

Levels of alcohol consumption and smoking habits based on the income inequality.

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1

Abstract. *I investigated the association between state-level income inequality and reported alcohol consumption, smoking habits and tried to determine whether alcohol consumption and smoking problems would be more correlated to socioeconomic or other social/cultural factors. Evidence consistently finds that people with lower socioeconomic status are disproportionately or disparately affected by alcohol-related harms. According to the World Health Organization, the tobacco epidemic is one of the most relevant public health threats, killing each year directly more than 7 million people and around 1.2 million due to second-hand smoke, alcohol consumption – especially heavy episodic drinking – explains 27 percent of the socioeconomic inequalities in mortality. I analysed Organisation for Economic Co-operation and Development data on Daily smokers, Income Inequality, Alcohol consumption. The data consists of 46 countries worldwide from 1980 to 2020. Results show that with advancement of countries and their economies, percentage of people that smoke decreases while the level of alcohol consumption has weak negative correlation to the level of income inequality. Unlike other cited papers, I couldn't find strong evidence of the effect of income inequality on alcohol consumption and smoking habits.*

1. Introduction

Income disparity has long been a focus of socioeconomic research, having implications that go far beyond financial matters and into public health. This study investigates the complex relationship between state-level wealth disparity and two common cultural behaviors: consumption of liquor and smoking habits. The unequal distribution of wealth within cultures has continuously been related to poor health outcomes, particularly among those with lower socioeconomic status. Notably, the World Health Organization emphasizes the intensity of the tobacco pandemic, estimating that smoking causes approximately 7 million direct deaths per year, with an additional 1.2 million deaths attributable to secondhand smoke exposure. Furthermore, alcohol intake, particularly excessive episodic drinking, is acknowledged as a major contributor to socioeconomic differences in mortality.

This study examines the complex relationship between income inequality, smoking prevalence, and alcohol use using data from the Organisation for Economic Co-operation and Development (OECD) (Organisation for Economic Co-operation and Development [2024a] Organisation for Economic Co-operation and Development [2024b] Organisation for Economic Co-operation and Development [2024c]) covering 46 countries from 1980 to 2020. While recent research has frequently indicated a strong link between income disparity and these health habits, this research differs from previous findings. Despite the fact that developments in countries and economies are often associated with a

drop in smoking prevalence, the association between alcohol use and wealth disparity is weakly negative, contrary to expectations.

This study fits into a larger body of literature that has shed light on the complex dynamics of economic inequality and its implications for public health practices. Notably, studies by Karriker-Jaffe et al. [2013] and Pampel [2007] have highlighted the complex relationship between income inequality, alcohol use, and related issues. Additionally, Carnazza et al. [2023] conducted research on income-related differences in smoking patterns, particularly in the European Union.

However, as the study progresses, it becomes clear that the relationship between income disparity, alcohol use, and smoking patterns is complicated and possibly less straightforward than previously thought.

2. Hypotheses

During this research, I posed and tested 3 hypotheses.

Hypothesis one: Percentage of the nation who smoke daily rises with the level of economic inequality.

Hypothesis two: Annual sales of pure alcohol in litres per person aged 15 years and older rise with the percentage of population aged 15 years and over who are reporting to smoke every day.

Hypothesis three: During the Global economic crisis (years 2007-2008) there had been a large decrease in the levels of both alcohol and cigarette consumption.

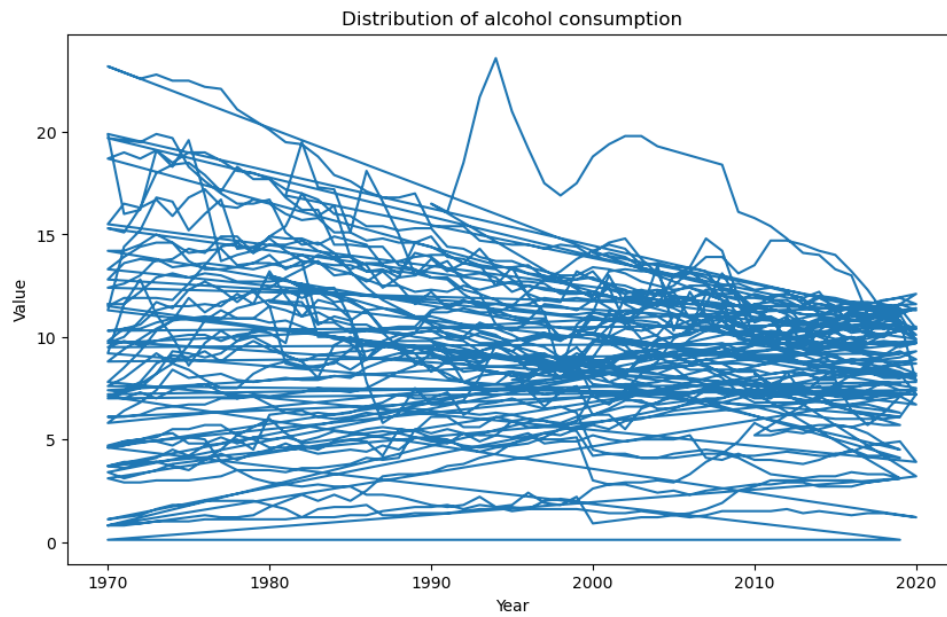
3. Data cleaning and preprocessing

The process of data cleaning started with the identification of unique locations within each dataset, which involved isolating and printing the unique values present in the "LOCATION" and "COU" columns across the respective data frames for alcohol consumption, smoking habits, income inequality, and Gross Domestic Expenditure on Research and Development. Subsequently, the datasets were merged based on the common "LOCATION" identifier. The cleaning procedure commenced with the removal of redundant columns. Furthermore, column names were standardized for clarity and consistency. Subsequent data cleaning steps included removing rows where there was difference between timelines, ensuring alignment between the temporal dimensions. The iterative cleaning process adopted in this study underscores the critical role of data preprocessing in ensuring the integrity, consistency, and compatibility of datasets.

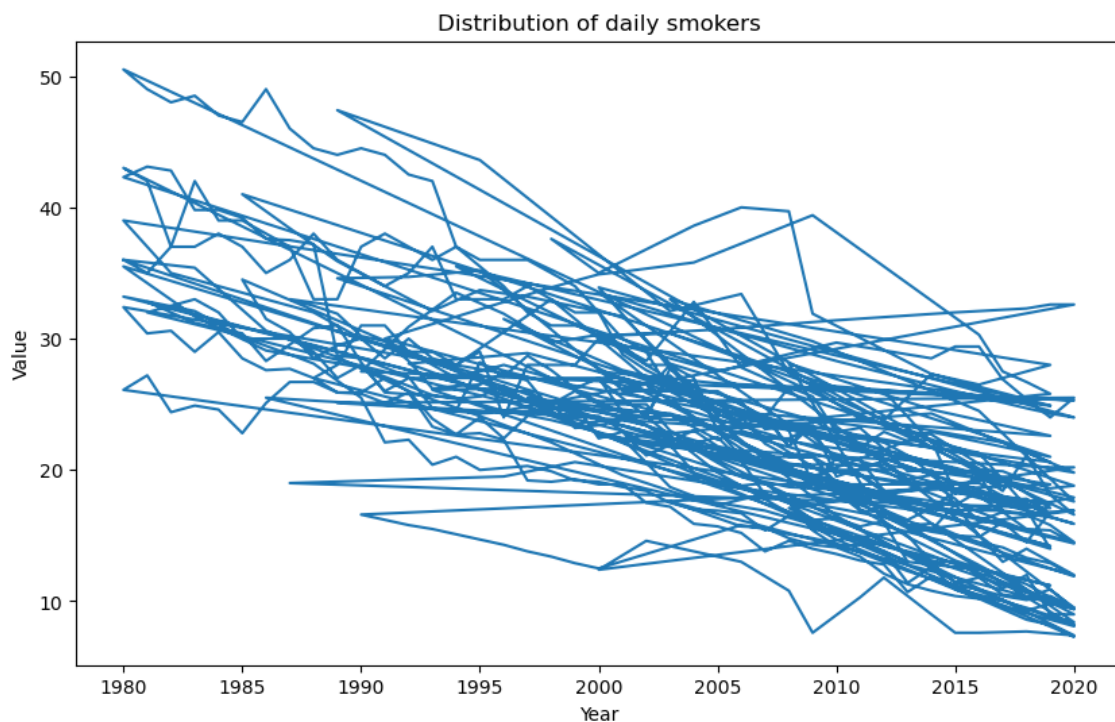
4. Methods and preliminary observations

During the project, I started by investigating how alcohol consumption and smoking has changed over 50 years in 46 countries.

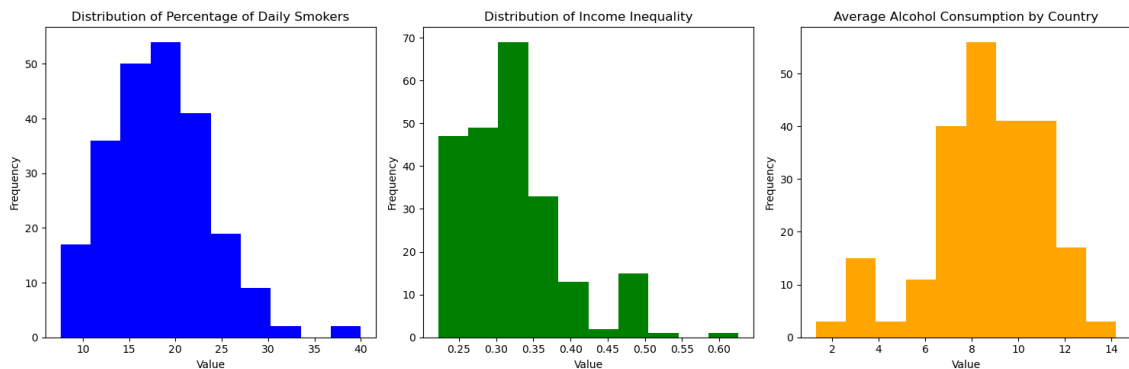
It is discernible from the data that instances of marked increases in alcohol consumption occurred during specific intervals. However, the overarching trend does not exhibit a discernible pattern of neither continuous growth nor decline. Consequently, the dataset's representativeness is compromised, thereby limiting the ability to draw conclusions that align with findings from other scholarly inquiries.



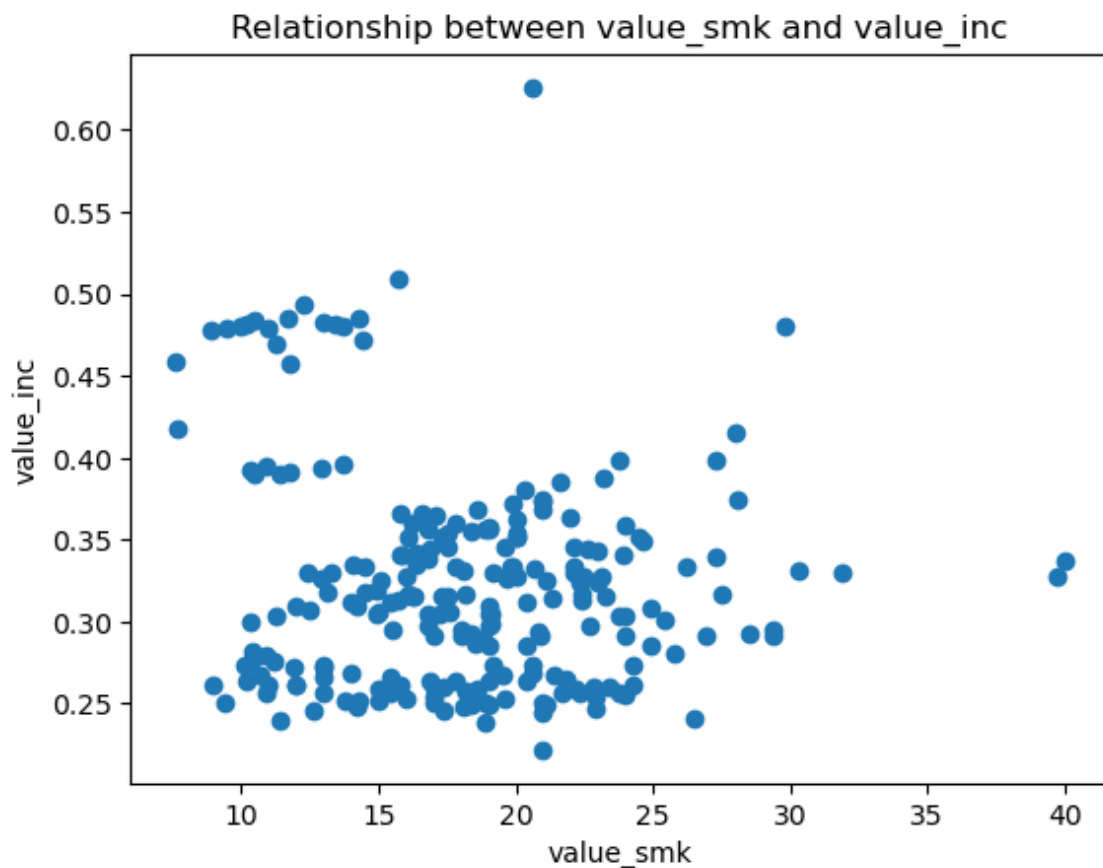
In terms of the prevalence of daily smoking within the population, discernible patterns reveal a general decline over time. Nonetheless, certain outliers, exemplified by nations such as Greece and Russia, exhibit upward trends in smoking prevalence. These deviations from the overall declining trajectory necessitate acknowledgment and are posited to stem largely from contextual factors such as political and economic circumstances prevailing during the respective periods under scrutiny. Consequently, this phenomenon constitutes a notable limitation inherent within the scope of this investigation, thereby warranting its explicit incorporation as part of the third hypothesis.



5. Hypothesis testing

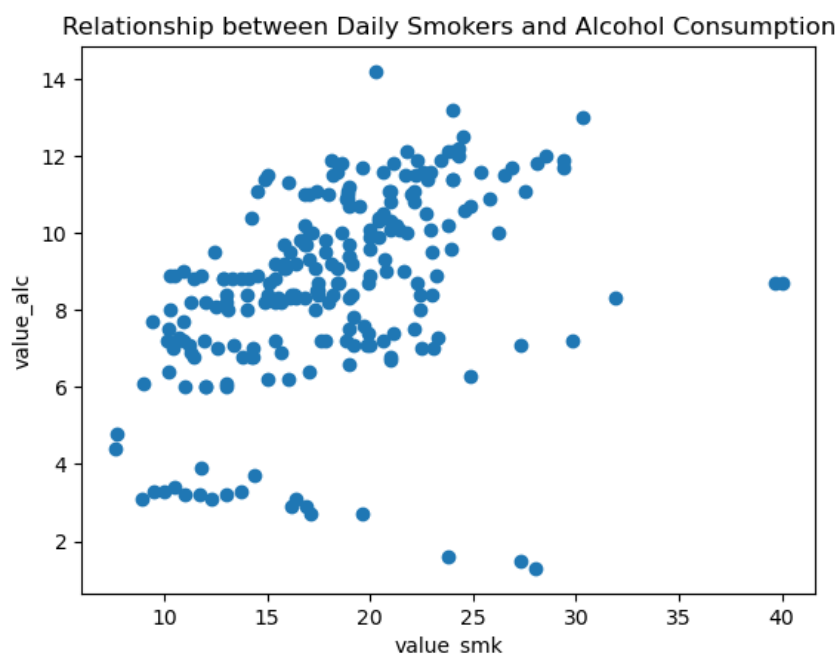


Subsequently, a visual examination of the data distribution was conducted to assess its conformity to a Gaussian or bell curve distribution. This preliminary analysis aims to ascertain the suitability of employing specific correlation tests contingent upon the observed distributional characteristics.

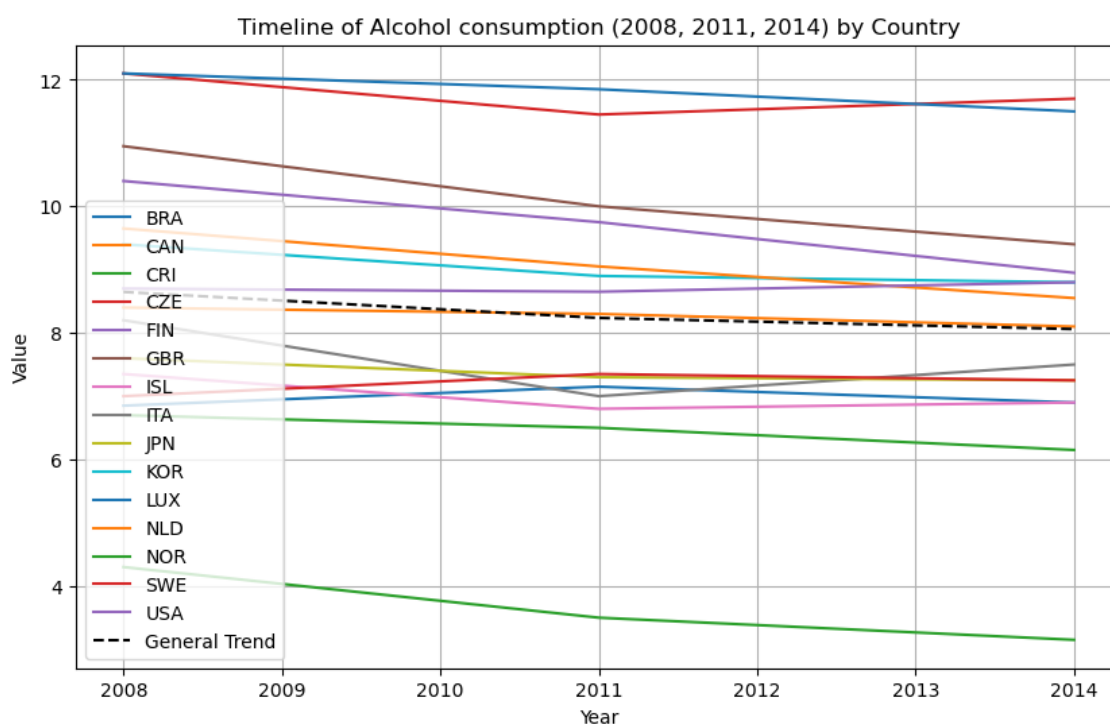


Despite the semblance of a bell curve in the distribution, determining a linear relationship from the scatter plot remained challenging. Consequently, I opted to perform Spearman's correlation test to ascertain the presence of any significant associations.

Subsequently, I followed a consistent methodology in implementing the same analytical approach across all subsequent tests.



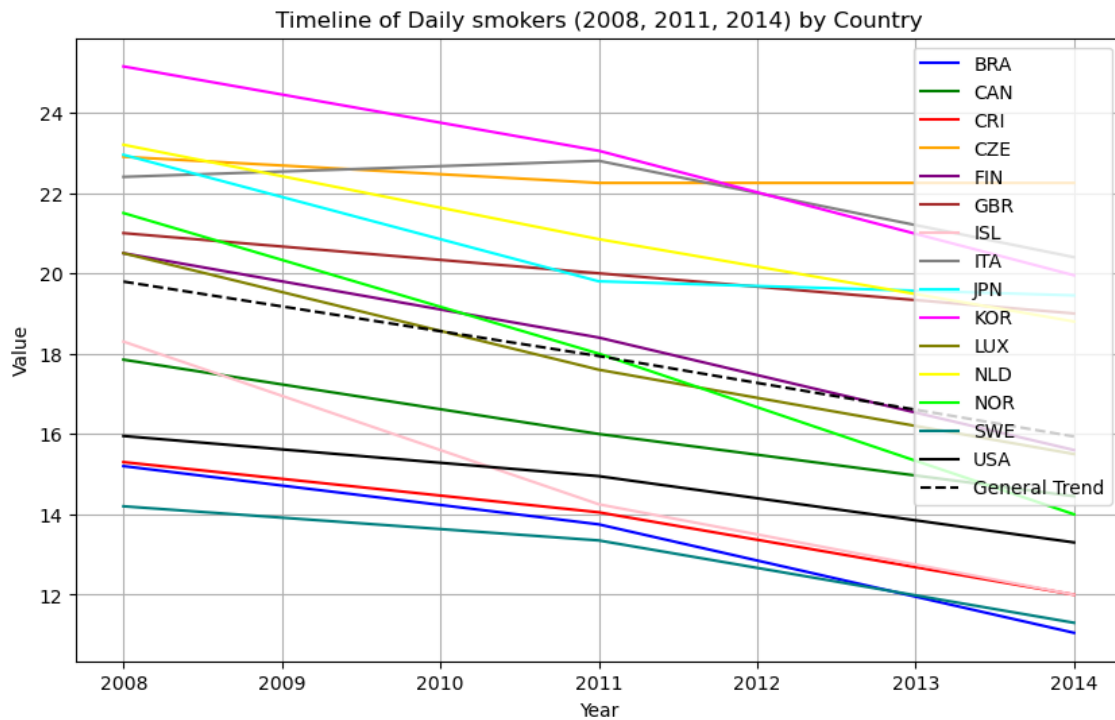
There is a moderate correlation between annual sales of pure alcohol in litres per person aged 15 years and older rise with the percentage of population aged 15 years and over who are reporting to smoke every day. After performing Spearman's correlation test, the statistic turned out to be 0.512 significant on 99.9 confidence scale.



The selection of countries included in this graph was primarily dictated by data availability and the prevalence of missing values within the dataset for the years under consideration. This approach aimed to mitigate potential biases stemming from incom-

plete data coverage while ensuring the robustness and reliability of the analytical framework. However, it is essential to acknowledge that this selection process may introduce inherent limitations, such as the exclusion of certain nations or the potential for sampling bias. As such, the generalizability of these findings to broader populations may be influenced by the representativeness of the selected countries within the dataset.

As previously indicated, the capacity to infer conclusions and discern patterns by analyzing the alcohol consumption on state level is limited in this dataset. The graph represents change in alcohol consumption in the period encompassing the prelude to, duration of, and aftermath following the Global Economic Crisis. Evidently, while a downward trajectory characterizes the global trend, the rate of decline during the crisis period exhibits a more pronounced decrement compared to the subsequent post-crisis phase.



Regarding smoking behavior, which inherently signifies addiction more prominently than alcohol consumption, divergent trends are discernible across various nations. For instance, Italy exhibits a distinct upward trajectory during the Global Economic Crisis, deviating from patterns observed in other countries. Conversely, nations such as Iceland, Japan, and the Czech Republic manifest marked declines in smoking prevalence during economically challenging periods. Subsequent to the economic crises, these countries exhibit less of a trend towards stopping to smoke. However, at the global level, discerning noteworthy distinctions in smoking trends proves challenging.

6. Results

Analysis reveals a highly significant and persistent decreasing trend in habitual smoking prevalence spanning the years from 1980 to 2000. Subsequent to this period, although exhibiting fluctuations, the prevalence of habitual smoking continues to display a predominantly decreasing trajectory.

Contrary to the hypothesized positive association between the prevalence of daily smoking within a nation and the level of economic inequality, this analysis reveals a notably weak negative correlation coefficient of -0.1, accompanied by a considerably high p-value of 0.3. This observation suggests an absence of a substantive relationship between these variables within the studied dataset.

Conversely, my findings indicate a statistically significant positive correlation between alcohol consumption and the prevalence of daily smoking, with a correlation coefficient of 0.51 and an exceedingly low p-value of 9.6×10^{-17} . This robust correlation underscores a notable concurrence in patterns between these two behavioral indicators.

Furthermore, the analysis identifies a modest negative correlation coefficient of -0.23 between alcohol consumption and economic inequality. Despite its statistical significance, this correlation remains relatively modest, suggesting a nuanced relationship between alcohol consumption and the socioeconomic distribution within the studied context.

During the period encompassing the Global Economic Crisis, the analysis revealed shifts in health behaviors concerning alcohol consumption and smoking habits. Despite the complexities inherent in global economic downturns, discernible trends emerged from our investigation.

Firstly, with regard to alcohol consumption, the data exhibited an interesting pattern. While the overall global trend showed a downward trajectory, indicative of potential economic austerity measures and changes in consumer spending patterns, there were instances of sudden increases in alcohol consumption in certain regions. This phenomenon suggests that the impact of economic crises on alcohol consumption is nuanced and may be influenced by contextual factors such as cultural norms, regulatory policies, and economic resilience.

Secondly, the prevalence of habitual smoking during the Global Economic Crisis period demonstrated heterogeneous patterns across different countries. Some nations experienced a surge in smoking prevalence, possibly attributed to stress-related coping mechanisms or changes in affordability and accessibility of tobacco products. Conversely, other countries exhibited declines in smoking prevalence, potentially reflecting increased awareness of health risks and intensified tobacco control efforts amidst economic uncertainty.

Therefore, I would like to outline a growing psychological and personal influence on each of these factors.

7. Discussion

The outcomes derived from the battery of analyses consistently underscore the divergent nature of smoking and alcohol consumption behaviors, indicating disparate trends influenced by a myriad of factors encompassing national, cultural, social, and external economic dynamics.

Evidently, the observed patterns in smoking prevalence and alcohol consumption exhibit significant variation across nations, reflective of the intricate interplay between cultural norms, societal customs, and economic circumstances. This nuanced understanding elucidates the multifaceted nature of these behaviors, which defy singular explanations or overarching generalizations.

Moreover, the varying trends in smoking and alcohol consumption underscore the necessity of considering a holistic array of determinants when evaluating public health phenomena. While economic inequality may exert discernible effects on certain health behaviors, its impact appears to be nuanced and context-dependent, interacting with a host of other societal and environmental factors.

In summary, the heterogeneous trends elucidated by the analyses reaffirm the complexity inherent in understanding and addressing public health challenges related to smoking and alcohol consumption. A comprehensive approach that accounts for the multifactorial nature of these behaviors is essential for the formulation of effective interventions and policies aimed at promoting population health and well-being.

8. Limitations and Implications

It is imperative to acknowledge and address the limitations inherent within the research methodology.

One notable limitation of the current study pertains to the reliance on secondary data sources, such as the Organisation for Economic Co-operation and Development (OECD) database. While these datasets offer extensive coverage and longitudinal insights, they are subject to inherent biases and inaccuracies, stemming from factors such as data collection methodologies and reporting discrepancies across different nations. Consequently, the generalizability of these findings may be constrained by the quality and representativeness of the underlying data.

Moreover, the observational nature of this study design precludes the establishment of causality between variables of interest. While correlation analyses elucidate associations between socioeconomic indicators and health behaviors, they do not ascertain the directionality or causal pathways underlying these relationships.

Furthermore, the complexity of human behavior necessitates the consideration of multifaceted determinants beyond the scope of this analysis. Sociodemographic factors, cultural norms, health and pricing policies, environmental influences exert profound effects on health behaviors, yet their nuanced interplay may remain not captured.

Moreover, the identification of divergent trends in smoking and alcohol consumption behaviors underscores the necessity of nuanced and multifactorial approaches to health promotion. Tailored interventions that account for the heterogeneous nature of these behaviors and the diverse sociocultural contexts in which they manifest are essential for fostering sustainable improvements in population health outcomes.

In conclusion, while the research dives into the complex interplay between socioeconomic disparities and health behaviors, it also underscores the need for continued scholarly inquiry and evidence-based policymaking to address the multifaceted challenges confronting public health in contemporary society.

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