



# Exploring Dental Care Affordability Via Twitter

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## Abstract

**Objective:** The percentage of the population reporting that they needed but did not obtain dental care in the previous twelve months due to cost is higher than any other health service, according to both the Center for Disease Control and the Federal Reserve. Twitter is a social media interface in which users can microblog by sharing short messages of 140, more recently 280, characters. Through this interface, users can report real-time experiences. Twitter has been a source for several public health surveillance studies and has been used as a measurement tool for health related quality of life. In this study we explore dental care affordability via twitter.

**Study Design:** Analysis of tweets were guided by search terms that highlight lack of affordability, urgency and need for dental care. Tweets made in the United States were selected and then categorized by state. Natural language processing (including text mining, sentiment and n-gram analysis) was used to study pain prevalence, coping mechanisms and economic descriptors of the sample population.

**Population Studied:** 16,152 relevant tweets from 2009-2017 were obtained through the webscraper "GetOldTweets". The tweets were manually coded (1/0) by a dentist for validity. 1,555 tweets were valid and could be categorized into a specific state, in the United States based, on the information provided in the tweeters' userframe. Located users were mapped and the states were labeled by dental insurance coverage level, as covered by Medicaid (Levels 1-4).

**Principal Findings:** The states with the most tweets evenly represented high and low coverage areas: California, Texas, New York and Florida. Natural language processing, text analytics showed that "pain", "root canal", "insurance" and "money" were the most frequently tweeted words. Over 50% of the tweeters reporting being in pain. The most frequent coping mechanisms included self treatment, home remedies and over the counter treatments/ medications. Bigrams of tweets by insurance coverage level showed that tweeters in both high and low coverage areas tweeted about pain at the same rates but tweeters from low coverage areas were more likely to tweet about the use of painkillers and visits to the emergency room. Tweeters from low dental insurance coverage areas had sentiments more frequently associated with disgust, anger and fear when tweeting about their inability to afford dental care.

**Conclusions:** Findings suggest that people throughout the United States are unable to afford dental care despite the level of safety net dental insurance coverage provided by Medicaid.

**Implications for Policy or Practice:** Findings from this study were both qualitative and quantitative and provide insight into prevalence of dental pain, which dental procedures patients are unable to afford as well as common coping mechanisms when dental care is inaccessible.

## Introduction

- Americans report needing dental care, but being unable to obtain it due to cost more than any other health care service
- Over 33% of adults in the United States lack dental coverage
- Comprehensive dental coverage for children is an essential benefit under the Affordable Care Act, making it mandatory for children enrolled in Medicaid. However, dental benefits for Medicaid- eligible adults are optional and level of coverage is determined at the state level.
- Medicaid Coverage of Adult Dental Benefits:
  - No Coverage: No benefits are offered, including in emergency situations
  - Emergency Only: Relief of Pain under defined emergency situations
  - Limited: Fewer than 100 diagnostic, preventative, and minor restorative procedures recognized by the American Dental Association (ADA); per-person annual expenditure for care is \$1000 or less.
  - Extensive: A comprehensive mix of services, including more than 100 diagnostic, preventative, minor/ major restorative procedures recognized by the ADA; per-person annual expenditure cap is at least \$1,000.

## Sample Tweets

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"

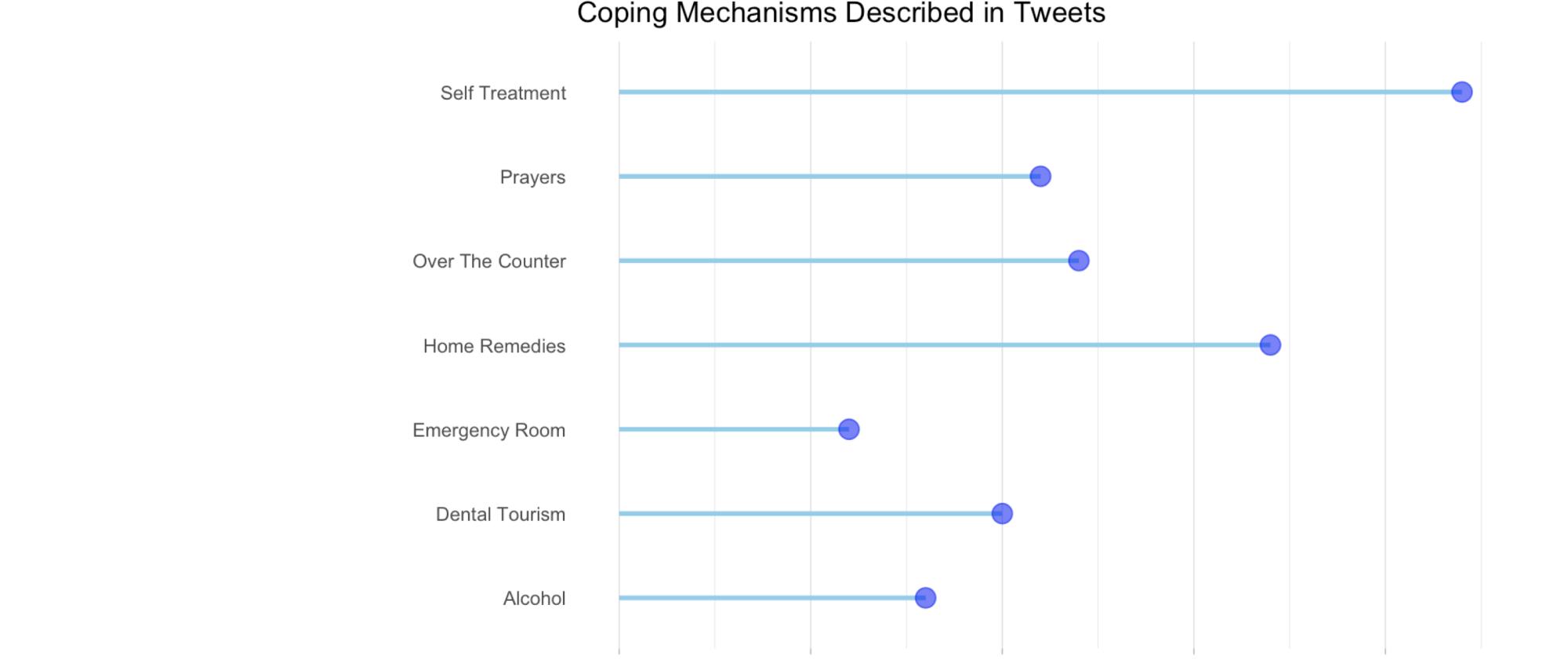
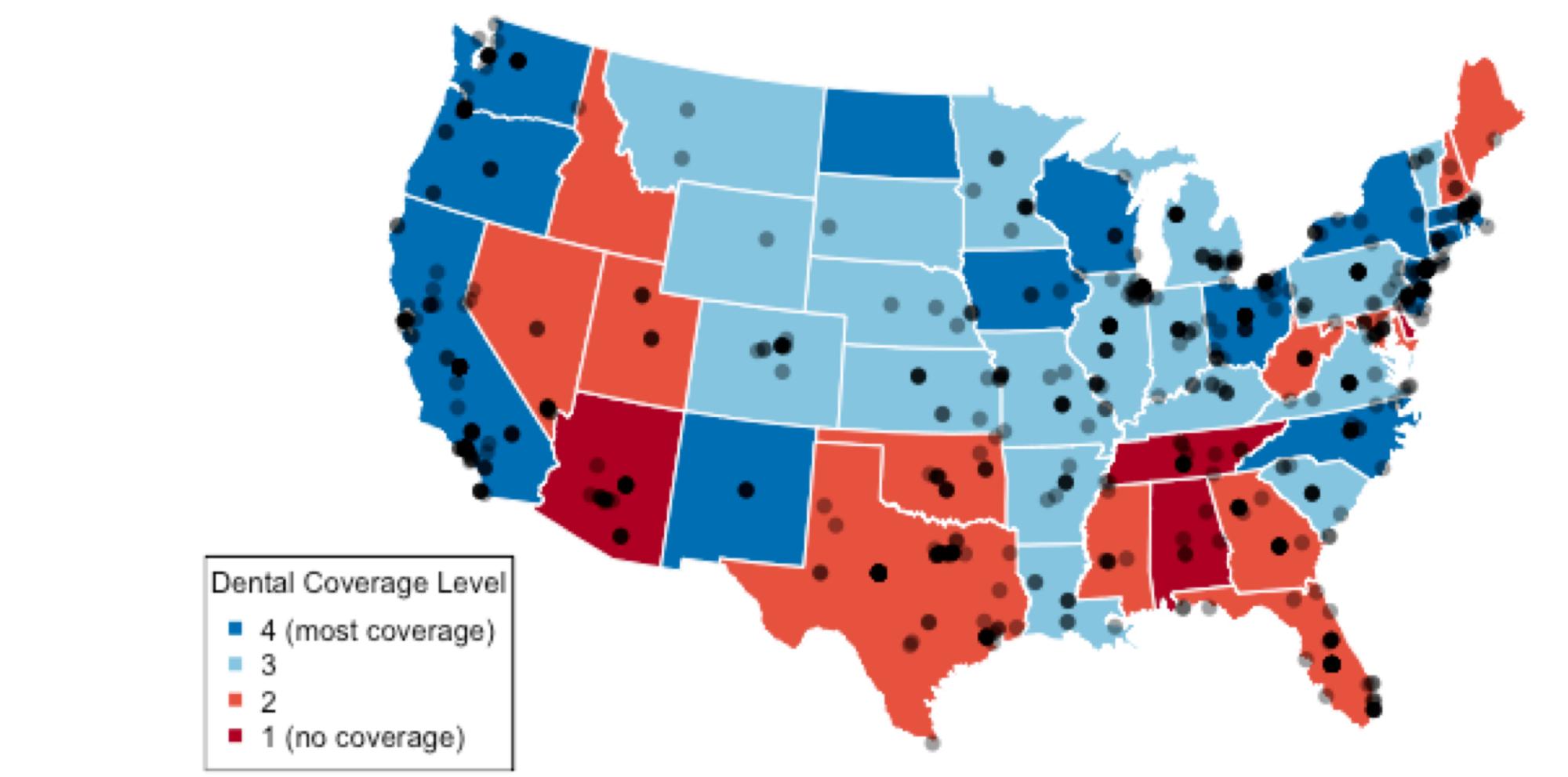
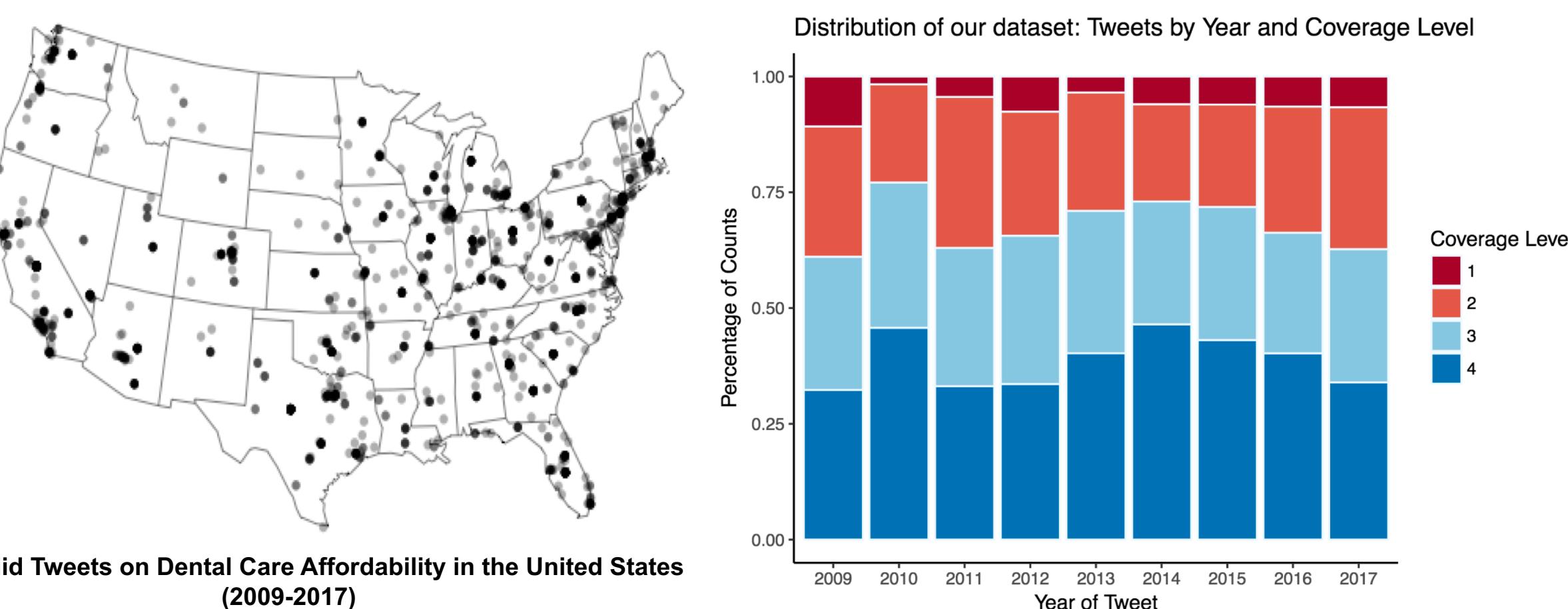
March 2016:  
"Half a molar just shattered out... Lovely. No money for a dentist. Looks like it's a job for whiskey and pliers. #messyfriday"

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"

## Results



## Methods

### Gathering Tweets

- 16,152 tweets from 2009-2017 pulled using web scraper "get old tweets"
  - Search terms: Can't afford / Can't pay / No money for → Toothache | Tooth ache, Dentist, Root canal | Rootcanal, Extraction, Tooth pain, Dental pain, Teeth hurt
- Duplicate tweets removed through both manual deletion and coding through R
- Tweets were coded (1/0) manually by DDS for content validity
- 1,555 Tweets were located and placed in a specific state in the United States
  - Twitter API was used to extract tweeters' userframes and google maps API was used to map the tweets (latitude and longitude)

### Analyzing Tweets

- States were categorized and color coded by Medicaid coverage level of adult dental benefits (1-4)
- Natural language processing was conducted by methods of word counts, word associations, sentiment analysis, and n-gram analysis in order to analyze pain prevalence, coping mechanisms, and economic descriptors.

## Summary

- Number of Tweets by Coverage Level**
  - Low: 498 (32%)
  - High: 1057 (68%)
- The states with the most tweets evenly represented high and low coverage areas**
  - High Coverage: California, New York
  - Low Coverage: Texas, Florida
- Natural Language Processing showed that "pain", "root canal", "insurance", and "money" were the most frequently tweeted words**
- 37% of valid/ located tweets reported pain**
  - Prior to introducing the Location inclusion criteria, over 50% of valid, coded tweets reported pain
- Of tweets that mentioned coping Mechanisms, self-treatment, over-the-counter treatments/ medicines and home remedies were mentioned most often.**
  - Self Treatment included the use of 'Pliers' and 'Pulling teeth'
  - Over The Counter (OTC) coping Strategies: 'Oralجel', 'Aspirin', 'Painkillers', 'Antibiotics'
  - Home Remedies: 'Oil pulling', 'Eating raw garlic', use of 'Clove oil' and more.
- Tweeters in both high and low coverage areas tweeted about pain in equal amounts but tweeters from low coverage areas were more likely to tweet about the use of painkillers and visits to the emergency room.**
- Tweeters from low coverage areas tweeted sentiments more frequently associated with disgust, anger, and fear when tweeting about their inability to afford dental care.**
- People in low coverage areas reported higher out of pocket costs for dental treatment.**

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work  
today  
glad  
dental  
poor  
low  
omg  
hurt  
insurance  
falling  
remedies  
hope  
pliers  
covered  
haven't  
  
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**LOW**  
**HIGH**

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