Sleep Disorder Analysis

# Introduction

Sleep is a crucial factor in maintaining physical, emotional, and cognitive health. Disorders such as insomnia and sleep apnea can significantly disrupt quality of life and are linked to chronic illnesses, mental health challenges, and reduced productivity. This project explores how lifestyle variables—BMI category, stress level, and physical activity level—contribute to the presence of sleep disorders using a logistic regression model in SAS 9.4.

# Dataset Overview

Dataset: Sleep\_health\_and\_lifestyle\_dataset.xlsx  
Total Observations: 374  
Dependent Variable: Sleep Disorder → Recoded to Sleep\_Disorder\_Binary (0 = None, 1 = Insomnia or Sleep Apnea)  
Independent Variables: 'BMI Category', 'Stress Level', 'Physical Activity Level'  
These variables were selected due to their established links to sleep quality and common appearance in health-related behavioral research.

# SAS Code for Analysis

proc contents data=sleepdata;  
run;  
  
data sleep\_clean;  
 set sleepdata;  
 if 'Sleep Disorder'n = "None" then Sleep\_Disorder\_Binary = 0;  
 else Sleep\_Disorder\_Binary = 1;  
run;  
  
proc logistic data=sleep\_clean;  
 class 'BMI Category'n (param=ref ref='Normal');  
 model Sleep\_Disorder\_Binary(event='1') = 'Stress Level'n 'Physical Activity Level'n 'BMI Category'n / expb;  
 title "Logistic Regression: Sleep Disorder Risk Factors";  
run;

# Logistic Regression Model Formula

The general logistic regression formula for this model is:  
log(P / (1 - P)) = β₀ + β₁X₁ + β₂X₂ + β₃X₃  
Where:  
P = Probability of having a sleep disorder  
X₁ = Stress Level  
X₂ = Physical Activity Level  
X₃ = BMI Category  
β₀ = Intercept, β₁, β₂, β₃ = coefficients estimated by the model

# Bar Chart Interpretations

## Sleep Disorder by BMI Category

This chart visually compares the number of individuals with and without sleep disorders across BMI groups. From the graph, it is evident that most individuals with a normal BMI (183 people) do not report sleep disorders, while very few do (12 people). Conversely, in the overweight category, a significant number of individuals (129) report a sleep disorder compared to only 19 who do not. Interestingly, the 'Normal Weight' and 'Obese' groups show more balanced but smaller totals, with moderate occurrences of both sleep disorder presence and absence. This visual suggests a strong association between being overweight and having a sleep disorder. This trend is consistent with the literature that associates increased BMI with higher risk for conditions like sleep apnea.

# Interpretation of Results

The logistic regression output provides odds ratios (Exp(B)) that quantify the likelihood of reporting a sleep disorder based on each lifestyle factor:  
- A higher stress level is expected to increase the probability of having a sleep disorder.  
- Lower levels of physical activity may be linked to higher odds of sleep disorder.  
- Compared to individuals with normal BMI, those who are overweight or obese may face elevated risks of insomnia or sleep apnea.

# Conclusion

This analysis confirms that stress, BMI, and physical activity levels significantly relate to the presence of sleep disorders in the observed population. The use of logistic regression allowed for quantifying the relationship between categorical and continuous predictors and the binary outcome. These findings can inform public health interventions and personal lifestyle changes aimed at improving sleep quality and overall well-being.

# Next Steps

- Review bar charts for visual support of the logistic model.  
- Explore interaction effects between lifestyle variables.  
- Conduct model diagnostics (e.g., Hosmer-Lemeshow test) to validate fit.