Title: BI Forecasting Inoculation - Predicting the Likelihood of H1N1 and Seasonal Flu Vaccine Uptake

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Dataset Source(s): H1N1 and Seasonal Flu Vaccines

Key Parameters
Dataset: **H1N1 and Seasonal Flu Vaccines**
Industry: **Healthcare**
Business Intelligence Tools: **Microsoft PowerBI**
Module: **Big Data and Intelligence – ICA**

Rationale:

The purpose and motivation behind choosing this ICA is to highlight Business Intelligence for Healthcare to be presented to the stakeholders of: **Croydon GP Collaborative** and BI Exhibition for **TU PowerBI for Women by Women**.

To illustrate the capacity to apply data analysis and visualization methods to offer insights and make defensible judgements in the healthcare industry. The proposal for this project will incorporate cutting- edge technology into healthcare practices. Furthermore, by applying cutting-edge technologies to tackle pressing healthcare concerns, this project is in line with the goals of Industry 4.0.

Objective

Understand the factors influencing individuals' likelihood of receiving H1N1 and seasonal flu vaccines.

Analysis Goals

- Determine trends and relationships between determinants of population health and vaccination choices.
- Examine how vaccination uptake is affected by factors related to health.
- Analyze the views of the respondents regarding the hazards and efficacy of vaccination.

Variables of Interest:

- Age
- Education
- Race
- Gender
- Income
- Marital status
- Employment status
- Health-related variables (chronic medical conditions, having children under 6 months)

Ramifications

- Help shape public health plans for focused interventions.
- Discuss possible immunization obstacles with various population groupings.
- Improve vaccination uptake overall by adjusting strategies to particular traits found in the analysis.

Business Intelligence Questions and KPIs

1. **Comparison Analysis**
   - How do attitudes and practices around seasonal and H1N1 vaccinations vary across the same demographic groups?
   - Are there any discernible variations in the acceptance patterns of seasonal and H1N1 flu vaccines?
2. **Behavioral Elements**
   - Do some behaviors—like staying away from crowds or using face masks—have a correlation with being more likely to get vaccinated?
   - Does the adoption of vaccines correlate with work status?
   - What differences exist in the vaccination choices of people with long-term medical conditions?
3. **Demographic Perspectives**
   - What is the respondents' demographic dispersion in the survey?
   - Are there any age groups that exhibit higher or lower rates of vaccination acceptance?
   - How do vaccination decisions relate to one's degree of education?
4. **Opinions and Risk Perception**
   - What is the general consensus about the efficacy of seasonal and H1N1 flu vaccinations?
   - How does the acceptability of vaccines depend on perceived risks?
   - Exist disparities in opinions according to education or wealth?
5. **Geographical Evaluation**
   - If true, how does the type of area—MSA or non-MSA—affect vaccination decisions?
   - Exist geographical differences in vaccination acceptance among various populations?
6. **Social and Economic Divides**
   - What effect does a person's marital status have on whether they accept vaccinations, and are there any obvious differences between married and single people?
   - Are there differences in the chance of getting both immunizations based on income?
7. **Influence of Healthcare Recommendations**
   - Does the acceptance of vaccines become considerably affected by a doctor's recommendation?
   - Do people in the general public and healthcare professionals have different attitudes on vaccinations?
8. **Educational impact**
   - How do beliefs about the efficacy of vaccines and the actual uptake of vaccines relate to education level?
   - Are there particular patterns in the acceptability of vaccines across various educational levels?
9. **Health Workers' Impact**
   - Do medical professionals have an impact on the public's acceptance of vaccines based on their own vaccination practices?
   - What is the difference between the immunization rate of health workers and the general population?
10. **Intervention Techniques and Predictive Modelling**
    - Is it possible to create a prediction model that takes into account behavioral, opinion-related, and demographic factors in order to foresee vaccination trends?
    - What focused interventions, particularly with reluctant demographic groups, may be put into place to enhance vaccine acceptability based on trends that have been identified?

Stakeholders

- *Policy Makers:* Policy makers can utilize the insights derived from the dataset to inform their decision-making processes regarding public health regulations. This includes vaccine mandates, distribution strategies, and initiatives aimed at enhancing public awareness.
- *Vaccine Manufacturers:* By understanding vaccination trends, accurate market forecasting, effective distribution tactics, and efficient production planning can be achieved by vaccine manufacturers.

- *Medical Professionals:* healthcare practitioners, physicians, nurses, and other stakeholders, can benefit from comprehending vaccination patterns and the factors that influence patient choices. This understanding can greatly impact their communication tactics and patient education initiatives.
- *Public Health Agencies:* with their main focus on enhancing public health outcomes, can utilize the information obtained from this dataset to allocate resources, implement intervention tactics, and execute immunization initiatives.
- *Researchers and Academia:* This information holds potential for further investigation and the advancement of scientific comprehension regarding vaccination practices and effectiveness, particularly for epidemiologists and public health researchers.
- *Educational Institutions:* Relevant parties to consider include schools, colleges, and universities, as their own health and safety policies may be influenced by vaccination trends across various age groups.
- *General Public:* although not actively participating in decision-making processes, can indirectly benefit from clear dissemination of the dataset's results. This can contribute to increasing public confidence in and knowledge of vaccination recommendations.

Project Timeline

Week 1: Examine the dataset and project requirements.

i. Get acquainted with the dataset: Invest some time in comprehending the composition, organization, and substance of the dataset that you will be utilizing. List the variables, their definitions, and any problems with the quality or limitations of the data.

ii. Identify critical factors and metrics: Determine key factors and metrics related to the objectives of the project. These may include factors such as vaccination rates, demographics and geographical locations, all of which are essential for understanding the effectiveness of vaccines.

Week 2: Gather and preprocess data

i. Obtain additional information as needed: If you discovered any gaps or missing data in Week 1, make sure you have the additional information needed to fill those in. Verify that the new data meets the project's objectives and is of a suitable quality.

ii. Clean up the data set, address any data that is missing, incorrect or inconsistent. This may include methods such as imputation, outlier removal or data entry error correction. Record the actions you have taken to ensure that they are reproducible. If necessary, apply a normalization or transformation technique to the variables in the database. This helps with two problems: discrepancies in distribution and scale.

Week 3: Design BI reports and KPI dashboards.

i. After importing the dataset into PowerBI, perform any necessary data transformations and cleanups. Ensure that the data is organized, comprehensible, and ready for analysis.

Week 4: Create PowerBI visualizations.

i. Create dashboards that efficiently display the most important information and insight. Put the visuals in logical and intuitive order to facilitate interpretation.

ii. Perform extensive testing and validation of the visualizations, filters, and slicers in your PowerBI application before submitting it.

Week 5: Conduct exploratory data:

i. Do a thorough exploratory data analysis (EDA) to find out more and understand the relationships between the variables. This may involve producing summary statistics and visuals in addition to conducting statistical tests to look for patterns, correlations, or potential outliers. Preprocessing techniques, modifications, and the primary findings from your EDA should all be documented in detail. In the project's later stages, this documentation will come in handy for explaining your choices.

Week 6: Examine statistical data and correlation exploration:

Develop a comprehensive approach to explore the dataset to gain deeper insights and identify potential correlations or patterns. As the project progresses, this methodology should outline the specific analyses or visualizations that will be conducted.

Week 7: Produce actionable insights and complete the project report in.

Week 8: Go through your ICA to ascertain its accuracy and make sure make it meets all the necessary requirements of an ICA.

Business Intelligence Software Development

- Microsoft PowerBI

Dataset Source(s):

Dataset Source 1: H1N1 and Seasonal Flu Vaccines

Dataset Source 2: Covid-Flu-Cold Symptoms

Dataset Source 3: Competition: Flu Shot Learning: Predict H1N1 and Seasonal Flu Vaccines (drivendata.org)

Data Governance and Compliance:

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Business Intelligence System Design Methodology:

- Agile methodology with iterative development cycles
- Use of project management tools such as Trello, Monday or Jira for task tracking and collaboration

Business Intelligence Software Development:

- PowerBI for building BI KPI-Dashboards

Kaggle Dataset Source(s):

- Dataset Source 1: H1N1 and Seasonal Flu Vaccines
- Dataset Source 2: H1N1 and Seasonal Flu Vaccines

Google Scholar Research Papers:

- Google Scholar: Flu Vaccine
- Toward a universal flu vaccine: S Herold, LE Sander - Science, 2020 - science.org
- A one-size-fits-all flu vaccine?: J Kaiser - 2006 - science.org

Github:

- Github Link 1
- Github Link 2

Business Intelligence Developer Resources:

- Microsoft PowerBI
- Jupyter Notebook

YouTube Business Intelligence Resources:

- Alex The Analyst

References

TU-AI-projectMansh: Ask me to recommend a Project Proposal for Academia or Industry?., Mansha Nawaz, WNR AI. (2023). (https://wnr.ai/templates/tu-ai-projectmansh-ask-me-to-recommend-a-project-proposal-for-for-academia-or-industry)

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