

# “Obesity of the Youth: Health Disparity and Income Inequality”

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# Background

- Racial and socioeconomic disparities significantly impact youth obesity rates, with Black and Hispanic adolescents facing higher risks due to systemic barriers in income, education, and healthcare access
- Lifestyle factors like poor diet, low physical activity, and inadequate sleep contribute to increased cardiometabolic and obesity risks across youth populations—even among those who are physically active
- The COVID-19 pandemic intensified disparities, leading to worsened physical and mental health, food insecurity, and weight gain—especially among low-income and minoritized youth

# Objectives

1. Analyze the impact of socioeconomic, racial, and healthcare factors on adolescent obesity using logistic regression models.
2. Measure and compare inequality in obesity outcomes across subgroups using the Concentration Index and Kakwani Index.
3. Apply the PRECEDE-PROCEED public health framework to interpret behavioral and structural contributors to youth obesity and guide policy implications.
4. Compare changes in obesity risk before and after the COVID-19 pandemic using a year-based indicator (2019 vs 2023) to assess temporal disparities.

# Methodology

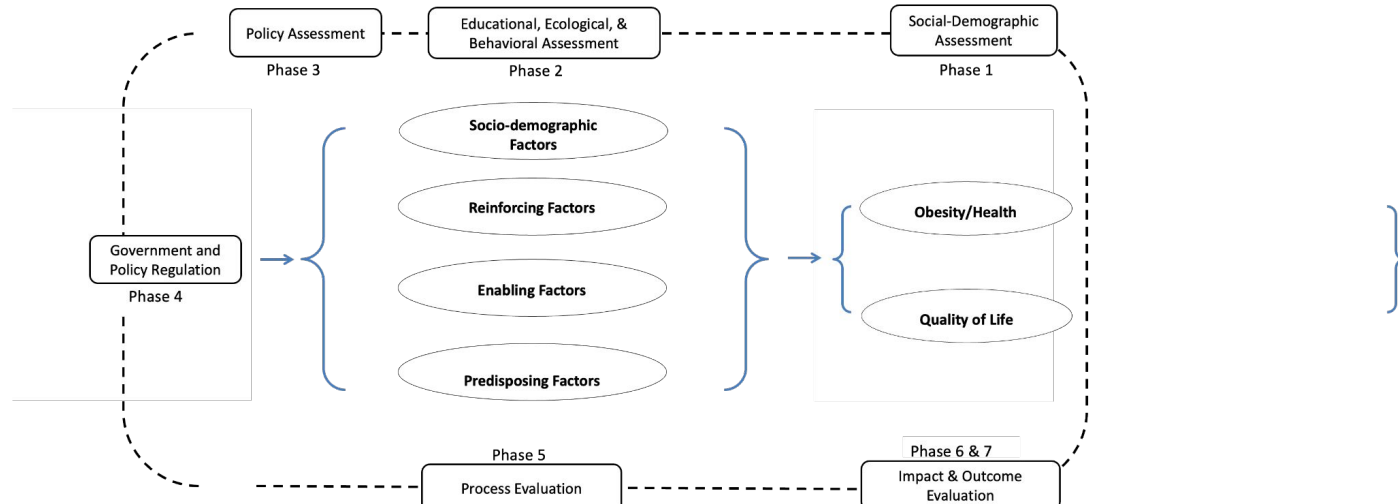
1. This study was done in the context of a behavioral model using inferences from a Concentration Index, the Precede-Proceed Model and pooled logistic regression to analyze the demographics of children with obesity with marginal effects to estimate predictors of overweight and obesity.
2. Concentration Index (1) – Analysis to identify the degree / level of socioeconomic inequality that exists within the examined variable. In this study, it is used to evaluate the effects of different demographic health factors.
3. Precede-Proceed Model (2)– A health promotion framework used to limit disease, centered on Program Planning & Evaluation. In this study, it was used to propose that health outcomes are attributed to the child's behavior based on state obesity programs.
4. BMI is used to classify children's weight status, BMI values between the 85th to 95th percentile are overweight, and BMI values equal to or greater than the 95th percentile are obese.

# Data Source and Sample

- Source: National Survey of Children's Health (NSCH) 2019 & 2023
- Final Sample: N = 39,714
- Ages 7–17, balanced by gender, race/ethnicity
- Key Outcome: BMI (binary) – overweight/obese vs healthy
- Predictors span demographic, socioeconomic, healthcare, and time-based variables

# The PRECEDE-PROCEED Framework

- Predisposing: Age, gender, race/ethnicity, wellbeing
- Enabling: Income, insurance, healthcare access
- Reinforcing: Parental education, care quality
  - Guides how health behaviors are shaped structurally and socially
  - Useful for designing interventions, not just explaining disparities



# Key Variables

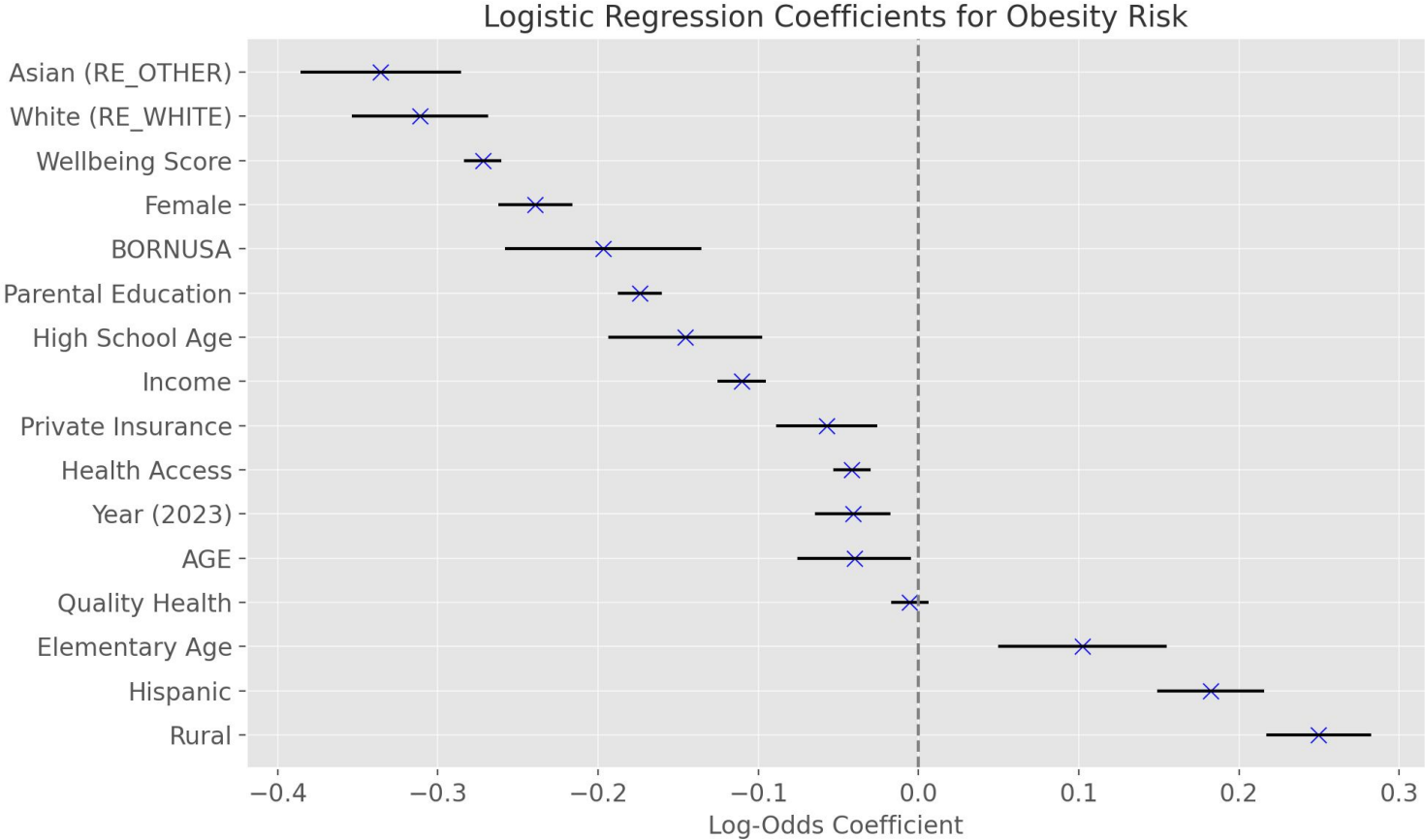
Category	Variable
Demographics	AGE, GENDER, RACETH, BORNUSA
Socioeconomic Status (SES)	EDUC_P, INCOME
Healthcare	INSURANCE_TYPE, HEALTH_AVAIL, QUALITY_HEALTH
Behavioral	WELLBEING_SCORE
Time	YEAR
Schooling	EDUC_ELEM, EDUC_MID (Ref), EDUC_HIGH

# Methodology-Modeling Approach

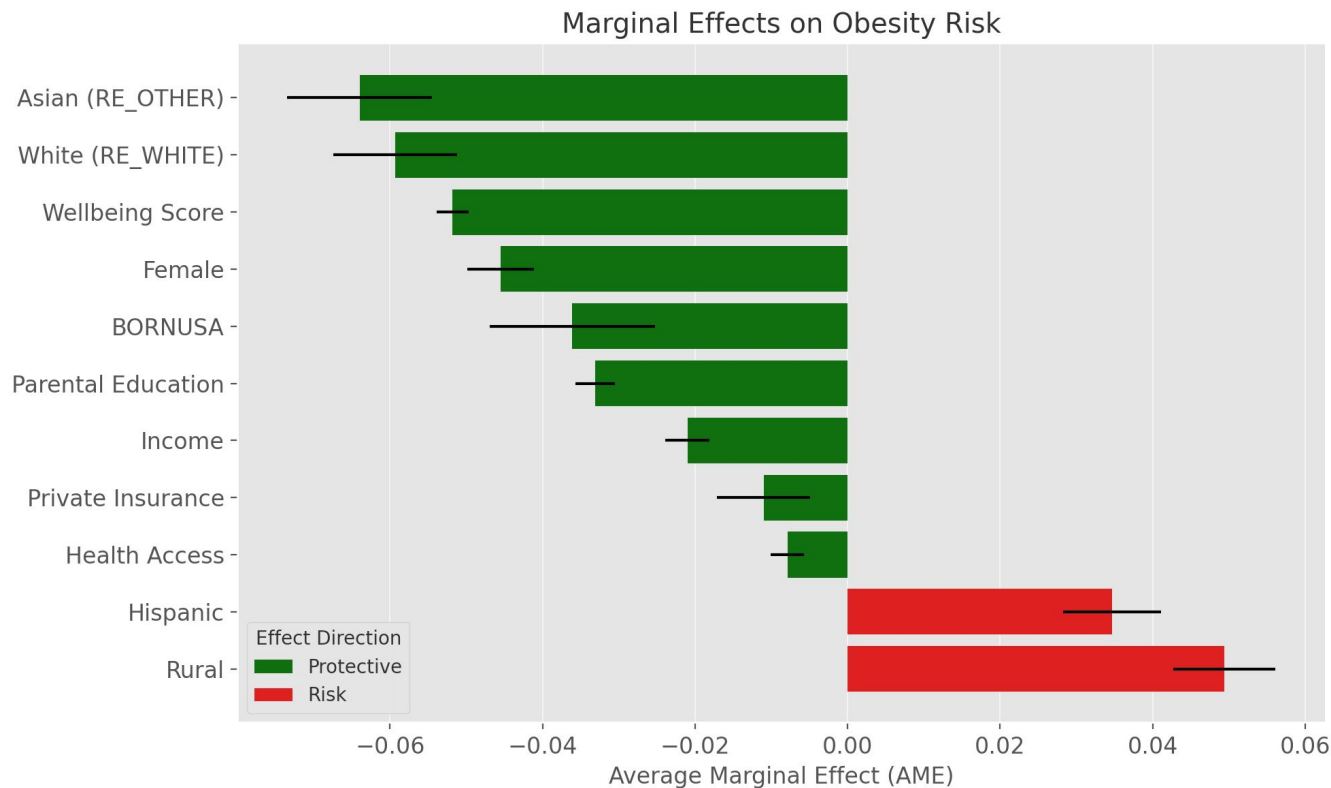
- Logistic regression used to predict BMI status
- Marginal effects computed to aid interpretation
- Model controls for age, race, year, and clustering
- Model Fit:
  - McFadden's Pseudo- $R^2 = 0.041$
  - AIC = 45029 | Wald  $\chi^2 = 1236.7$  ( $p < 0.001$ )



# Estimation Results



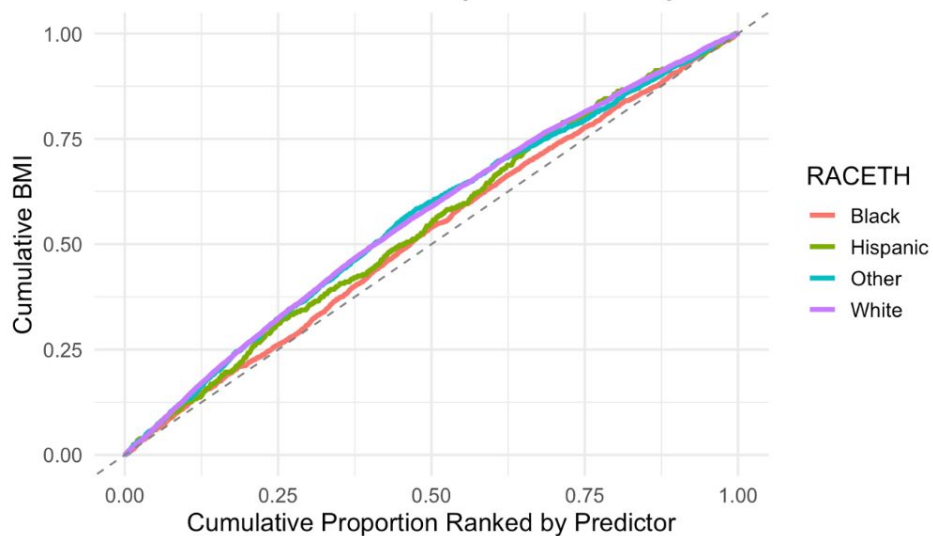
# Marginal Effects: What Drives Obesity?



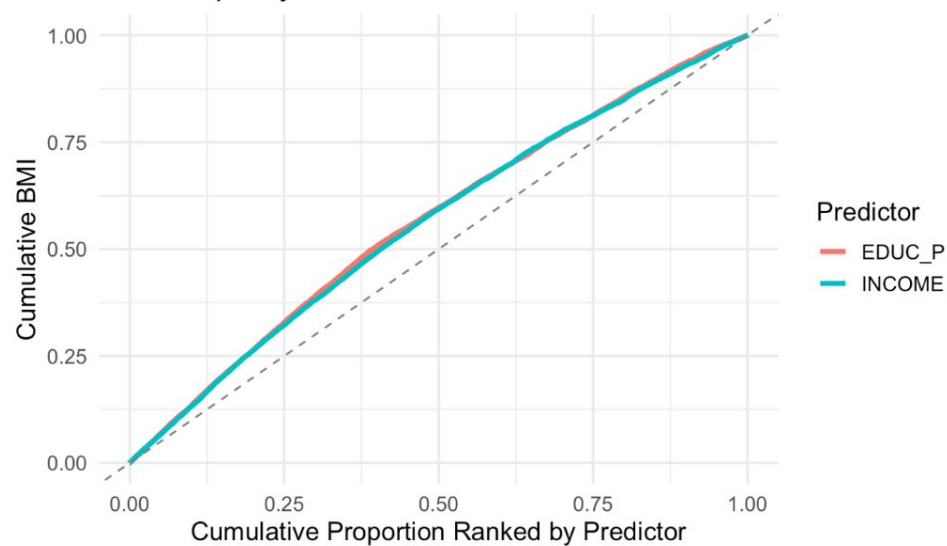
### Concentration Index Table

Group	Sub-Group	Concentration Index	Gini Index	Kakwani Index	Obs.
AGE	Male	0.0002	0.1469	-0.1467	20643
	Female	0.0009	0.1456	-0.1446	19071
EDUC_P	“	-0.0257	0.1594	-0.1852	39714
INCOME	“	-0.0222	0.2513	-0.2735	39714
GENDER	Male	0.1944	0.1944	0.0000	20643
	Female	0.1701	0.1701	0.0000	19071
RACE	Hispanic	-0.2057	0.2057	0.0000	5382
	Black	-0.2183	0.2182	0.0001	2927
	White	-0.1783	0.1783	0.0000	30745
QH	Male	-0.0070	0.0510	-0.0580	20643
	Female	-0.0091	0.0524	-0.0615	19071

BMI Concentration Curve by Race/Ethnicity



BMI Inequality: Income vs Education



# Results

1. Higher income, parental education, and better healthcare access were significantly associated with lower obesity risk among adolescents.
2. Black and Hispanic youth had higher obesity prevalence, while White and Asian youth had significantly lower odds, even after controlling for income.
3. Obesity was more concentrated among low-income and less-educated groups
4. Post-COVID year (2023) showed a small but significant reduction in obesity odds, though disparities persisted across all subgroups
- 5.

# Conclusions

- Logistic modeling identifies key social determinants of obesity
- PRECEDE-PROCEED framework helps explain how structural inequality shapes outcomes
- Concentration indices show clear health disparities by race and SES
- Policies must be multi-layered, addressing both access and structural inequities

# Policy Implications

- Address structural inequities by expanding access to quality healthcare, especially for low-income and racially marginalized youth.
- Support education-based interventions, as parental education strongly predicts healthier weight outcomes in children.
- Invest in school and community programs that promote nutrition, physical activity, and mental well-being—especially post-pandemic.
- Prioritize culturally tailored interventions that address racial and ethnic disparities in obesity, sleep, and nutrition among youth populations.