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# Pattern of Health Behavior and its Association with Self-rated Health: Evidence from the 2018 Behavioral Risk Factor Surveillance System in the United States

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## Introduction

Physical inactivity, tobacco use, and alcohol consumption are linked with increased morbidity and mortality. To improve public health services, we need to keep policymakers updated with health-related issues. Yet, there are limited numbers of recent research on the combination of those lifestyle behaviors as the determinants of self-rated health (SRH) in the US. Therefore, this study (1) examines the pattern of physical activities, smoking, alcohol consumption, and self-rated health (SRH), and (2) investigates the association between the behaviors and SRH status among US citizens. We analyzed the data mainly employing R/RStudio program, chi-square tests and logistic regression models

## Materials

**Data source:** 2018 BRFSS administered by the Centers for Disease Control and Prevention, a nationally representative sample of 437,436 American adults

**Variable:** smoking rate, alcohol consumption level, body mass index (BMI), and other socio-demographic/economic factors. Polar questions (Yes/No): physical activity, health care coverage, Medicare possession, and other chronic diseases

**Statistical analysis:** (1) Univariate analysis to summarize the data. (2) Bivariate analysis for cross-classification to determine the empirical relationship between two variables. (3) Chi-square test to test for a statistically significant relationship between each two chosen variables. (4) Dichotomous logistic regression model to examine the association between the reporting optimal SRH and selected health behaviors among the adult people:

$$\ln \left[ \frac{P(y=1|x)}{1-P(y=1|x)} \right] = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_p x_p$$

$y = \begin{cases} 1, & \text{if the adults have optimal SRH (that is, good, very good, and excellent)} \\ 0, & \text{if the adults do not have optimal SRH (that is, fair or bad)} \end{cases}$

$x_1$ : physical activity (yes, no)

$x_2$ : smoking (every day, some day, not at all)

$x_3$ : alcohol consumption (at least one drink in a month, none)

## Results

Figure 1: Percentage distribution of the American adults by levels of selected health behaviors and SRH status

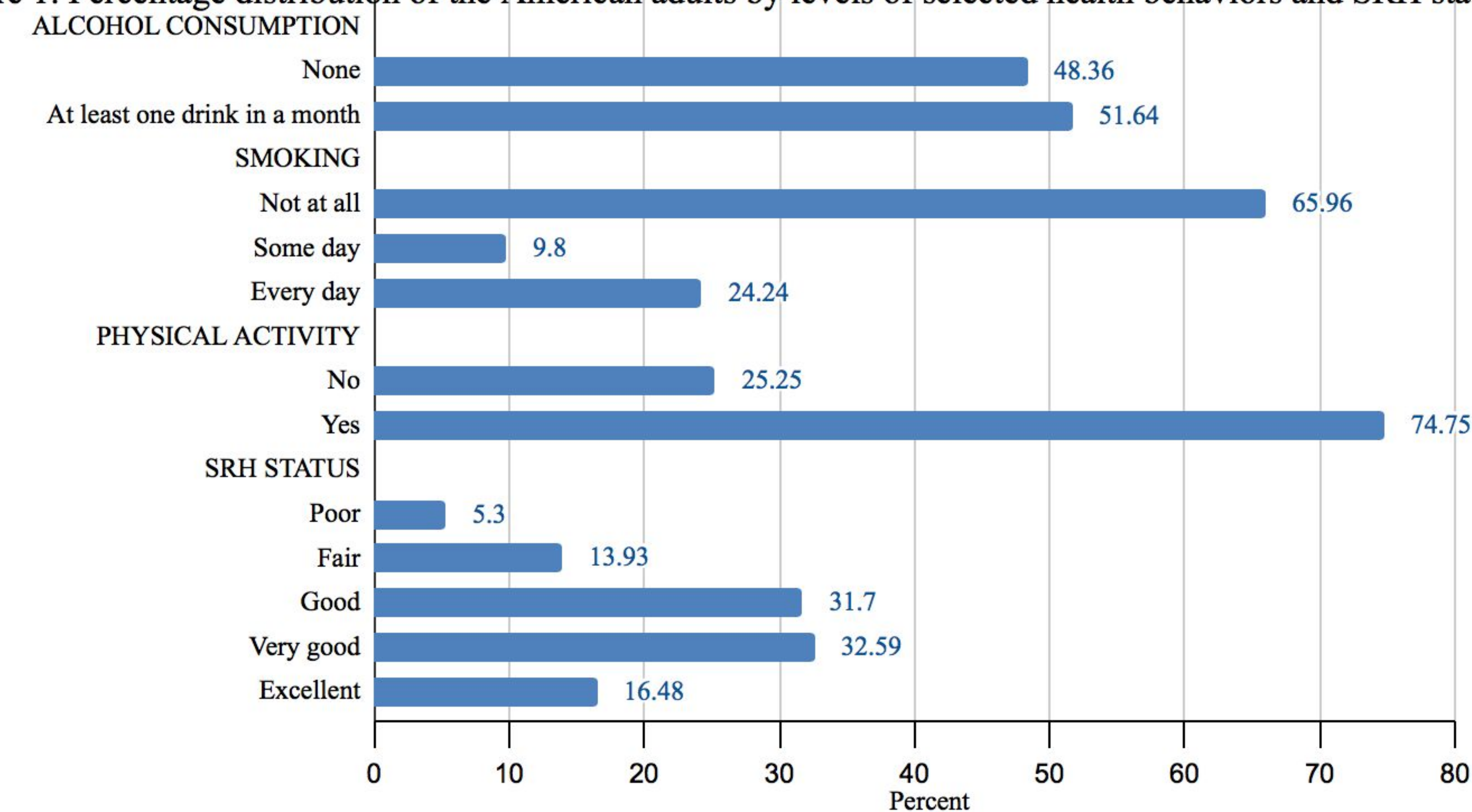


Table 2. Optimal SRH by level of selected health behavior, 2018 BRFSS, United States

Health behavior	Self-rated health		P-value
	Optimal	Sub-optimal	
<b>Physical activity</b>			≈ 0.0
Yes	86.7 (282356)	13.3 (43477)	
No	63.4 (69640)	36.6 (40183)	
<b>Smoking</b>			≈ 0.0
Every day	67.5 (29370)	32.5 (14134)	
Some day	71.7 (12618)	28.3 (4970)	
Not at all	77.7 (92029)	22.3 (26418)	
<b>Alcohol consumption</b>			≈ 0.0
At least one drink in a month	87.4 (187282)	12.6 (27086)	
None	73.7 (147715)	26.3 (52634)	

Table 3 Results of logistic regression analysis showing the adjusted odds ratio (AOR) for reporting optimal SRH by selected health behavior among adult people, 2018 BRFSS, United States

Level of health behavior	Coefficient (β)	SE(β)	AOR <sup>‡</sup>	95% CI of AOR	P-value
<b>Physical activity</b>					
Yes	(ref.)	--	1.000	--	--
No	-1.095	0.012	0.335	(0.327, 0.343)	<0.001
<b>Smoking</b>					
Every day	(ref.)	--	1.000	--	--
Some day	0.040	0.021	1.040	(0.100, 1.084)	0.060
Not at all	0.394	0.013	1.483	(1.445, 1.522)	<0.001
<b>Alcohol consumption</b>					
At least one drink in a month	(ref.)	--	1.000	--	--
None	-0.789	0.012	0.454	(0.444, 0.465)	<0.001

<sup>‡</sup> Adjusted for socio-economic, demographic and chronic diseases variables

## Conclusion

Our analysis of the 2018 BRFSS survey has pinpointed the targeted groups of different unhealthy behaviors and SRH levels that need more attention from the policy-makers:

- Physical inactivity is common among women, older ages, lower education or household income, people outside of workforce, divorced/widowed/separated or rural or obese individuals, or who are or has chronic diseases
- Younger ages, lower educational attainment or income, unemployed, marital single, having no chronic diseases, are predictors of smoking
- People aged 25-34, employed, male sex, the non-Hispanic white, urban individuals, having normal weight, higher education/ income level, or those without the diseases drink more than those of their categories
- Optimal SRH are prevalent among younger age, high income/education, male gender, people being Asian, married, urban residents, having normal weight, or those without the illness
- Optimal SRH is much less for people who smoke and are physically inactive. People who have at least one drink a month report optimal SRH much more often than those who do not

We encourage the policy formulators:

- To consider educational campaigns targeting the youth to raise awareness about the harmful health effects of the unhealthy behaviors.
- Further focus on the maintenance of the public space for everyone to encourage them to do physical activity, raise tax for cigarettes or tobacco products.

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