The Association Between Breakfast Nutrition Among Adolescents and Demographic Factors

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Introduction

- Proper nutrition stems from breakfast, often referred to as the most important meal of the day, and significantly impacts the amount of nutrients needed at the start of the day.
- The food choices faced by adolescents are heavily influenced by the economic constraints that affect low-income households and adolescents' nutrition.
- Protein intake was higher among Asian and Black adolescents (for meat, poultry, and fish) compared to White adolescents (Nagata et al., 2025).
- As the level of urbanization increased, so did the protein-rich foods among children and adolescents in China, contrasting with rural areas (Zhang 17 et al., 2017).
- Across many low and middle-income rural areas, rural adolescents tend to have lower overall energy and protein intake compared to urban adolescents (Keats et al., 2018).
- During development, increases in lean body mass are higher in males (~3.8 g/day) than in females (~2.3 g/day), which explains that protein intake tends to be higher for boys (Desbrow, 2021).

Methods

Sample

- Participants were U.S. adolescents in grades 7-12 drawn from a nationally representative study from Wave I of Add Health. In total, 6,504 students completed the in-school questionnaire, with some also completing an in-home interview.

Measures

- The study focused solely on animal protein consumption, rather than total protein, as the dataset only contained specific metrics for breakfast sources such as meat and eggs.
- Animal protein intake from breakfast — either from eating meat or eggs — is 1: yes, 0: no.
- Four demographic factors were used:
  - Adolescents' region is categorized as "Rural", "Urban", and "Suburban"
  - Adolescents' race is categorized into Asian or Pacific Islander, Black or African American, Native American or American Indian, White, and Other.
  - Adolescents' sex is categorized as male or female.
  - Household income of parents was measured quantitatively, ranging from $0-$900k; categorized into low, medium low, medium high, and high.

Research Questions

1. How does each of the demographic factors relate to protein consumption for breakfast?
2. Taken together, how do race, income, sex, and region predict the likelihood of protein consumption?

Results

Bivariate

- Chi-square analysis for race revealed the proportion who consume protein is **not** statistically significant (X^2=7.5, 4 df, p =.1096).
- Chi-square analysis for income revealed the proportion who consume protein is statistically significant (X^2=14.4, 3 df, p= 0.002462).
- Chi-square analysis for the region revealed the proportion who consume protein is **not** statistically significant (X^2=3.6, 2 df, p=.1678).
- Chi-square analysis for sex revealed the proportion who consume protein is statistically significant (X^2=5.2, 1 df, p= .02237).

Multivariate

- Adolescents in rural areas consistently consume more protein, while those in urban areas are within the middle, and those in suburban areas consume less.
- Males consumed more protein than females.
- Protein intake increases with household income, but only slightly in urban areas, resulting in the higher-income adolescents consuming the most protein.
- However, a logistic regression analysis for all demographic variables is **not** a significant predictor of protein consumption.

Figure 1. Proportion Who Consume Protein by Race

Race Category	Proportion Who Consumed Protein
Asian or Pacific Islander	.47
Black or African American	.55
Native American or American Indian	.50
Other	.32
White	.34

Figure 2. Regional Association Between Race and Protein Breakfast Consumed
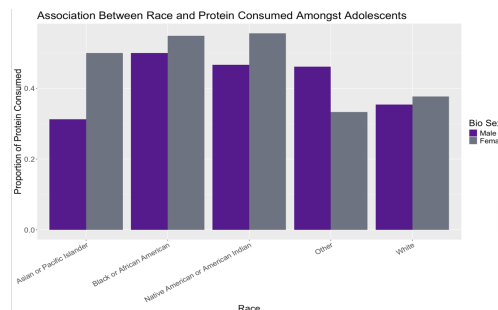

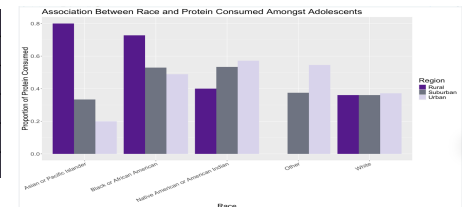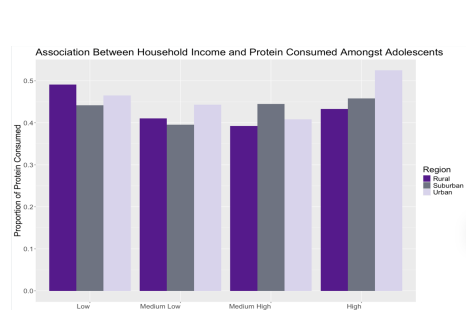**Figure 3.** Association Between Race and Protein Breakfast Consumed by Sex

Figure 4 Regional Association Between Household Income and Protein Breakfast Consumed

Discussion

- The factors associated with protein consumption remain unclear, as the demographic variables appear to be linked and may be acting as confounders.
- Some racial groups (Black, Asian, Native American) appeared to have higher protein consumption, although the difference was not statistically significant.
- Although adolescent males are generally supposed to consume more protein overall for development, the graph appears to show that females consume more protein than males within most racial groups.
- Further research is needed to examine specific breakfast foods to better yield an understanding of the cultural and environmental factors that play a role in adolescents' nutrition.

Desbrow, B. (2021b, September 13). *Youth Athlete Development and Nutrition*. Springer Nature. https://link.springer.com/content/pdf/10.1007/s40279-021-01534-6.pdf
Keats, E. C., Rappaport, A. I., Shah, S., Oh, C., Jain, R., & Bhutta, Z. A. (2018, December 14). *The dietary intake and practices of adolescent girls in low- and middle-income countries: A systematic review*. MDPI. https://www.mdpi.com/2072-6643/10/12/1978
Nagata, J. M., Helmer, C. K., Wong, J., Diep, T., Domingue, S. K., Do, R., Ervin, R., Mehta, A. S., Al-shoaibi, A. A. A., Gooding, H. C., Ganson, K. T., Testa, A., Baker, F. C., & Garber, A. K. (2025, January 27). *Social Epidemiology of Early Adolescent Nutrition*. Nature News. https://www.nature.com/articles/s41390-025-03838-z
Zhang J;Wang D;Eldridge AL;Huang F;Ouyang Y;Wang H;Zhang B; (2017, May 21). *Urban-rural disparities in energy intake and contribution of fat and animal source foods in Chinese children aged 4-17 years*. NIH. https://pubmed.ncbi.nlm.nih.gov/28531133/