Analysis of Dietary Intake and Dental Health

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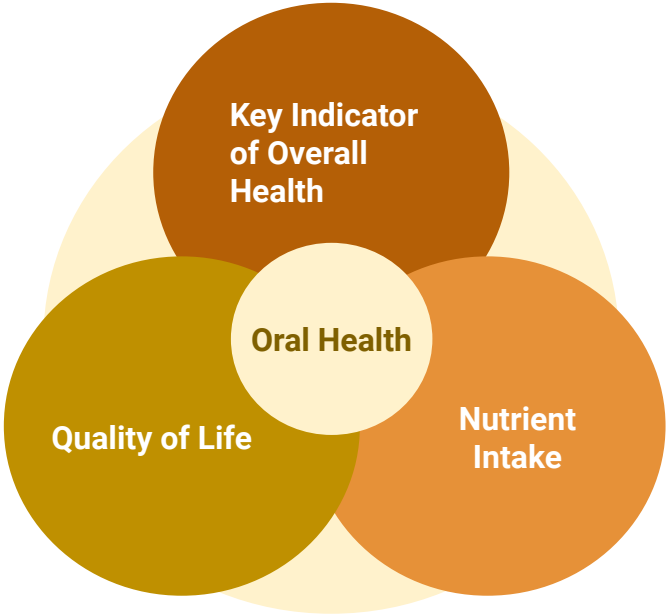
Introduction



Questions:

- What **kinds** of dietary supplement do the participants usually take?
- Any **habits** regarding nutrient intake for the participants?
- Any **correlation** between nutrient intake, dietary supplement, and dental health?

Dataset Overview and Preprocessing

National Health and Nutrition Examination Survey (NHANES)

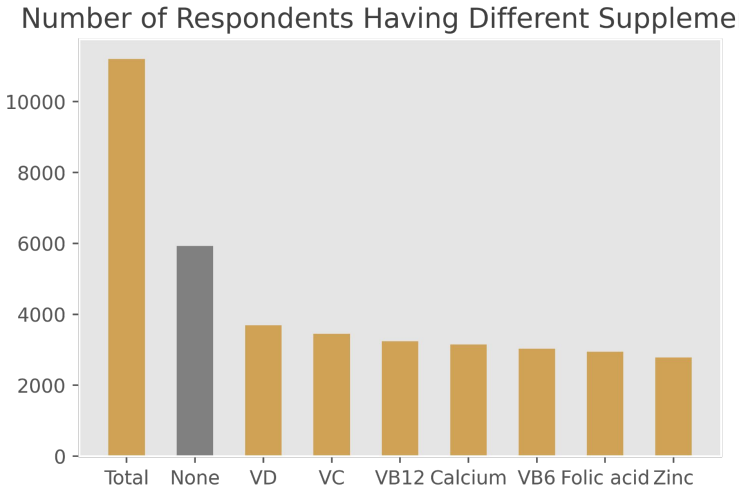
15,000+ participants

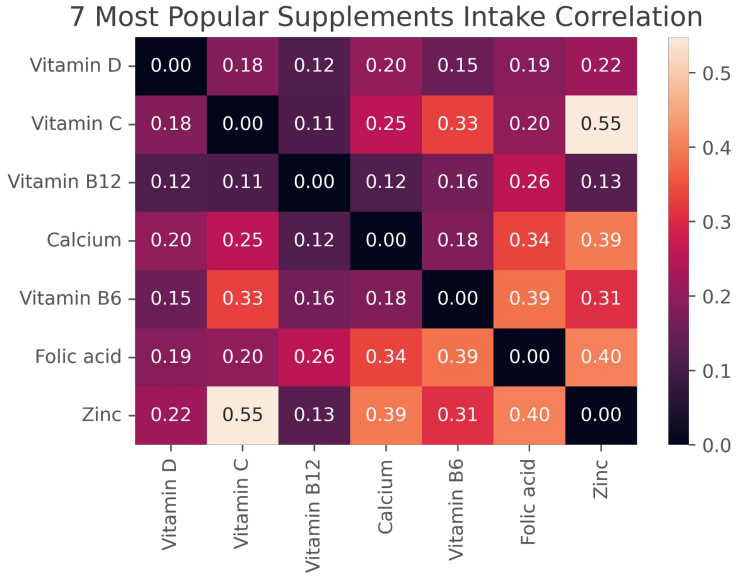
- Dietary supplement intake data: **34** attributes
- Individual foods/Total nutrient intake data: **64** attributes
- Oral health data: **6** attributes for **overall oral health**, **6** for **each** specific tooth

Pre-processing

Drop empty attributes/entries → Fill in empty/"refused" cells → Product labels by combining dental data

Dietary Supplement Dataset



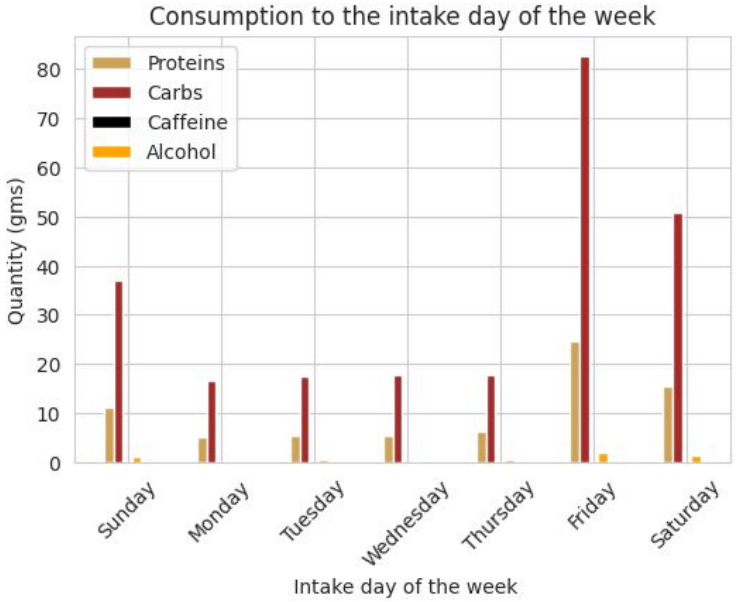


Mean Pearson Correlation:

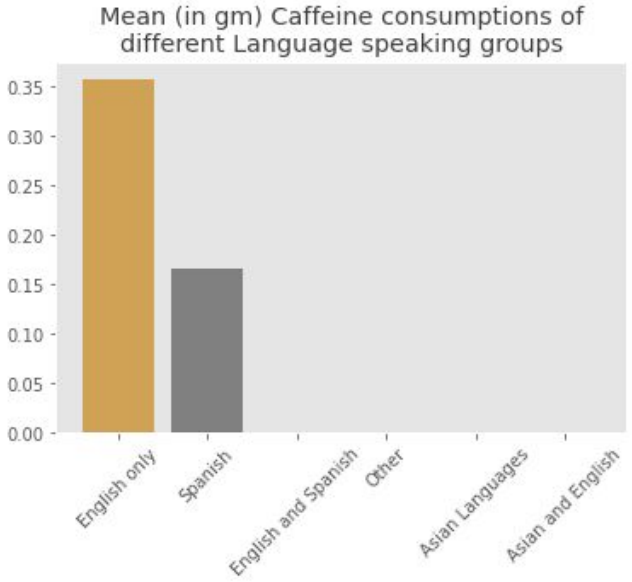
- All 34 supplements: 0.13
- Top 7 supplements: 0.24

People who are taking one common supplement is more likely to take other common supplements at the same time.

Nutrient Intake - Data Insights

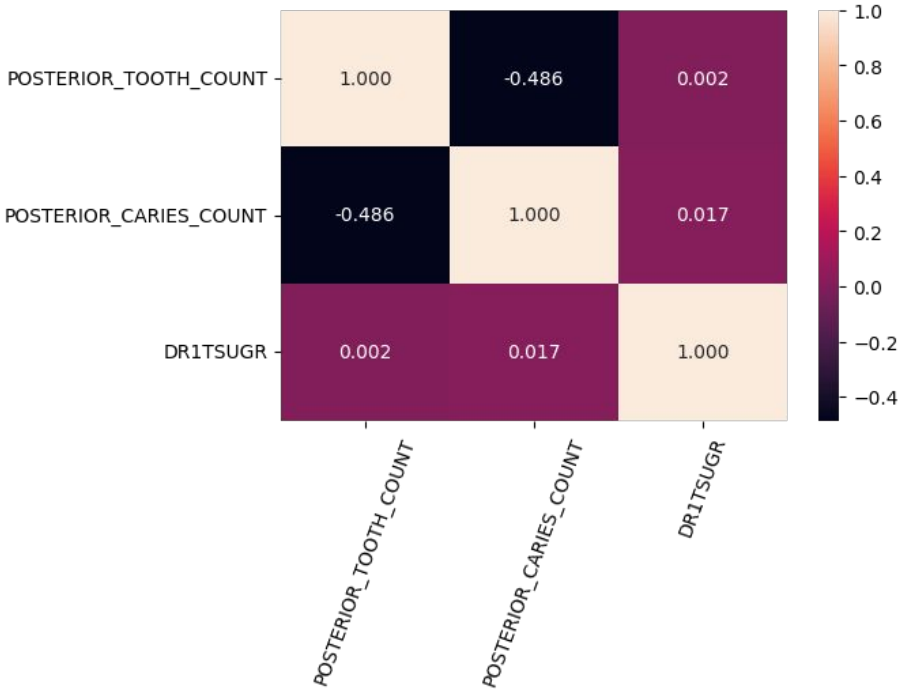


Respondents intake 140% more nutrients on Friday than the average of a week.



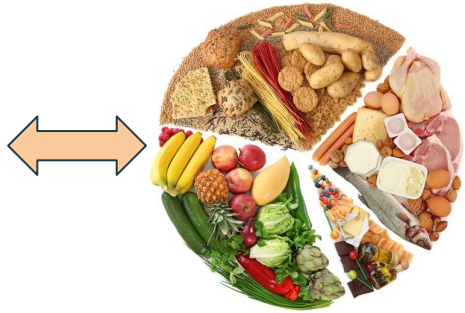
Caffeine consumptions in English and Spanish speaking countries.

Total Sugar ⇔ Dental Caries



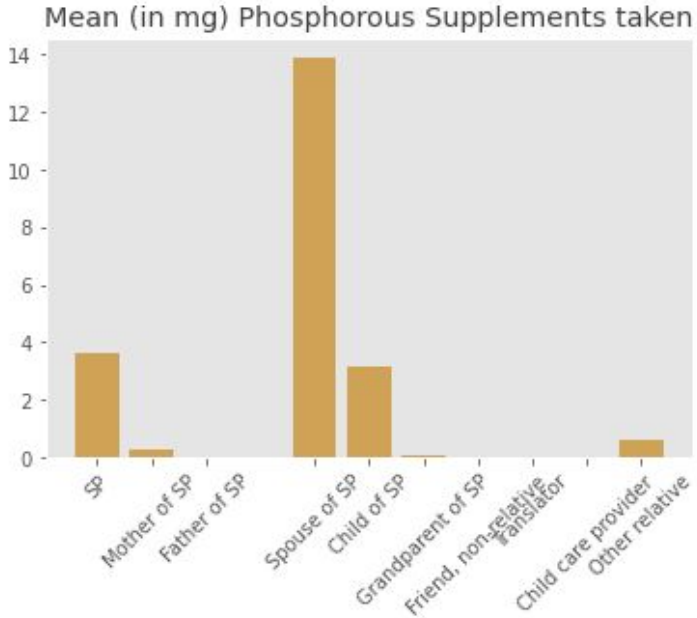
Cross Dataset Insights

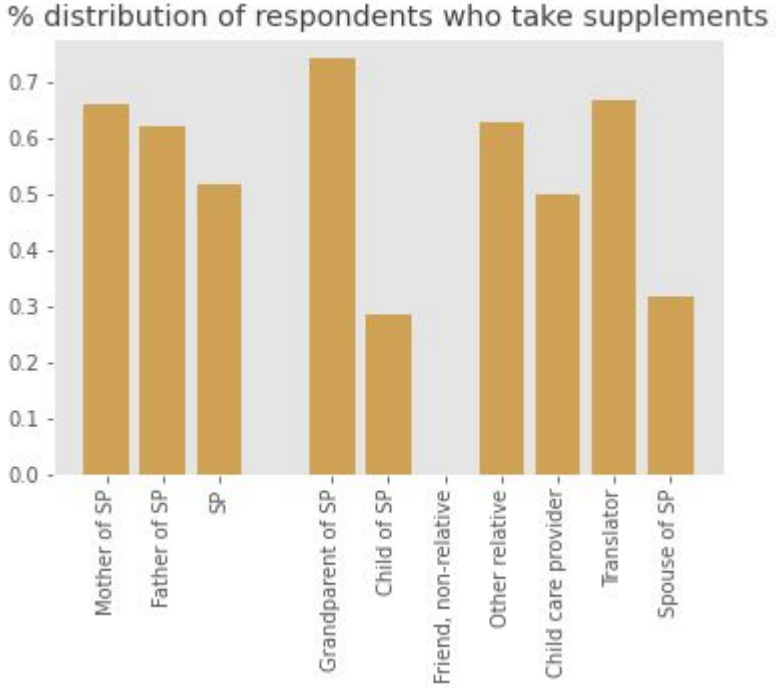
Number of dietary supplements and Number of foods/bevarages reported (ρ = 0.32))



Caffeine and Root carries (ρ = 0.28)

Cross Dataset



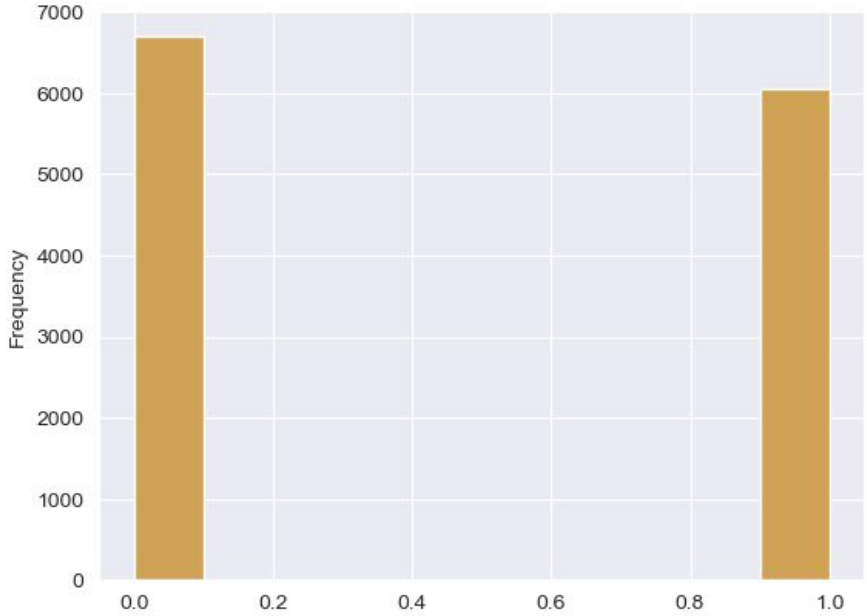


Dental Dataset - Labelling

Convert ~150 sparse columns to 0-1 labels

Serious Dental Health Issue :

- More than 6 Caries
- At least one Root Carie



Model

Pre-Processing	Models	Score
● Numerical Data ○ 0 -1 Scaling ○ PCA ● Categorical Data ○ One Hot Encoding ● Train-Test Split : 80%-20%	● Linear Models ● Random Forest ● Support Vector Machines ● ADA Boost	● PCA shows Linear Separation Not Possible ● Random Forest : 66% ● SVM : 68% ● ADA Boost : 69%

Conclusion

Observed

- High nutrient intake during weekends
- Diet difference matters
- High caffeine consumption in western-speaking countries

Predicted

Serious dental issue: ADA Boost Accuracy 69%