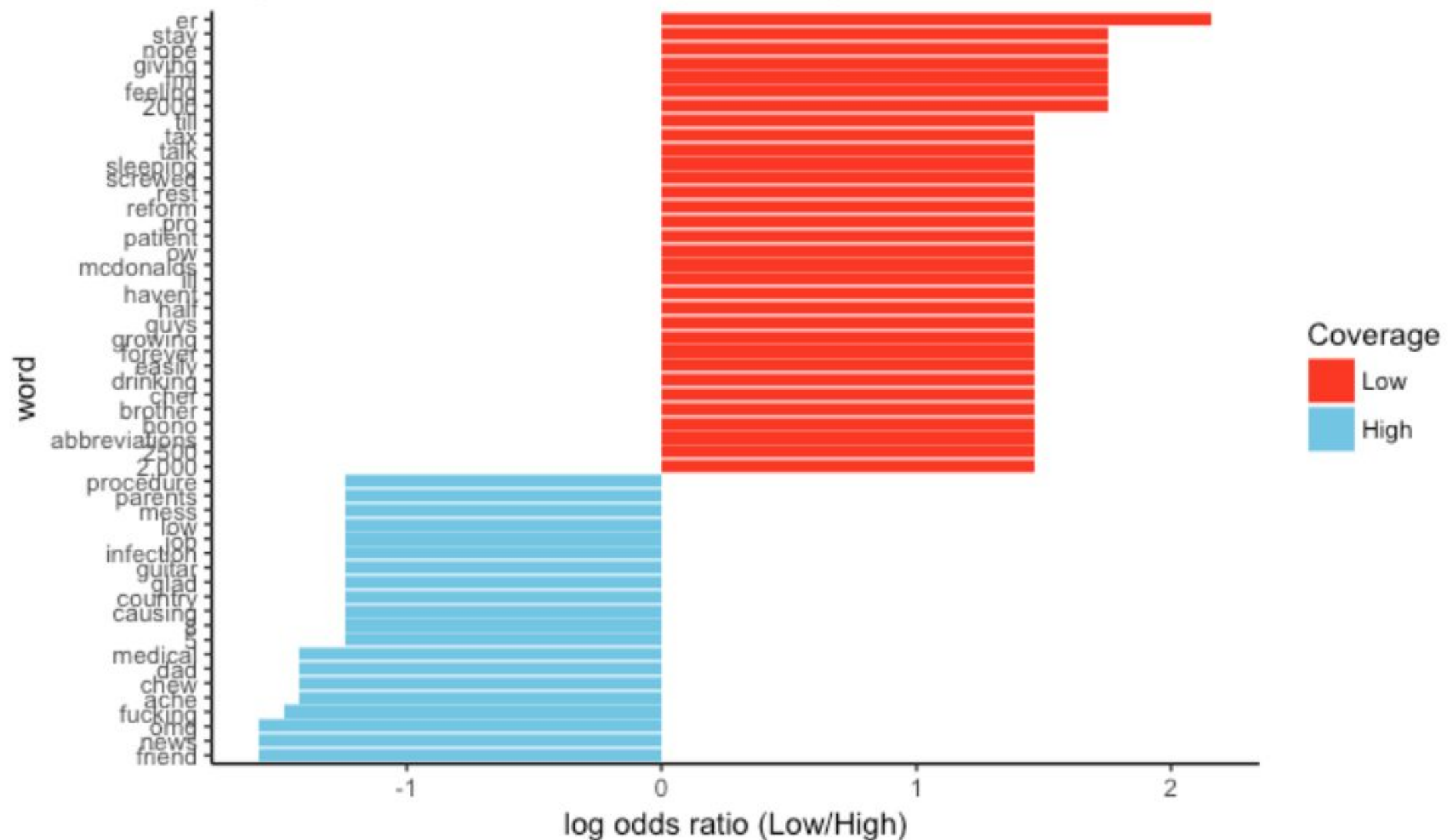
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NLP: 678

Log Odds Ratios of Words by Coverage



METHODS - Machine Learning

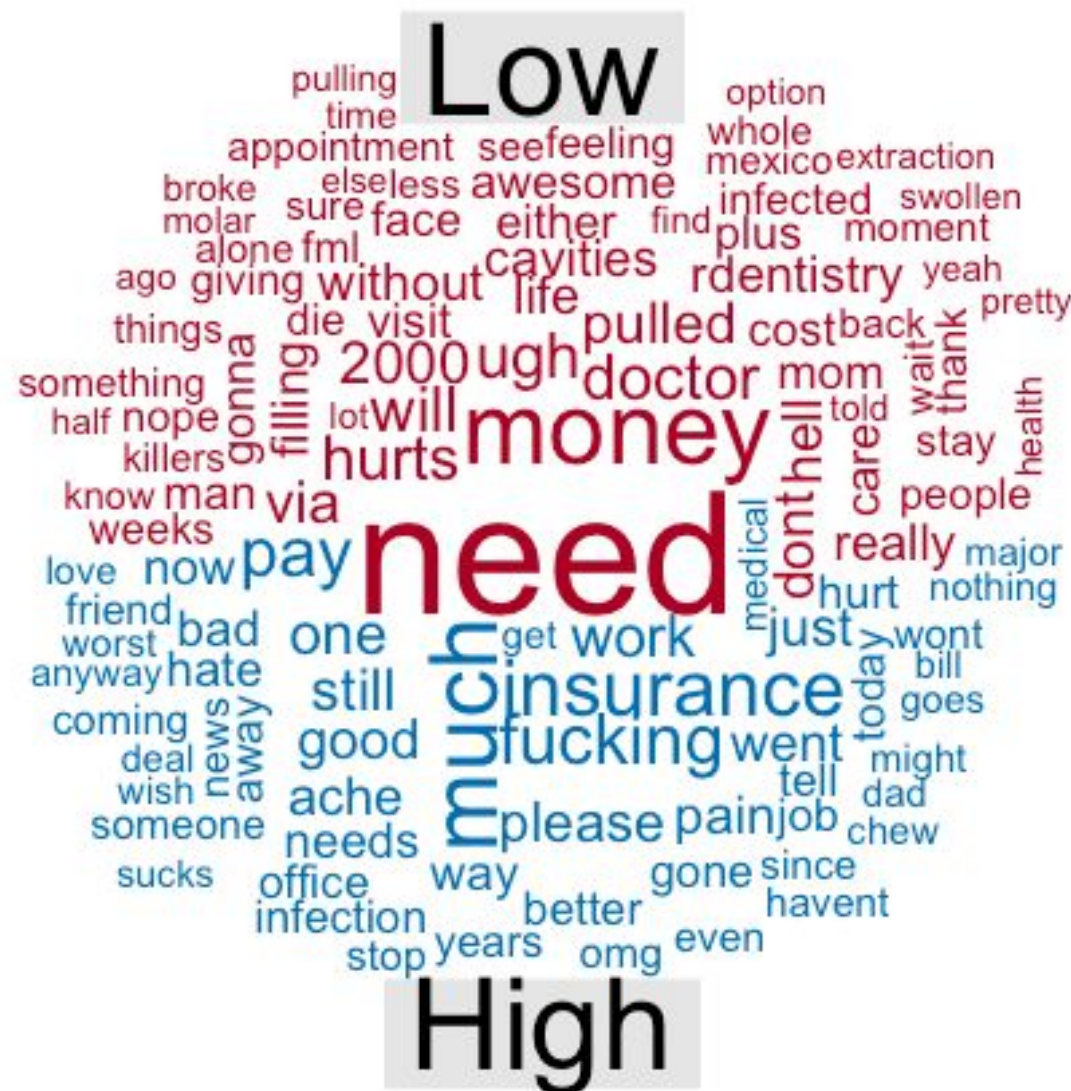
4

Machine Learning
(Userframe+ Tweets)

Can we identify a user's level of dental coverage based on twitter data?

Tweets

Training: 70% Test Data: 30%



Created new features

- # commas
- # blanks
- # capital letters
- # hashtags
- # mentions
- # capital letters used first in word
- # capitals
- # blanks (spaces)
- # Sentiment scores of tweets

Used 450 features without latitude and longitude

METHODS - feature importance

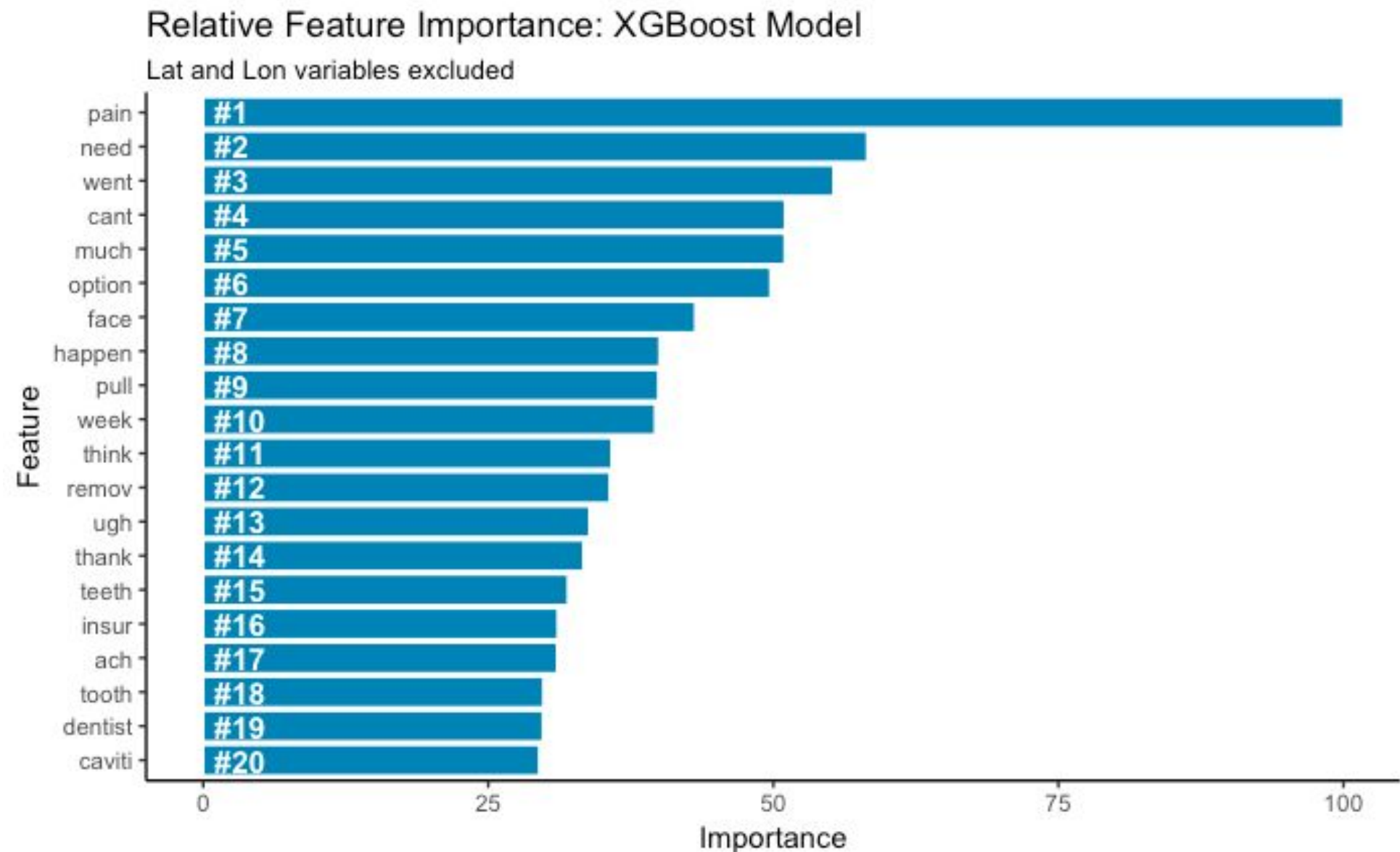
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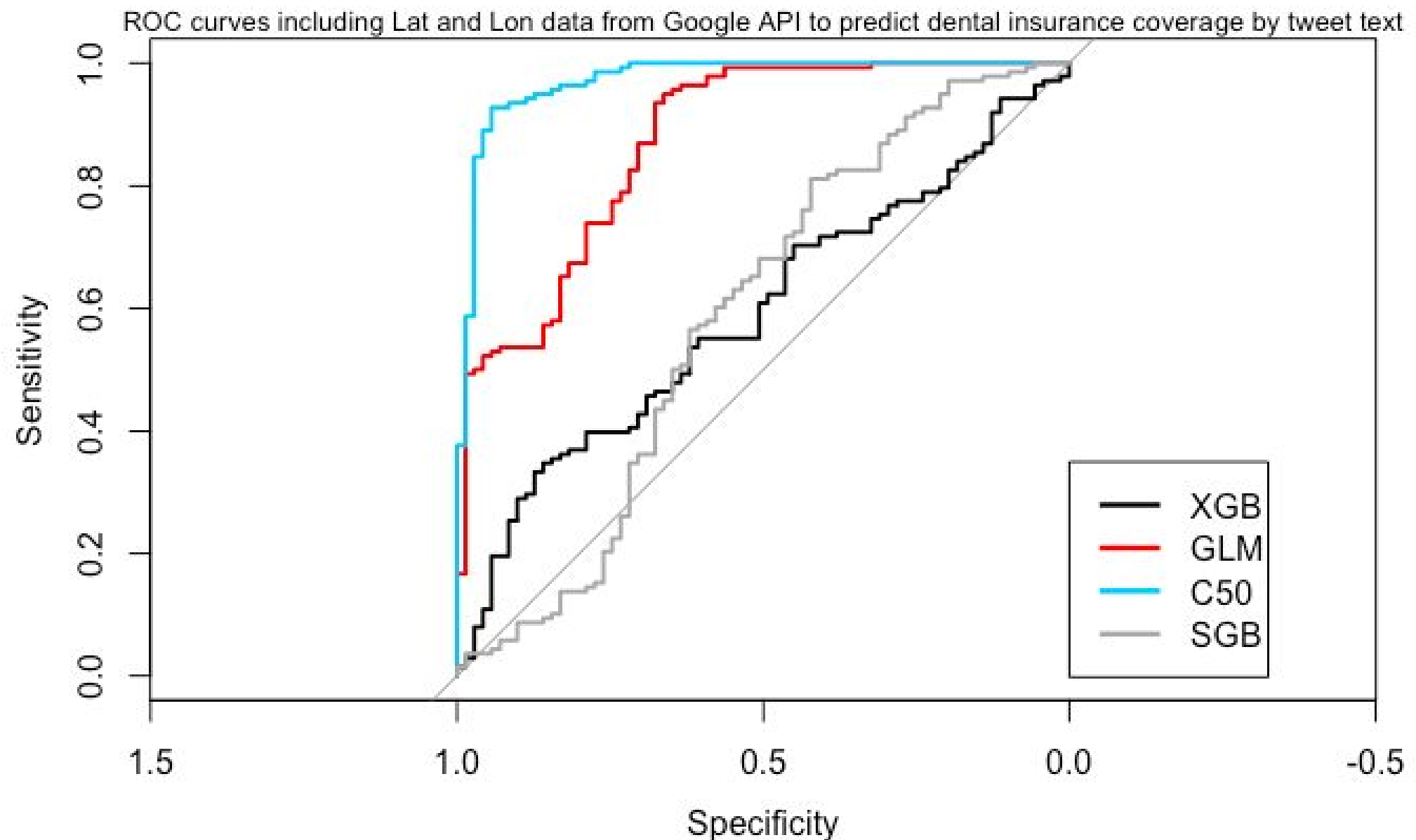


METHODS - model performance

4

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Conclusion

1

GetOldTweets

(webscraper)

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NLP

(Word Counts)
(Word
Associations)
(Bigramming)

Analysis

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NLP: 678

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