

Understanding Vaccine Hesitancy in Louisiana: a study of social media listening and community feedback

Angie Viviana Sanchez, Julia Ardoin, Sadie Smith, Sahithya Sakhamuri, Henry Chu

Submitted to: Journal of Medical Internet Research
on: May 01, 2025

Disclaimer: © The authors. All rights reserved. This is a privileged document currently under peer-review/community review. Authors have provided JMIR Publications with an exclusive license to publish this preprint on its website for review purposes only. While the final peer-reviewed paper may be licensed under a CC BY license on publication, at this stage authors and publisher expressly prohibit redistribution of this draft paper other than for review purposes.

Table of Contents

Original Manuscript.....	5
---------------------------------	----------

Preprint
JMIR Publications

Understanding Vaccine Hesitancy in Louisiana: a study of social media listening and community feedback

Angie Viviana Sanchez¹ MD, MPH; Julia Ardoin¹ BA; Sadie Smith¹ MPH; Sahithya Sakhamuri¹ MPH; Henry Chu¹ PhD

¹ University of Louisiana at Lafayette Lafayette US

Corresponding Author:

Angie Viviana Sanchez MD, MPH

University of Louisiana at Lafayette
635 Cajundome Blvd
Lafayette
US

Abstract

INTRODUCTION: The rise of social media has significantly impacted public health programs, with platforms such as YouTube, Facebook, X (formerly Twitter), Instagram, and more recently, TikTok, being used to promote health information, raise awareness about disease outbreaks, and support disease prevention programs. However, the diverse and often unverified nature of the content on social media can make it challenging to discern accurate information, contributing to user uncertainty, which may contribute to low vaccination rates in some regions. This is especially true in Louisiana, as COVID-19 vaccination rates were among the lowest in the country in 2022. Therefore, understanding public sentiment on social media and developing targeted campaigns to counter unverified information is essential for advancing public health campaigns.

METHODS: Social media listening was conducted using Meltwater, a media monitoring and social listening platform, supplemented by Google Alerts and Google News, to identify if vaccine-related stories or sentiments were attracting unusual attention. Additionally, a social media campaign aimed at educating Louisiana residents about disease manifestation, symptoms, vaccines available for disease prevention, and potential side effects was developed. Posts were published two to three times a week and boosted for seven days.

RESULTS: From November 13, 2023, to June 11, 2024, social media listening identified at least 15 unique, noteworthy stories that signified sentiment spikes. These conversations were predominately related to vaccine hesitancy, with users expressing opposition to vaccines or reluctance to engaging with vaccine-related information. Sentiment spikes included themes related to mistrust of vaccines and concerns about their safety and efficacy. The social media campaign received 69,600 impressions, reached 43,429 users, received 652 reactions and likes, 62 shares, and 105 comments. Most of the audience was female, with higher engagement from older users on Facebook and younger users on Instagram. Finally, posts related to Hepatitis B, Rotavirus, and MMR vaccines received the most attention.

DISCUSSION: Social media has become a key tool for digital health, helping to implement disease prevention programs and promoting advances in medicine. However, unverified information remains a major barrier to vaccination, despite the dissemination of information from reputable public health organizations and providers. To address this, information that is accessible, understandable, and culturally competent must be circulated to mitigate disinformation and improve attitudes toward vaccination. More research is needed to evaluate the effectiveness of social media campaigns in reducing vaccine hesitancy and improving willingness to adopt public health recommendations to increase vaccination rates.

(JMIR Preprints 01/05/2025:76827)

DOI: <https://doi.org/10.2196/preprints.76827>

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**

Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.

No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**

Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain visible to all users.

Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <https://www.jmir.org/preprint/76827>

No. Please do not make my accepted manuscript PDF available to anyone. I understand that if I later pay to participate in <https://www.jmir.org/preprint/76827>



Original Manuscript

Understanding Vaccine Hesitancy in Louisiana: a study of social media listening and community feedback

Angie V. Sanchez, MD, MPH¹, Julia Ardoin, BA¹, Sadie Smith, MPH¹, Sahithya Sakhamuri, MPH¹,

Henry Chu, PhD¹

¹University of Louisiana at Lafayette, 104 E University Ave, Lafayette, LA 70504

Correspondence and reprint requests may be mailed to 635 Cajundome Blvd, Lafayette, LA 70506.

The corresponding author is Dr. Angie Sanchez who may be reached at angie.sanchez@louisiana.edu

or 337-482-0694

Abstract

INTRODUCTION: The rise of social media has significantly impacted public health programs, with platforms such as YouTube, Facebook, X (formerly Twitter), Instagram, and more recently, TikTok, being used to promote health information, raise awareness about disease outbreaks, and support disease prevention programs. However, the diverse and often unverified nature of the content on social media can make it challenging to discern accurate information, contributing to user uncertainty, which may contribute to low vaccination rates in some regions. This is especially true in

Louisiana, as COVID-19 vaccination rates were among the lowest in the country in 2022. Therefore, understanding public sentiment on social media and developing targeted campaigns to counter unverified information is essential for advancing public health campaigns.

METHODS: Social media listening was conducted using Meltwater, a media monitoring and social listening platform, supplemented by Google Alerts and Google News, to identify if vaccine-related stories or sentiments were attracting unusual attention. Additionally, a social media campaign aimed at educating Louisiana residents about disease manifestation, symptoms, vaccines available for disease prevention, and potential side effects was developed. Posts were published two to three times a week and boosted for seven days.

RESULTS: From November 13, 2023, to June 11, 2024, social media listening identified at least 15 unique, noteworthy stories that signified sentiment spikes. These conversations were predominately related to vaccine hesitancy, with users expressing opposition to vaccines or reluctance to engaging with vaccine-related information. Sentiment spikes included themes related to mistrust of vaccines and concerns about their safety and efficacy. The social media campaign received 69,600 impressions, reached 43,429 users, received 652 reactions and likes, 62 shares, and 105 comments. Most of the audience was female, with higher engagement from older users on Facebook and younger users on Instagram. Finally, posts related to Hepatitis B, Rotavirus, and MMR vaccines received the most attention.

DISCUSSION: Social media has become a key tool for digital health, helping to implement disease prevention programs and promoting advances in medicine. However, unverified information remains a major barrier to vaccination, despite the dissemination of information from reputable public health organizations and providers. To address this, information that is accessible, understandable, and culturally competent must be circulated to mitigate disinformation and improve attitudes toward vaccination. More research is needed to evaluate the effectiveness of social media campaigns in reducing vaccine hesitancy and improving willingness to adopt public health recommendations to

increase vaccination rates.

Keywords: vaccines, vaccine sentiments, vaccine hesitancy, social media listening, public health campaigns, Louisiana.

Abstract Word Count: 396

Manuscript Word Count: 2586

Number of Tables: 5

Introduction

Since its popularization in the early 2000s, social media has evolved into a multifaceted tool for multiple uses: socializing with friends, family, and the public, professional networking, and accessing information in conjunction with traditional news mediums. Presently, social media has penetrated all generations, as it offers a variety of options, including engaging with videos, entertainment, news, opinion forums, and more. Platforms such as YouTube, Facebook, X (formerly Twitter), Instagram, and recently TikTok have not only been used as spaces for connection and community, but also as a means of disseminating information¹.

Since the emergence of new social media platforms and applications, public health strategies have been substantially impacted. Healthcare providers, public health professionals, and other organizations started to use social media for health education campaigns, which are now widely used for multiple purposes. This includes issuing timely information about disease outbreaks and informing target audiences about varying health topics, such as health promotion and disease prevention programs^{2,3}. Furthermore, with advancements in medical technology, these platforms have

become an increasingly fundamental part of medical research. Researchers now use social media to gain insights into public attitudes, such as trust in medical personnel, acceptance of new treatments or prevention mechanisms (e.g. vaccines), and hesitancy towards adopting public health recommendations³.

While skepticism and doubt toward vaccinations have been present and influential throughout history⁴⁻⁶, the risk of social media has amplified these challenges. As an easily accessible, user-driven information channel, social media enables a rapid flow of content that can be overwhelming, confusing, and anxiety-inducing. The abundance of accurate, false, and contradictory information being shared creates a breeding ground for inaccurate information^{1,7}. For example, during the COVID-19 pandemic, the rapid spread of unverified information on social media generated high levels of confusion, anxiety, and mainstream rejection of vaccines and prevention guidelines disseminated by health personnel and public health organizations⁸. Although distrust is not a new barrier in public health, the rapid spread of inaccurate information on social media has become a contributing factor to low vaccination rates in some regions⁹⁻¹². For instance, in 2022, only 56% of Louisiana's population was vaccinated against COVID-19, ranking it as the state with the fourth lowest vaccination rate in the United States (U.S.)^{13,14}. This gap is especially evident when comparing Louisiana to other states in the U.S. In 2023, states like Rhode Island, Massachusetts, the District of Columbia, and Hawaii each reported that 80% or more of their population were fully vaccinated against COVID-19, with over 38% having received a booster dose. In contrast, less than 1% of Louisiana's population had received a booster dose the same year¹⁴.

Vaccination gaps extend past COVID-19 and are present in routine childhood and influenza immunizations. These disparities often vary by state. For example, during the 2022-2023 influenza season, only 41.1 % of Louisiana's residents were vaccinated, falling below the national average of 46.9%, while states like Massachusetts reached 62.4%¹⁵. Similarly, uptake of the Measles, Mumps, and Rubella (MMR) vaccine, which is part of routine childhood vaccinations, declined by almost

30% among children with Medicaid in Louisiana in 2020 compared to previous years, perhaps as a consequence of the COVID-19 pandemic¹⁶. Additionally, racial gaps in childhood vaccination rates persisted at the state level in 2019-2021. In Louisiana, African-American children were almost 12% less likely to have received the full schedule of recommended vaccinations compared to White children¹⁷. Additionally, 76.1% of privately insured children aged 35 months received all the recommended vaccines in 2020-2021 compared to 57.8% of children with Medicaid. In 2021, Louisiana ranked fifth lowest in childhood vaccination coverage, with a rate of 62%, compared to states like Iowa, Massachusetts, Connecticut, Vermont, and North Dakota, all of which reported vaccination rates exceeding 80%¹⁷.

With guidance from the World Health Organization's (WHO) Infodemic Management training and the Social Listening and Monitoring Tools from U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC), this study sought to gain insights into the factors that contribute to Louisiana's low vaccination rates^{18,19}. Using these resources, a social media listening plan was developed to analyze circulating conversations about vaccines. Additionally, a social media educational campaign was created to reduce erroneous information regarding vaccines and promote vaccine confidence. First, data on real-time user conversations and sentiments regarding vaccines were collected. Next, users were provided with foundational information in social media campaigns. This included key concepts such as what infections are, types of microorganisms and the diseases they cause. This laid the groundwork to introduce vaccinations as a means of prevention. This approach aimed to empower individuals to make informed decisions, without fear or false claims of adverse events. This article describes the search strategies used to perform social media listening, topics covered in the health and vaccination educational campaign, and the resulting levels of user engagement and acceptance.

Methods

Social media listening

To understand the online conversation regarding vaccines, Meltwater—a media monitoring and social listening platform— was used to perform social media listening, occasionally supplementing search results using Google Alerts and Google News depending on the capabilities of social listening tools. In total, eleven saved searches grouped by topic and one saved search limited to Louisiana-based social media users were created. Saved searches were built to accurately capture vaccine sentiment. Each search was constructed using a series of keywords separated by Boolean operators to narrow the focus of the results. For example, to explore discussions about vaccines related to opinions on the credibility of the CDC and the Food and Drug Administration (FDA), the following Meltwater search was built: “(‘vax’ OR ‘vaccine*’) AND (‘Center for Disease Control’ OR ‘CDC’ OR ‘FDA’ OR ‘Food and Drug Administration’) AND (‘lie*’ OR ‘credibility’ OR ‘trust’ OR ‘conspiracy’ OR ‘conspiracies’ OR ‘approval process’ OR ‘approval transparency’ OR ‘approval credibility’ OR ‘Fauci’ OR ‘World Health Organization’ OR ‘National Institute of Health’).” The search was limited to return results that were in English and from U.S.-based sources. In total, 12 saved searches were developed and grouped by the following topics: CDC & FDA Credibility, Childhood Vaccines, COVID-19 in the U.S., Flu Vaccine in the U.S., Louisiana Department of Health (LDH), Public Health Agencies (CDC, WHO, etc.), Respiratory Syncytial Virus (RSV) Vaccine, Rural Healthcare, Vaccine Alternatives, Vaccine Brands, and Vaccine Hesitancy: General U.S., and Vaccine Hesitancy: Louisiana.

Team members sifted through search results daily, utilizing Meltwater’s tagging feature to save noteworthy results. Every two weeks, a team member built a dashboard in Meltwater that combined the various search results into consumable insights, including top keywords, total mentions, total mentions trend, and sentiment breakdown. These dashboards highlighted instances when vaccine-related stories or sentiments were receiving higher-than-average levels of online engagement.

Social media campaign

In April 2024, social media accounts were created on Facebook, Instagram, and X under the name @ECHOatLCHI (ECHO stands for “Empowering Communities for Healthy Outcomes” and LCHI stands for “Louisiana Center for Health Innovation”) with the goal of providing general education about vaccines to Louisiana residents. Informative posts were published on these accounts two to three times a week and boosted for seven days on Facebook and Instagram. Approximately \$15 was spent per post on each account. The target audience for the boosted posts included users in Louisiana ages 18-65+, with the following characteristics: Location: Louisiana, United States; Interests: Louisiana, Health & Wellness, Foodie or Physical exercise, Education; School: University of Louisiana at Lafayette or Southeastern Louisiana University or LSU; Education level: College grad or High school grad; Employers: University of Louisiana at Lafayette or LSU; Industry: Sales, Education and Libraries, Management, Food and Restaurants, Construction and Extraction, Production, Healthcare and Medical Services, Installation and Repair Services, Community and Social Services, Life, Physical and Social; Sciences, Farming, Fishing and Forestry or Cleaning and Maintenance Services; Parents: Parents (All).

Results

Social media listening

Every two weeks, two-to-three noteworthy news stories or sentiments that attracted increased social media attention were highlighted. From November 13, 2023, to June 11, 2024, up to 15 unique, noteworthy stories that signified a sentiment spike were identified (Table 1). Based on the analysis, most social media conversations about vaccines involved users who were either opposed to vaccines or uninterested in engaging with vaccine-related content. Generally, vaccine conversations often revolved around certain major, underlying themes, including mistrust of the government, pharmaceutical companies, the CDC, WHO, and other public health organizations, mistrust of vaccine safety and efficacy, and health freedom (belief in bodily autonomy over mandatory vaccination).

Table 1. Sentiment spikes on social media

Sentiment/Story	Report #	Reporting Timeframe
RSV vaccine awareness and lack of awareness	1	Nov. 13 – Nov. 27, 2023
Texas Attorney General Ken Paxton announced plans to sue Pfizer	2	Nov. 28 – Dec. 11, 2024
A public health worker in New Zealand “proved” excess death caused by COVID-19 vaccines	2	Nov. 28 – Dec. 11, 2024
Rise in respiratory illness (COVID-19 and flu) cases	4	Dec. 25, 2023 – Jan. 8, 2024
Florida Surgeon General Dr. Joseph Ladapo’s comments against mRNA/ COVID-19 vaccination	5	Jan. 9 – Jan. 22, 2024
Clusters of measles outbreaks generated conversations about childhood vaccines	5, 8, 9, and 10	Jan. 9 – Jan. 22, 2024, Feb. 20 – March 4, 2024, March 5 – March 18, 2024, and March 19 – April 1, 2024
Mistrust toward the CDC, the WHO, and pharmaceutical companies*	6, 12, and 14	Jan. 23 – Feb. 5, 2024, April 16 – April 29, 2024, and May 13 – May 27, 2024
Reports of COVID-19 vaccine side effects and injury*	7, 9, 11, and 14	Feb. 6 – Feb. 19, 2024, March 5 – March 18, 2024, April 2 – April 15, 2024, and May 14 – May 27, 2024
New COVID-19 isolation and vaccine guidance from the CDC	8	Feb. 20 – March 4, 2024
Inaccurate information related to blood donation and COVID-19 vaccine status	8	Feb. 20 – March 4, 2024
Louisiana legislature surrounding vaccines and Louisiana school vaccine opt-out rates	10	March 19 – April 1, 2024
H5N1 avian influenza	11, 12, 13, and 14	April 2 – April 15, 2024, April 16 – April 29, 2024, April 30 – May 13, 2024, and May 14 – May 27, 2024
AstraZeneca withdrew its COVID-19 vaccine from market	13	April 30 – May 13, 2024
Dr. Anthony Fauci testified in Congress in COVID-19-related hearing	15	May 28 – June 10, 2024
Moderna developing	15	May 28 – June 10, 2024

combination flu and COVID-19 vaccine		
--------------------------------------	--	--

Table 1. Stories or sentiments that were attracting increased social media attention.

In addition to the sentiment spikes, we also highlighted “information voids” (Table 2), which were areas where social media users lacked accessible, credible information from trustworthy sources. In the absence of credible information, users often create and adopt unsubstantiated claims as an answer. Information voids can be problematic, as they can grow rapidly and fuel misunderstanding if not properly addressed by credible sources.

Table 2. Information Void on Social Media

Information Void	Report #	Reporting Timeframe
RSV vaccine: eligibility, availability, and how it works	1 and 4	Nov. 13 – Nov. 27, 2023, and Dec. 25, 2023 – Jan. 8, 2024
Novavax: differences to other COVID-19 vaccines, effectiveness, and availability	2	Nov. 28 – Dec. 11, 2023
Vaccine cost/insurance coverage	2	Nov. 28 – Dec. 11, 2023
Vaccine “shedding” and other general questions about vaccine technology	5 and 13	Jan. 9 – Jan 22, 2024, and April 30 – May 13, 2024
mRNA technology and safety	6, 7, and 15	Jan. 23 – Feb. 5, 2024, Feb. 6 – Feb. 19, 2024, and May 28 – June 10, 2024
MMR vaccination and necessity	8, 9, and 10	Feb. 20 – March 4, 2024, March 5 – March 18, 2024, and March 19 – April 1, 2024
New CDC Guidance on COVID-19	8	Feb. 20 – March 4, 2024
H5N1: Should I be concerned? How can I prevent it?	11, 12, 13, and 14	April 2 – April 15, 2024, April 16 – April 29, 2024, April 30 – May 13, 2024, and May 14 – May 27, 2024
General necessity of vaccines versus just trusting your immune system	15	May 28 – June 10, 2024

Table 2. Information gaps on social media with users without accessible, credible information from legitimate sources

Social media campaign

From social media listening, one of the biggest issues identified that contributed to vaccine hesitancy was a general sense of misunderstanding about vaccines and their role in preventing disease. To remedy this information gap, a vaccine education campaign was created. The campaign began with fundamental questions such as: “What is a vaccine,” “How do vaccines work,” and “Why are vaccines necessary?” From this, the content shifted to providing education about target vaccinations: influenza vaccine, routine childhood vaccines, and RSV vaccine. To align with current campaigns led by the LDH and regional medical directors, information related to Human Papillomavirus (HPV) was included at the end of this campaign. Over the span of nine weeks, twenty-one posts were published on social media accounts. Each post covered information related to disease manifestation, symptoms, available vaccines for prevention, and vaccine side effects. Each post was promoted for one week to a set audience, with a budget of approximately \$15 per post on Facebook and Instagram.

Overall, the social media posts received 69,600 total impressions (calculated by the number of views all posts received across all platforms) (Table 3), reached 43,429 users (the number of users who saw any post), and received 652 reactions and likes, 62 shares, and 105 comments. Across Facebook and Instagram, posts received higher reach, impressions, and engagement among women compared to men (Table 3). Reach metrics were limited to Facebook and Instagram, as X does not provide this metric for organic posts.

Table 3. Total impressions and reach on social media

Category	Post #	Facebook	Instagram	X	Total
General	1	2601	1978	19	4598
General	2	821	1856	21	2698
General	3	1192	1077	21	2290
General	4	2349	1976	23	4348
General	5	1106	1307	31	2444
General	6	864	1752	18	2634
General	7	912	1882	15	2809
General	8	806	1945	16	2767
General	9	442	1858	12	2312

General	10	391	2101	18	2510
Influenza	11	2849	1465	17	4331
Influenza	12	657	1254	16	1927
Childhood	13	4589	1436	32	6057
Childhood	14	1944	1337	22	3303
Childhood	15	2737	1674	23	4434
Childhood	16	1551	1597	21	3169
Childhood	17	1886	1541	29	3456
RSV	18	1814	1759	23	3596
RSV	19	361	1657	21	2039
Childhood	20	2894	1545	13	4452
HPV	21	2530	873	23	3426
Total		35296	33870	434	69600

Total reach on social media

Category	Post #	Facebook	Instagram	Total
General	1	1609	828	2437
General	2	455	925	1380
General	3	672	695	1367
General	4	1496	826	2322
General	5	789	805	1594
General	6	633	827	1460
General	7	626	1006	1632
General	8	589	1085	1674
General	9	397	1141	1538
General	10	321	1247	1568
Influenza	11	2076	711	2787
Influenza	12	468	723	1191
Childhood	13	3262	867	4129
Childhood	14	1561	998	2559
Childhood	15	1983	796	2779
Childhood	16	1120	955	2075
Childhood	17	1376	869	2245
RSV	18	1193	882	2075
RSV	19	296	748	1044
Childhood	20	2250	1001	3251

HPV	21	1784	538	2322
Total		24956	18473	43429

Table 3 displays impressions—the number of views received- and reach—the number of users who saw any post in each post across all ECHO accounts.

The most prominent and highly reached audience segment was women aged 25-34 (representing 26.3% of all reached audience) (Table 4). Posts related to general vaccine information on Facebook reached a higher proportion of older users, while posts on Instagram reached more younger audiences (Table 5). Facebook posts received significantly higher engagement compared to the other platforms. Posts focused on routine childhood vaccines outperformed posts related to general vaccine information and posts about influenza, RSV, and HPV. The post related to hepatitis B and rotavirus vaccines (post #13) received the highest reach and impressions, reaching 4,129 users and receiving 6,057 impressions across all platforms (table 3). The post related to the MMR vaccine (post #16) garnered the most reactions and likes, receiving 20 comments, 65 likes, 3 love reactions, 1 “laugh” reaction, and 1 “angry” reaction across all platforms. Finally, the post with the most shares was about the childhood vaccine schedule, receiving 13 shares across all platforms.

Out of 105 comments, 80% (84) expressed mistrust, negative attitudes, and hesitancy towards vaccinations. Examples included comments such as “Flu prevention comes from vitamins, juices, and sunshine. Complications including death come from vaccinations” and “Many of us were skeptical about vaccinations before COVID-19, but now we know we can no longer trust any vax or any organization or doctor that pushes them.” To minimize the risk of influencing other users, all negative comments were hidden.

Table 4. Demographics of reached users

Age Range	Women	Men
18 - 24	14.20%	6.60%
25 - 34	26.30%	5.70%
35 - 44	14.60%	2.80%
45 - 54	7.30%	1.60%
55 - 64	7.70%	1.90%
65 +	8.80%	2.60%

Table 4. Outline the demographic composition of reached users on social media ECHO accounts.

Table 5. Age range of users on social medial

Category	Post #	Age Range on Facebook	%	Age range on Instagram	%
General	1	35-44	26.80%	25-34	42.20%
General	2	55-64	25.30%	18-24	54.80%
General	3	18-24	54.50%	18-24	47.90%
General	4	35-44	26.00%	25-34	39.90%
General	5	65+	48.60%	18-24	33.10%
General	6	65+	22.40%	25-34	42.70%
General	7	65+	37.30%	18-24	53.10%
General	8	65+	21.80%	18-24	40.80%
General	9	65+	37.30%	18-24	42.20%
General	10	65+	37.30%	18-24	44.40%
Influenza	11	25-34	46.00%	25-34	36.60%
Influenza	12	25-34	23.10%	18-24	31.90%
Childhood	13	25-34	66.20%	25-34	33.40%
Childhood	14	55-64	30.30%	25-34	35.60%
Childhood	15	25-34	57.90%	25-34	42.30%
Childhood	16	65+	37.60%	18-24	41.60%
Childhood	17	25-34	52.50%	25-34	38.60%
RSV	18	25-34	49.30%	25-34	41.00%
RSV	19	18-24	37.50%	25 - 34	45.20%
Childhood	20	25-34	29.60%	25-34	35.20%
HPV	21	25-34	38.60%	25-34	35.20%

Table 5 shows the age range of users on social media ECHO accounts according to our vaccine categories: general, influenza, childhood, RSV and HPV vaccines.

Discussion

With the advancement of communication technologies, the medicine and public health fields have recognized the need to adopt and evolve the ways in which health messages are delivered to communities. Digital health has become vital in communicating health threats to the public, educating them about disease prevention, and promoting advances in medicine, such as new treatments⁷.

Despite their potential for disseminating valuable information, social media networks have also widened gaps in access to health. This is due to an increase in skepticism, distrust, and inaccurate information caused by the overwhelming flow of true, false and contradictory

information, exacerbating historical distrust in the government and health providers.

Unlike other platforms, X has been widely used in research studies due to its relatively open access to audience and content data. In contrast, popular platforms like YouTube, Facebook, Instagram, and TikTok have stricter privacy policies. These policies enforce more stringent data-sharing regulations, which increase limitations to analyzing opinions and generating universally effective strategies^{7,12,20,21}. While CrowdTangle—an insight tool that gathers and analyzes social media content^{22,23}, was previously used to import user activity data from Facebook, Meta began limiting its access and eventually ended all data collection activities in mid-2024²⁴. This has led to even greater limitations in gathering information from social media and understanding people's perspectives on health prevention programs and treatments.

Despite these limitations, the research findings outlined that online vaccine sentiments are dependent on several factors, including: what social media platform is more frequently used (different environments of Facebook vs. Instagram vs. X vs. online forums), if the user stays within their algorithmically created echo chamber (users are more likely to post about a topic if their peers are also engaged), and whether vaccines are currently part of mainstream news coverage (users may actively think about vaccines or feel encouraged to post about them until they are prompted by current news stories). Past medical abuses and inconsistencies in the delivery of information have caused mistrust in many communities, especially those in underserved conditions²⁵⁻²⁷. Therefore, in addition to focusing on emergency response, education, and disease prevention, public health campaigns need to rebuild trust within the population. It is essential to recognize that different populations require tailored approaches depending on demographic characteristics, language, culture and religious beliefs, and needs²⁸⁻³². Ensuring that information is accessible and understandable by everyone is crucial in public health campaigns that focus on reducing vaccine hesitancy.

To maximize the reach of messages, campaigns should target a variety of media sources and social media platforms, which may engage a more diverse population. Additionally, collaborating

with interdisciplinary teams, such as marketing professionals, biostatisticians, educators, and researchers, can further enhance the effectiveness of campaigns. Furthermore, there is a need for more research studies to evaluate the impact of social media campaigns in reducing hesitancy and increasing the adoption of public health recommendations. This will lead to the development of more community-based research approaches, which may offer additional perspectives on strategies that improve health and digital literacy by using a more cultural and linguistic approach, helping to reduce barriers to trust and improve the credibility and performance of public health campaigns on social media.

Limitations

The social listening platform that was utilized for this research, Meltwater, had certain limitations regarding the types of content that could be collected. For instance, platforms like Facebook, Instagram, and YouTube have restrictions in place to prevent third-party data collection of content, even when the content is publicly posted, and the intended use of collection is for research purposes. As a result, most of the content used in this study was sourced from X, news, blogs, and forums.

Acknowledgments

This study was funded by the Louisiana Department of Health (LDH) under grant number 2000761057. Authors are fully responsible for all the work presented in this manuscript. This work does not represent the official views of LDH.

Conflict of interest

The authors declare no conflict of interest.

References

1. Broniatowski DA, Jamison AM, Johnson NF, et al. Facebook Pages, the “Disneyland” Measles Outbreak, and Promotion of Vaccine Refusal as a Civil Right, 2009-2019. *Am J Public Health*. 2020;110(S3):S312-S318. doi:10.2105/AJPH.2020.305869
2. Jeyaraman M, Ramasubramanian S, Kumar S, et al. Multifaceted Role of Social Media in Healthcare: Opportunities, Challenges, and the Need for Quality Control. *Cureus*.

- 2023;15(5):e39111. doi:10.7759/cureus.39111
3. Chen J, Wang Y. Social Media Use for Health Purposes: Systematic Review. *J Med Internet Res.* 2021;23(5):e17917. doi:10.2196/17917
 4. Nuwarda RF, Ramzan I, Weekes L, Kayser V. Vaccine Hesitancy: Contemporary Issues and Historical Background. *Vaccines.* 2022;10(10):1595. doi:10.3390/vaccines10101595
 5. Trangerud HA. “What is the problem with vaccines?” A typology of religious vaccine skepticism. *Vaccine X.* 2023;14:100349. doi:10.1016/j.jvacx.2023.100349
 6. Motta M, Stecula D. Quantifying the effect of Wakefield et al. (1998) on skepticism about MMR vaccine safety in the U.S. Useche SA, ed. *PLOS ONE.* 2021;16(8):e0256395. doi:10.1371/journal.pone.0256395
 7. Sylvia Chou WY, Gaysynsky A, Cappella JN. Where We Go From Here: Health Misinformation on Social Media. *Am J Public Health.* 2020;110(S3):S273-S275. doi:10.2105/AJPH.2020.305905
 8. Sasse K, Mahabir R, Gkountouna O, Crooks A, Croitoru A. Understanding the determinants of vaccine hesitancy in the United States: A comparison of social surveys and social media. Koh KP, ed. *PLOS ONE.* 2024;19(6):e0301488. doi:10.1371/journal.pone.0301488
 9. Nowak GJ, Cacciatore MA. State of Vaccine Hesitancy in the United States. *Pediatr Clin North Am.* 2023;70(2):197-210. doi:10.1016/j.pcl.2022.11.001
 10. Skafle I, Nordahl-Hansen A, Quintana DS, Wynn R, Gabarron E. Misinformation About COVID-19 Vaccines on Social Media: Rapid Review. *J Med Internet Res.* 2022;24(8):e37367. doi:10.2196/37367
 11. Sylvia Chou WY, Gaysynsky A. A Prologue to the Special Issue: Health Misinformation on Social Media. *Am J Public Health.* 2020;110(S3):S270-S272. doi:10.2105/AJPH.2020.305943
 12. Walsh-Buhi ER. Social Media and Cancer Misinformation: Additional Platforms to Explore. *Am J Public Health.* 2020;110(S3):S292-S293. doi:10.2105/AJPH.2020.305949
 13. Gillard CJ, Al-Dahir S, Earls M, Singleton B. A Culturally Competent Vaccine Hesitancy Educational Model for Community Pharmacists to Increase Vaccine Uptake, Louisiana, 2021–2022. *Am J Public Health.* 2022;112(S9):S900-S903. doi:10.2105/AJPH.2022.307070
 14. Louisiana Coronavirus Vaccination Progress. *USA FACTS.* <https://usafacts.org/visualizations/covid-vaccine-tracker-states/state/louisiana/>. May 10, 2024.
 15. Flu Vaccination Coverage, United States, 2022–23 Influenza Season. Published online October 10, 2023. <https://www.cdc.gov/flu/fluview/cov-2223estimates.htm>
 16. Walker B, Anderson A, Stoecker C, Shao Y, LaVeist TA, Callison K. COVID-19 and Routine Childhood and Adolescent Immunizations: Evidence from Louisiana Medicaid. *Vaccine.* 2022;40(6):837-840. doi:10.1016/j.vaccine.2021.12.022
 17. Hest R. Revised Childhood Vaccinations Measure on State Health Compare Shows Vaccination Rates Vary by State, Race/Ethnicity, and Insurance Coverage. *State Health Access Data Assistance Center (shadac).* <https://www.shadac.org/news/childhood-vaccinations-rate-by->

state-ethnicity-insurance. January 30, 2024.

18. Eysenbach G. How to Fight an Infodemic: The Four Pillars of Infodemic Management. *J Med Internet Res*. 2020;22(6):e21820. doi:10.2196/21820
19. U.S. Department of Health and Human Services Centers for Disease Control and Prevention. Social Listening and Monitoring Tools. Published online 2021. https://www.cdc.gov/vaccines/covid-19/vaccinate-with-confidence/rca-guide/downloads/cdc_rca_guide_2021_tools_appendix_sociallistening-monitoring-tools-508.pdf
20. Andrew Perrin. Social Media Usage: 2005-2015. *Pew Res Cent*. Published online 2015. <https://www.pewresearch.org/internet/2015/10/08/social-networking-usage-2005-2015/>
21. Jaidka K. Cross-platform- and subgroup-differences in the well-being effects of Twitter, Instagram, and Facebook in the United States. *Sci Rep*. 2022;12(1):3271. doi:10.1038/s41598-022-07219-y
22. Pascual-Ferrá P, Alperstein N, Barnett DJ. A Multi-platform Approach to Monitoring Negative Dominance for COVID-19 Vaccine-Related Information Online. *Disaster Med Public Health Prep*. Published online May 3, 2021:1-24. doi:10.1017/dmp.2021.136
23. Aleksandric A, Anderson HI, Melcher S, Nilizadeh S, Wilson GM. Spanish Facebook Posts as an Indicator of COVID-19 Vaccine Hesitancy in Texas. Published online 2022. doi:10.48550/ARXIV.2209.04975
24. Meta. CrowdTangle. Transparency Center. Accessed January 31, 2025. <https://transparency.meta.com/researchtools/other-datasets/crowdtangle>
25. Bajaj SS, Stanford FC. Beyond Tuskegee — Vaccine Distrust and Everyday Racism. *N Engl J Med*. 2021;384(5). doi:10.1056/NEJMp2035827
26. Scharff DP, Mathews KJ, Jackson P, Hoffsuemmer J, Martin E, Edwards D. More than Tuskegee: Understanding Mistrust about Research Participation. *J Health Care Poor Underserved*. 2010;21(3):879-897. doi:10.1353/hpu.0.0323
27. Jaiswal J, Halkitis PN. Towards a More Inclusive and Dynamic Understanding of Medical Mistrust Informed by Science. *Behav Med*. 2019;45(2):79-85. doi:10.1080/08964289.2019.1619511
28. Sanchez AV, Ison JM, Hemley H, et al. Designing the Fostering Inclusivity in Research Engagement for Underrepresented Populations in Parkinson's Disease study. *Contemp Clin Trials*. 2022;115:106713. doi:10.1016/j.cct.2022.106713
29. Sanchez AV, Ison JM, Hemley H, Jackson JD. Diversifying the research landscape: Assessing barriers to research for underrepresented populations in an online study of Parkinson's disease. *J Clin Transl Sci*. 2024;8(1):e34. doi:10.1017/cts.2024.20
30. Ison JM, Jackson JD, Hemley H, et al. Fostering Inclusivity in Research Engagement for Underrepresented Populations in Parkinson's Disease: The FIRE-UP PD study. *Contemp Clin Trials*. 2024;144:107619. doi:10.1016/j.cct.2024.107619
31. Rooney MK, Santiago G, Perni S, et al. Readability of Patient Education Materials From

High-Impact Medical Journals: A 20-Year Analysis. *J Patient Exp.* 2021;8:237437352199884. doi:10.1177/2374373521998847

32. Otado J, Kwagyan J, Edwards D, Ukaegbu A, Rockcliffe F, Osafo N. Culturally Competent Strategies for Recruitment and Retention of African American Populations into Clinical Trials. *Clin Transl Sci.* 2015;8(5):460-466. doi:10.1111/cts.12285

