Study Title: **"Immunization Insights from the Last Frontier: An Ethnographic Study of Vaccine Confidence in Alaska”/ “Social Media, Misinformation, and Vaccine Hesitancy in Alaska's Underserved Communities**: A Qualitative Study”

**Objective:** This study will explore how social media influences vaccine hesitancy and decision-making among individuals from diverse socio-demographic backgrounds in underserved communities. By combining in-depth interviews with social media content analysis, the research aims to identify key drivers of vaccine hesitancy, the role of social media in shaping public opinion, and potential strategies for countering misinformation and promoting accurate vaccine information.

**Study Objectives:**

1. To examine the key themes, sentiments, and concerns surrounding COVID-19 vaccine hesitancy as discussed on social media in Alaska.
2. To analyze patterns in the spread of misinformation or negative sentiment about vaccines on social media in Alaska.
3. To identify the major narratives and themes surrounding COVID-19 vaccination in Alaskan social media discourse.
4. To investigate how the spread of misinformation and negative sentiment on social media correlates with vaccine hesitancy in Alaska.
5. To compare the reasons for vaccine hesitancy between rural and urban populations in Alaska.
6. To understand how personal beliefs, misinformation, and political ideologies influence vaccine hesitancy in Alaska.
7. To identify the main barriers and motivators to vaccination among individuals hesitant to take the vaccine in Alaska.

**Significance and Novelty:** This study is highly significant and novel for several reasons:

* **Local Context:** The study comprehensively analyzes vaccine hesitancy and misinformation in Alaska, highlighting the unique socio-cultural and geographical context, including rural-urban divides and Indigenous perspectives.
* **Targeted Population:** The study specifically targets individuals hesitant to take the COVID-19 vaccine, providing deep insights into the reasons behind this hesitancy and identifying factors that are not easily captured through quantitative methods.
* **Political and Misinformation Influence:** Given the role of political beliefs and misinformation in vaccine attitudes, this study offers a timely and relevant exploration of how these factors affect vaccine hesitancy in a politically diverse state like Alaska.
* **Social Media Insights:** By leveraging large-scale social media data, this study allows for the real-time analysis of public sentiment and its evolution, offering insights into how online discussions shape vaccine attitudes and behaviors.
* **Misinformation Tracking:** The study uniquely tracks the spread and impact of misinformation on vaccine hesitancy, providing insights into how false narratives influence public health outcomes in Alaska.
* **Barriers and Motivators:** The study will provide actionable insights into the key barriers and motivators for vaccination in Alaska, helping to tailor public health interventions and communication strategies to local needs.

**Study Approach:** The study will use a qualitative research design, combining personal interviews and social media content analysis, to explore personal beliefs and community narratives about vaccine hesitancy among Alaskan residents. This design is highly significant and novel due to its focus on the specific socio-cultural and political factors unique to Alaska, including the rural-urban divide and the impact of misinformation in shaping vaccine attitudes. This study will combine quantitative sentiment analysis of social media data with qualitative thematic analysis of posts and discussions. By examining a large volume of social media content from users in Alaska, this study aims to identify the prevalent narratives and themes, track the spread of misinformation, and explore the relationship between social media discourse and vaccine hesitancy. This design is novel due to its focus on region-specific social media activity and its integration of sentiment analysis to understand emotional tones around vaccine hesitancy.

**Sample Size:** Approximately 87 participants across rural and urban areas were selected for interviews and focus groups.

**Data Collection Method:** In-depth, one-on-one interviews conducted via video calls, lasting 30 minutes.

**Inclusion Criteria:** Posts explicitly mentioning vaccine-related topics, vaccine hesitancy, or general opinions about COVID-19 vaccination in Alaska.

**Exclusion Criteria:** Irrelevant posts unrelated to the study objectives (e.g., general discussions unrelated to vaccine hesitancy).

**Study Design and Data Collection:**

1. **Target Population:**
   * Participants were selected from underserved communities in Alaska (or a similar context).
   * **Inclusion Criteria**: Adults aged 18+ with varying vaccine hesitancy levels and use social media. Alaska residents aged 18 and older who are hesitant or undecided about taking the COVID-19 vaccine were randomly selected.
2. **Sampling Method:**
   * **Purposive Sampling** was employed to recruit participants with varying degrees of vaccine hesitancy (e.g., hesitant, undecided, and vaccinated). To ensure diversity, participants were selected from **urban** and **rural** communities across Alaska, including diverse ethnic groups (e.g., Native Alaskan populations, White, African American, Hispanic, and Asian residents) to capture a broad spectrum of perspectives.
   * Participants were encouraged from different **ethnic**, **socio-economic**, and **educational** backgrounds to ensure diverse perspectives.
3. **Data Collection:**

**In-depth Semi-Structured Interviews**:

* + Participants answered open-ended questions about their vaccine experiences, hesitancy reasons, and social media use.
  + Questions were framed to understand the **cultural**, **psychological**, **social**, and **informational** factors influencing vaccine hesitancy.
  + Key interview themes were included:

1. **Interview Topics:** The interviews were focused on personal beliefs, vaccine concerns, and reasons for hesitancy. Key topics will include:
   * **Vaccine Concerns:** Specific worries about vaccine safety, efficacy, side effects, and trust in the healthcare system.
   * **Political Beliefs and Misinformation:** Influence of political ideologies, media consumption, and exposure to misinformation on vaccine perceptions.
   * **Personal Beliefs and Values:** How personal health beliefs, cultural values, or experiences with the healthcare system shape vaccine decisions.
   * **Barriers and Motivators:** Identifying perceived barriers to vaccination (e.g., access, trust, misinformation) and motivators (e.g., government policy, healthcare outreach, peer influence).
   * **Vaccine Hesitancy Reasons**: Personal, social, and health-related concerns.
   * **Social Media's Role**: Influence of social media content, information trustworthiness, misinformation, and peer/family influence.
   * **Barriers to Access**: Economic, logistical, or healthcare-related barriers to vaccination.
   * **Health Literacy**: Understanding vaccination benefits, side effects, and misinformation.
   * **Social Media Content Analysis**: Collect and analyze posts, comments, and discussions related to COVID-19 vaccines from popular platforms (e.g., Twitter). Focus on identifying themes like misinformation, vaccine advocacy, fear-based content, and community support. Use social media monitoring tools (e.g., Brand Watch, Hootsuite) to identify common hashtags, keywords, and emerging trends in vaccine discussions.
   * **Thematic Analysis** will categorize social media content and link it with interview findings.
2. **Research Questions:**
   * How does social media influence vaccine hesitancy in underserved communities?
   * What role do social media platforms play in spreading vaccine-related misinformation or misinformation corrections?
   * How do community members engage with vaccine-related content on social media, and how does this engagement influence their vaccination decisions?
   * What are the primary sources of vaccine-related information on social media, and how trustworthy are they perceived to be by individuals?
   * How do family and social circles influence vaccine decisions in underserved communities?
   * How do religious, cultural, or regional factors shape vaccine hesitancy and acceptance on social media in these communities?
   * How can social media platforms be used to effectively counter misinformation and promote accurate vaccine information to underserved groups?

**Data Analysis (Online social media):**

**Thematic Analysis:** The interview transcripts will be analyzed using thematic analysis to identify recurring themes, patterns, and key insights related to vaccine hesitancy. We will identify emotional tones, including fear, anger, distrust, or hope, and analyze how these sentiments evolve over time and across geographic regions of Alaska.

**Sentiment Classification:** Using Natural Language Processing (NLP) techniques, we will perform sentiment analysis on collected posts to classify the sentiment as positive, negative, or neutral. Sentiment analysis will be geographically mapped to show sentiment patterns across urban and rural areas of Alaska, identifying regions with high vaccine hesitancy or strong anti-vaccine sentiment.

**Data Mining Strategy:** Using social media scraping tools and APIs (e.g., Tweepy for Twitter, Facebook Graph API), we will collect publicly available posts, comments, hashtags, and discussions about COVID-19 and vaccination.

* + **Coding Framework:** Develop an initial coding framework based on the research questions (e.g., personal beliefs, political ideologies, misinformation, barriers, and motivators) and refine it as data is reviewed.
  + **Data Timeframe:** Posts from the past XX-XX months (to capture data from different phases of the COVID-19 pandemic, including vaccine rollouts, misinformation spikes, and major public health campaigns).
  + **Geo-tagging:** Posts will be geo-tagged to ensure the data reflects discussions from Alaska (either through location tags or user-reported location data).
  + Keyword Search Terms: Vaccine hesitancy, COVID-19 vaccine, vaccine safety, vaccine side effects, vaccine mistrust, "Alaska," "Native Alaskan," "COVID-19," and region-specific hashtags such as #AlaskaVaccine, #VaccineHesitancyAK, etc.
  + Hashtags and Mentions: We tracked trending hashtags and mentions related to vaccine discussions specific to Alaska.
  + **Software:** Use text mining to code and categorize the data, efficiently identifying common themes.
* **Cross-Group Comparison:** Thematic analysis will be conducted separately for urban and rural populations to identify differences and similarities in vaccine hesitancy reasons and perceptions.
* **Misinformation and Political Ideologies:** Specific attention will be paid to the role of misinformation, media narratives, and political beliefs in shaping attitudes toward vaccination, as well as their intersections with trust in healthcare systems and government interventions.

1. **Interview Data (Qualitative interview collected by us)**:
   * **Thematic Analysis** will be conducted on interview transcripts to identify patterns, themes, and insights regarding the factors influencing vaccine hesitancy.
   * **Misinformation about Vaccine Safety:** Concerns about adverse effects, misinterpretations of clinical data, or conspiracy theories.
   * **Mistrust in Healthcare Institutions:** Skepticism toward governmental health agencies, healthcare providers, or the pharmaceutical industry.
   * **Political Ideologies and Polarization:** Influence of political views on vaccine acceptance or hesitancy.
   * **Cultural and Social Norms:** Perspectives from Native Alaskan communities and rural populations that may influence vaccine uptake.
   * **Vaccination Narratives:** Stories of people being vaccinated or rejecting vaccination, community leaders' roles, and local perceptions of vaccination campaigns.
   * Codes will be developed based on interview responses, focusing on socio-demographic variables (age, income, education), cultural influences, health concerns, social media influence, and trust in healthcare systems.
   * A **comparative approach** will be used to analyze responses from different socio-demographic groups to understand variations in vaccine hesitancy.
2. **Social Media Content Data**:
   * **Sentiment Analysis** will be conducted on social media content to determine the general public's feelings toward vaccines (positive, negative, neutral). Identify false claims or distorted facts shared on social media (e.g., vaccine ingredients, effectiveness, side effects) and track their spread over time.
   * Analyze the spread of misinformation and its correlation with negative sentiment in posts. Determine how misinformation aligns with regional vaccine hesitancy.
   * Identify the sources of misinformation, such as influencers, websites, or social media accounts, and assess their impact on public opinion.
   * **Network Analysis** will explore how vaccine-related information spreads through social media platforms and the influence of key opinion leaders or influencers.
   * Thematic coding of social media posts will focus on misinformation narratives, vaccine support messages, and community discussions about vaccine risks and benefits.
3. **Integration of Findings**:
   * The **interviews** and **social media analysis** will be integrated to form a comprehensive understanding of the **interplay** between personal vaccine hesitancy, social media influence, and broader community beliefs.
   * Thematic insights will be cross-referenced to identify converging or diverging patterns between real-world experiences and virtual influences.
   * To strengthen the findings, we will correlate social media sentiments and themes with **survey data (comparison between online social media and our data)** on vaccine hesitancy from Alaska residents to explore how social media discussions influence individual attitudes toward vaccination.

**Expected Outcomes:**

* **Identification of Key Drivers of Hesitancy**: The study will highlight personal, community, and informational factors contributing to vaccine hesitancy.
* **Understanding Social Media's Role**: The research will provide a nuanced understanding of how social media content impacts vaccine decision-making, particularly in underserved communities.
* **Insights into Misinformation**: The study will explore the types of vaccine-related misinformation circulating on social media and its impact on decision-making.
* **Community-Centered Interventions**: The research will identify how social media platforms can be leveraged more effectively to educate and engage hesitant populations, correcting misinformation and increasing vaccine acceptance.