Evaluating the impact of BMI on Cholesterol

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Research Question:

Does a higher BMI cause higher cholesterol?

Data

Source:
2005 – 2006 National Health and Nutrition Examination Survey

Outcome variable:
Cholesterol Ratio (Total Cholesterol/HDL)

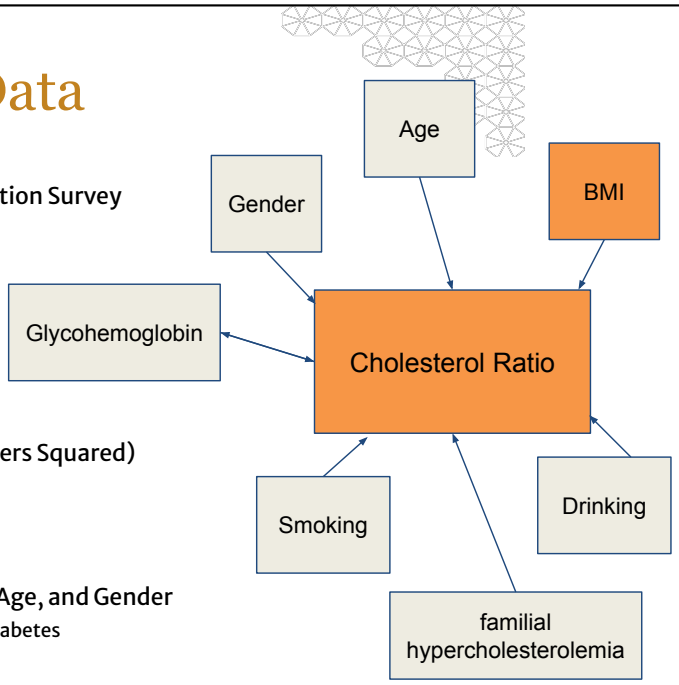
3.5 is desirable, greater than 5 is concerning

Key independent variable:
Body Mass Index (Weight in Kilogram / Height in Meters Squared)

18.5 – 25 is healthy, greater than 40 is severe obesity

Supplemental independent variables:
Glycohemoglobin (blood test to diagnose diabetes), Age, and Gender

Glycohemoglobin below 5.7% is normal, greater than 6.5% is diabetes



Model & Results

Increase in cholesterol ratio for each unit increase in BMI

Constant

$$\widehat{Cholesterol\ Ratio} = \beta_0 + \beta_1 \times BMI + Z\gamma$$

Row vector for additional covariates

Column vector for coefficients

Table 1: Estimated Regressions

	Outcome Variable: Cholesterol Ratio			
	(1)	(2)	(3)	(4)
BMI	0.064***	0.058***	0.055***	0.058***
	(0.003)	(0.003)	(0.003)	(0.003)
Glycohemoglobin		0.199***	0.151***	0.131***
		(0.031)	(0.034)	(0.033)
Age			0.005***	0.005***
			(0.001)	(0.001)
GenderMale				0.510***
				(0.034)
Constant	1.908***	1.006***	1.144***	0.924***
	(0.071)	(0.160)	(0.166)	(0.164)
Observations	4,401	4,401	4,401	4,401
Adjusted R^2	0.113	0.128	0.134	0.178
Residual Std. Error	1.144 (df = 4399)	1.135 (df = 4398)	1.131 (df = 4397)	1.102 (df = 4396)

Note: HC_3 robust standard errors in parentheses.

Limitation & Conclusion

Omitted Variables Bias:

Familial hypercholesterolemia, drinking habits, etc.

Reverse Causality Bias:

Individual's cholesterol ratio could affect their glycohemoglobin levels

Inspiration for future research:

The adjusted R-squared was below 20%, indicating there may be other factors, such as genetics and family history, with stronger effects on the cholesterol ratio.