Digital Voices: A Comparative Analysis of Google Reviews in Rural High- and Low-Health Ranked Counties

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BACKGROUND & OBJECTIVES

Online patient reviews have become a central source of information for choosing clinicians and hospitals, with platforms such as Google now among the most frequently used sites for evaluating healthcare providers.

Although star ratings do not fully capture clinical quality, multiple studies show that hospital ratings on online platforms correlate with traditional quality and patient-experience measures, suggesting that they offer a meaningful—if imperfect—signal of perceived care quality.

County Health Rankings & Roadmaps provides a framework and metrics to summarize county-level population health, offering a lens to examine how local context shapes perceptions of care.

Beyond numeric ratings, narrative review text contains rich, real-time information about what patients value and how they describe their experiences, offering insight into potential disparities in perceived healthcare quality and informing efforts to improve patient experiences in underserved rural areas.

This study focuses on rural healthcare institutions in Eastern North Carolina (ENC) and aims to:

1. Describe the distribution of Google ratings for rural Eastern NC healthcare facilities and examine how they vary across counties with differing County Health Rankings.
2. Assess whether facilities located in lower-ranked (less healthy) counties receive lower overall ratings compared with facilities in higher-ranked counties.
3. Analyze the linguistic content of patient reviews to characterize how patients talk about their care (e.g., emotions, trust, access, communication, and responsiveness).
4. Explore whether linguistic patterns in reviews differ across levels of Google star ratings.

METHODS

We analyzed publicly available Google Maps reviews for healthcare facilities in rural ENC. Rurality was defined using the USDA Rural–Urban Continuum Codes. ENC counties were identified using the NC Office of State Budget and Management regions; of 27 eligible counties, 19 with at least one facility were included.

County health status was characterized using the County Health Rankings & Roadmaps "Population Health and Well-Being" summary measure. Healthcare institutions were gathered from: (1) NC-licensed hospitals (including CAHs), (2) CMS provider and rural health clinic listings, (3) federally qualified health centers, and (4) NC local health departments, yielding 78 unique facilities across the 19 rural ENC counties.

A Python script utilizing the Google Places API was employed to retrieve Google Maps URLs. Google reviews were then collected using the Apify Google Maps Reviews Scraper, capturing star ratings and review text. In total, 6,178 reviews were retrieved; after excluding reviews with <10 words, 3,759 reviews remained for analysis.

Primary outcomes were the Google star rating and corresponding review text at the individual-review level aggregated to the facility/county level. Facility mean star ratings were summarized and compared across county health groups. Review texts were analyzed using LIWC 2015 to quantify linguistic and psychological categories. LIWC variables were examined across star ratings to characterize the language used in reviews.

Only de-identified, publicly available ratings and review text were used; no personal identifiers were retained. The study qualified as non–human subjects research and did not require IRB review under local policy.

RESULTS

- We identified 78 healthcare facilities across 19 rural ENC counties, yielding 6,178 Google reviews; 3,759 reviews with ≥10 words were retained for analysis.
- Facility-level ratings ranged from 2.1 to 4.6 stars (overall mean ≈3.8; Table 1. When grouped using the County Health Rankings' "Population Health and Well-Being" measure, facilities in less healthy counties (groups 7–8) tended to have lower ratings (≈3.6–3.8 stars) than facilities in healthier counties (groups 2–4; ≈4.0–4.1 stars).

Table 1. Overall county health status and average Google star rating by county.

NC County	County Health Group	Google Star Rating
Bertie	8	4.3
Halifax	8	3.9
Lenoir	8	2.1
Martin	8	3.8
Washington	8	4.0
Hertford	7	3.6
Northampton	7	4.3
Wilson	7	3.5
Beaufort	6	3.5
Pamlico	6	3.8
Chowan	5	4.3
Duplin	5	3.7
Greene	5	4.1
Pasquotank	5	2.5
Perquimans	5	4.4
Carteret	4	3.5
Hyde	4	4.6
Tyrrell	3	3.9
Dare	2	4.0

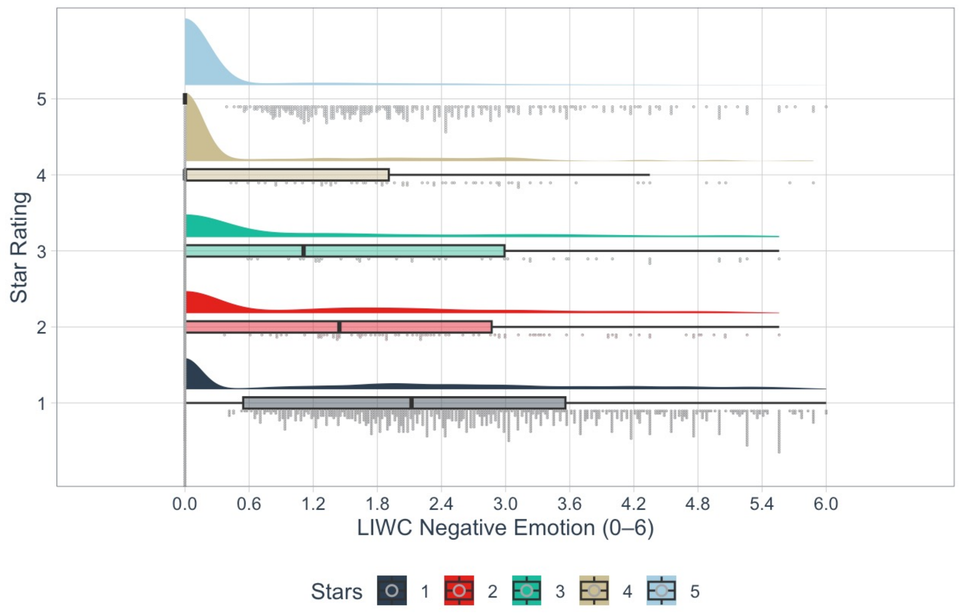

Figure 1. Raincloud Plot of LIWC Negative Emotion by Star Rating.

- Review scores were highly polarized, nearly 90% of reviews were either1-or 5-star, with few 2–4-star reviews.
- Negative-emotion words were most prominent in low-rating reviews (Fig. 1).
- Across LIWC analyses, emotional tone increased monotonically with higher star ratings (mean tone ≈27 for 1-star vs. ≈88 for 5-star reviews), indicating that more positive ratings were accompanied by more positive overall language (Fig. 2–left, 3–a).
- Anger-related words were concentrated in low-rating reviews and decreased sharply with higher ratings (mean anger ≈3.2 for 1-star vs. ≈0.7 for 5-star; Fig. 2–right, 3–b).
- Use of negation words (e.g., "no," "not," "never") also declined from low to high ratings, consistent with fewer complaints and explicitly negative statements in positive reviews (Fig. 3–c).
- Small-multiples word clouds highlighted distinct thematic emphases. One-star reviews (Fig. 4) were dominated by terms related to delays, poor communication, and perceived disrespect (e.g., "waiting," "hours," "rude," "worst," "appointment," "told," "left," "emergency," "pain").
- In contrast, five-star reviews (Fig. 5) emphasized interpersonal quality, professionalism, and efficiency (e.g., "staff," "care," "friendly," "nurses," "doctor," "professional," "helpful," "excellent," "caring," "quick," "clean").
- These patterns show that rural patients' narratives differentiate not only levels of satisfaction but also specific dimensions of the care experience that may underlie perceived quality.

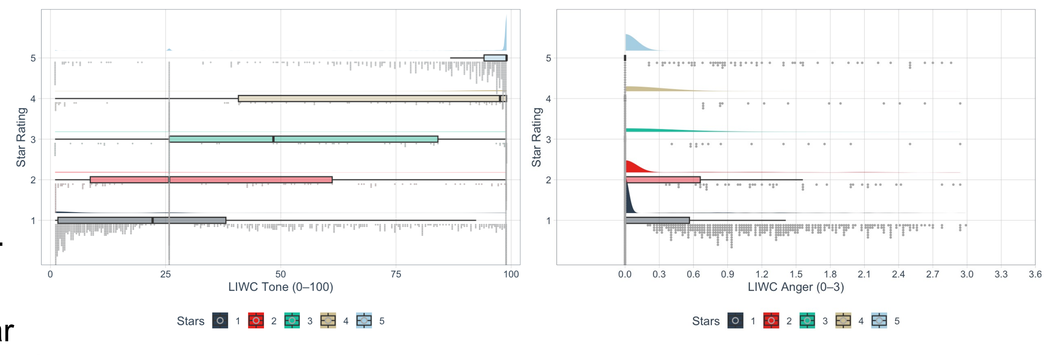

Figure 2. Raincloud Plots of LIWC Tone (left) and Anger (right) by Star Rating.

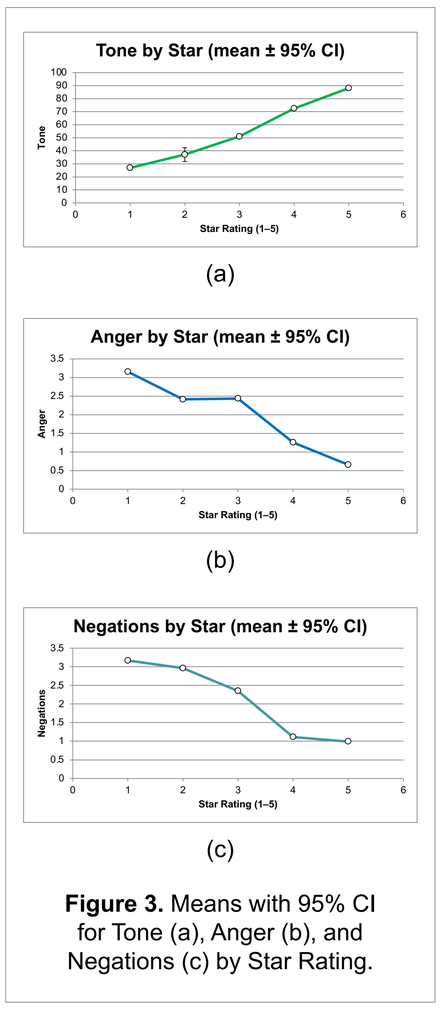

Figure 3. Means with 95% CI for Tone (a), Anger (b), and Negations (c) by Star Rating.

Figure 4. 1-star reviews.

Figure 5. 5-star reviews.

CONCLUSIONS & NEXT STEPS

Rural ENC facilities had generally moderate–to–high Google ratings, but ratings tended to be lower in counties with poorer population health, suggesting potential inequities in perceived care quality. Reviews were highly polarized: low-star reviews showed more anger, negative emotion, and negation, whereas high-star reviews used more positive tone and praised staff and efficiency. Online narratives thus highlight specific drivers of dissatisfaction (e.g., waits, communication) and satisfaction (e.g., caring staff), complementing traditional quality measures.
Next Steps include extending analyses to all NC counties to compare rural vs. urban patterns; using advanced NLP to identify themes within reviews across star ratings; and assessing large language models as tools to summarize and monitor reviews for quality improvement and equity.