Determinants of Perceived Health: Dietary Habits, Socioeconomic Factors, Physical Activity, and Personal Metrics

A 2019 and 2021 SMART BRFSS City and County Data Analysis

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Date of Submission: October 20th, 2023

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## Abstract (Modified)

In today's evolving healthcare landscape, understanding the myriad determinants of perceived health becomes indispensable. Perceived health, while a subjective assessment of one's health status, often mirrors tangible health outcomes, emphasizing its significance in broader healthcare discussions. Historically, researchers have evaluated these determinants in isolation; however, their interconnected nature calls for an integrative approach.

Our research centers around critical research inquiries:

How do dietary habits, specifically the consumption of fruits and green vegetables, relate to overall health outcomes and perceived health predictions?

How does socioeconomic status, emphasizing racial and ethnic backgrounds, influence healthcare access and overall health outcomes?

How does regular physical exercise influence tangible health outcomes, such as the risk of developing cancer, and mental health outcomes, including the likelihood of being diagnosed with depression?

Is there a correlation between chronic conditions and individuals' self-assessed health status?

Can perceived health be accurately predicted using dietary habits, socioeconomic indicators, lifestyle choices, and individual metrics?

To explore these inquiries, we utilize data from the 2019 and 2021 SMART: BRFSS City and County datasets, with 152 variables for 2021 and 161 for 2020(Centers for Disease Control and Prevention, 2021). Our methodology is two-pronged: first, emphasizing the complete set of shared original features from both datasets for predictive modelling and, subsequently, contrasting the models' performances with the full feature set against a select subset (based on importance in predicting perceived health).

By amalgamating these determinants, from dietary choices to socioeconomic contexts, our study endeavours to paint a comprehensive picture of the factors driving perceived health. The anticipated findings aim to direct personalized healthcare strategies, steer policy alterations, and identify potential areas ripe for future research, all with the ultimate aspiration of promoting the holistic well-being of diverse populations.

## Intoduction

## Navigating the vast world of health data today feels like piecing together a complex puzzle. One aspect of health which often gets overlooked is self-perceived health. Why do some individuals feel healthier despite medical ailments while others feel otherwise, even in prime physical conditions? It is like comparing two fruits from the same basket; they might look the same, but their tastes could differ based on various invisible parameters. It is not just about how often we hit the gym or whether we have had our veggies; it is about how all these factors shape our overall sense of well-being.

## Our study dives deep into this, unpacking the little intricacies that paint the bigger picture of perceived health. We are not just talking about the prominent parts, like diet or exercise, but also the subtle factors, like where we come from and the day-to-day challenges we face.

## By weaving together these threads—from the food on our plates to the societies we live in, from our workout routines to our battles with chronic conditions—the hope is to present a tapestry that depicts the rich landscape of perceived health. Now, with our roadmap laid out, let us answer the research questions and, more importantly, seek to understand the nuances of perceived health.

## Research Questions

**How do dietary habits, specifically the consumption of fruits and green vegetables, relate to overall health outcomes and perceived health predictions?**

Universally recognized as vital components of a healthful diet, fruits, and vegetables (F&V) are prominent. As underscored by the 2015-2020 U.S. Dietary Guidelines for Americans, it is recommended that F&V constitute one-half of the plate at each meal. This diverse collection of plant foods provides varying energy levels, nutrients, and dietary bioactives essential for human health (Wallace et al., 2020).

Beyond merely meeting our basic nutritional requirements, F&V has shown potential health-promoting effects. They play roles in reducing inflammation and aid in the prevention of various chronic disease states. Fruits and vegetables reduce years lost due to premature mortality and morbidity. With current global intakes of F&V being below recommended levels, there is a pressing need for public policies promoting dietary interventions to help increase F&V intake (Wallace et al., 2020).

In their comprehensive narrative umbrella review, Wallace et al. (2020) delved deep into the clinical and observational evidence on current intakes of F&V. They discussed the available evidence regarding the health benefits of F&V, emphasizing the significant role F&V plays beyond just fulfilling basic nutrient requirements in humans.

A critical takeaway from their research focuses on cardiovascular diseases (CVDs). The review suggests that among the myriad health benefits of F&V, they exhibit the most potent preventive effects against CVDs, mainly when consumed in quantities around 800 grams per day—roughly five servings. It is also noteworthy that certain types of F&V, such as cruciferous vegetables, dark-green leafy vegetables, citrus fruits, and dark-coloured berries, showcase superior effects on biomarkers and outcomes of chronic disease (Wallace et al., 2020).

## How does socioeconomic status, emphasizing racial and ethnic backgrounds, influence healthcare access and overall health outcomes?

In the U.S., significant disparities in healthcare access exist, especially related to socioeconomic and racial factors. By analyzing national survey data from 2011-2015, Towne Jr. (2017) reported that racial and ethnic minority working-age adults, specifically Hispanic adults, were more likely to forgo necessary medical care due to costs when compared to their White counterparts. This discovery was consistent even after adjusting for various other factors, including income, education, and region. Furthermore, individuals with lower incomes or without a college or technical school degree were likelier to skip medical care. Regionally, those residing in the southern U.S. faced higher instances of forgone medical care. State decisions regarding Medicaid Expansion also played a role; individuals in states that did not expand Medicaid reported higher instances of forgone care. Notably, among older adults (65 and above), racial or ethnic minority groups were more likely to forgo medical care than White older adults, highlighting the persistent racial disparities in healthcare access across different age groups.

## How does regular physical exercise influence tangible health outcomes, such as the risk of developing cancer, and mental health outcomes, including the likelihood of being diagnosed with depression?

Regular physical exercise is important in promotion of one’s overall health. It goes beyond merely enhancing physical well-being and playing a pivotal role in mental health. A deeper dive into the literature provides illuminating insights.

Depression and anxiety, prevalent psychiatric conditions, afflict millions in the United States. While there are numerous treatments available, not all are uniformly effective. Intriguingly, a study by Carek, Laibstain, and Carek (2011) postulates that physical activity strongly correlates with decreased symptoms of these conditions. Consistent exercise improves physical health, life satisfaction, cognitive function, and psychological well-being and acts as a buffer against psychological disorders. This research compellingly suggests that exercise is comparable to antidepressant medications for mild to moderate depression and can enhance the effectiveness of such medications. Moreover, while it has been less studied, exercise emerged as a cost-efficient treatment for various anxiety disorders.

Expanding this perspective, Pedersen and Saltin (2015) examined how exercise is a therapeutic tool for a gamut of 26 chronic diseases, including psychiatric, neurological, metabolic, cardiovascular, pulmonary, musculoskeletal disorders, and even cancer. Their analysis gleaned from many sources, including systematic reviews, meta-analyses, and randomized controlled trials, heralds exercise as a pivotal intervention. In many instances, exercise therapy is on par with, if not superior to, medical treatments in efficacy.

The power of regular physical exercise on tangible health outcomes and mental well-being is quite evident. As our understanding of its multifaceted benefits deepens, it underscores the need for integrating exercise into therapeutic regimens and broader public health initiatives.

## Is there a correlation between Chronic conditions and individuals self-assessed health status?

When it comes to understanding how we see our health, it's more than just a feeling. It's fascinating how our self-view of our health can tell us about future doctor visits or even how our longevity might come into play.(Palladino et al., 2016).

Various studies present an investigation of the intricate relationship between chronic diseases and self-assessed health status. Barreto & Figueiredo (2009) delved deep into this association, focusing on how gender can influence these perceptions. Their research encompassed 39,821 adults, revealing a noteworthy association between the number of chronic diseases and self-perceived health. They discerned that individuals with a higher number of risk behaviours had a reduced reporting of two or more chronic diseases, suggesting the possibility of reverse causality or enhanced survival rates in those who practice better self-care. This result begs the question: Do folks start living healthier after a diagnosis? Or do those who care for themselves have better chances of beating the odds of chronic illnesses?

The OECD report further sheds light on the subjective nature of health assessments across nations. Most OECD countries have a majority of adults reporting good health. However, countries such as Japan, Korea, Latvia, and Portugal show a significant proportion of adults assessing their health as subpar. Several factors contribute to this variation, including socio-economic conditions, risk factors like smoking, and even financial barriers to healthcare access. Socio-economic disparities, in particular, create a pronounced gap; people with higher incomes consistently reported better health than their lower-income counterparts. This finding reinforces the potential bidirectional relationship: good health leads to better income opportunities, while better income affords better healthcare and lifestyle choices.

One crucial takeaway from the OECD report is caution when comparing perceived health statuses internationally. Cultural, socio-economic, and even survey methodologies can significantly influence the respondents' perception, making direct comparisons challenging. Yet, the recurring theme remains consistent: chronic conditions and individuals' perceptions of their health status are closely entwined, influenced by many factors ranging from individual behaviours to societal structures.

**Can perceived health be accurately predicted using dietary habits, socioeconomic indicators, lifestyle choices, and individual metrics?**

The way individuals perceive their health status is a multi-faceted concept. A particularly insightful study on this topic comes from Teresia Mbogori and Tya M. Arthur, titled "Perception of Body Weight Status Is Associated with the Health and Food Intake Behaviors of Adolescents in the United States."

In this cross-sectional research, the aim was to explore the relationships between adolescents' perception of their body weight status, their self-reported health status, the quality of their diet, and their consumption patterns of fruits and vegetables. The findings from 1737 adolescents aged 12-17 who participated in the Family Life, Activity, Sun, Health, and Eating study. 62% of the participants felt their weight was "just right." Contrastingly, 10.9% considered themselves "underweight," while 22.4% and 4.7% perceived themselves as "a little overweight" and "very overweight," respectively.

An essential takeaway from the study was the positive correlation between weight perception and diet quality. Adolescents who believed their weight was "just right" were more likely to describe their health status as either "very good" or "excellent." This group also reported having a good-quality diet. A key observation was the dietary habits related to fruit and vegetable intake. Those perceiving their weight as "just right" consumed fruits and vegetables more frequently than their peers who saw themselves as either "underweight" or "overweight."

This research by Mbogori and Arthur underscores the crucial relationship between self-perception of body weight and adolescent dietary behaviours. It provides a lens through which we can appreciate the nuanced interplay between perception, health status, and dietary habits. It also stresses the importance of considering self-perception when discussing diet quality and overall health.

The prediction of perceived health indeed intertwines with multiple factors. As highlighted by the study, one's weight perception can influence and, in turn, be influenced by their dietary choices, race and gender.

## Descriptive Statistics of Datasets:

Datasets: 2019 SMART: BRFSS City and County Data and Documentation and 2021 SMART: BRFSS City and County Data and Documentation.

These datasets underwent preliminary cleaning, resulting in two comprehensive datasets devoid of redundant columns and missing data. The 2021 dataset encompasses 70 columns (56 categorical, 13 numeric and 2 Text) and 391,231 rows combined. The column of interest is the \_RFHLTH column (which represents categorical column for perceived health). These datasets are imbalanced and as such the recall metric shall be a point of focus in model evaluation. The profile reports will present detailed descriptive statistics about each column and its associated data. The tentative step by step Methodology from cleaning to the modeling is depicted below in the graph diagram below.

## Github Links:

[Big Data Project Cleanup and Initial EDA Notebook](https://github.com/OBINNADINNEYA/MY_BIGDATA_PROJECT/blob/main/Data_Cleaning_2019_2021.ipynb)

[Github BigData Project Repository](https://github.com/OBINNADINNEYA/MY_BIGDATA_PROJECT/tree/main)





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