# Supplemental Online Content

McCullough ML, Chantaprasopsuk S, Islami F, et al. Association of socioeconomic and geographic factors with diet quality in US adults. *JAMA Netw Open*. 2022;5(6):e2216406. doi:10.1001/jamanetworkopen.2022.16406



This supplemental material has been provided by the authors to give readers additional information about their work.

**eTable 1.** 2020 American Cancer Society Diet Guideline Score[a]

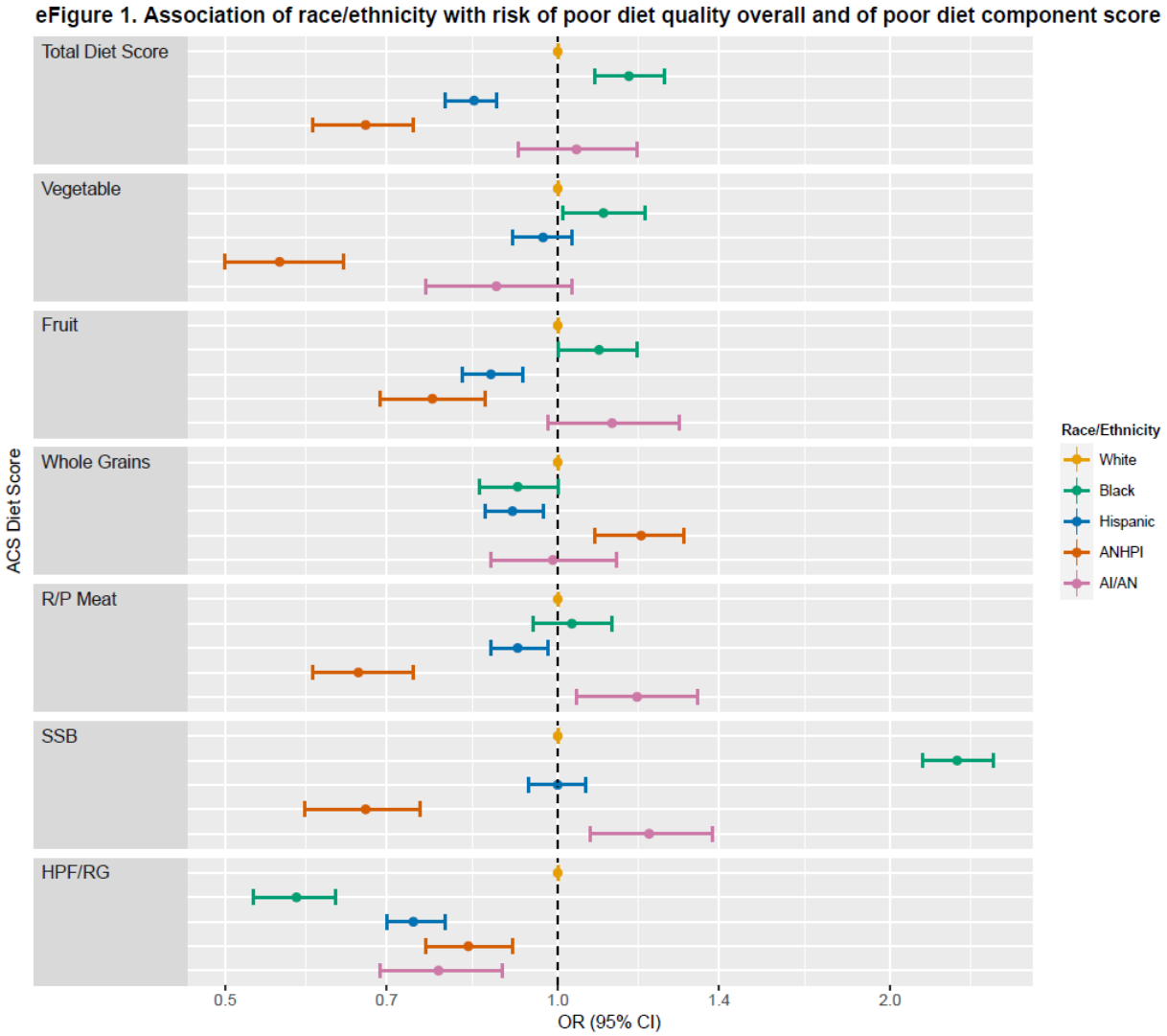
| Sub score category | Score | Criteria for low score | Points | Criteria for highest score | Points |
|---|---|---|---|---|---|
| Fruit & Vegetables | 0-3 | | | | |
| Vegetable intake | | Lowest quartile | 0 | Highest quartile | .75 |
| | | ≤2.1 svgs/d in men | | >4.9 svgs/d in men | |
| | | ≤2.4 svgs/d in women | | >5.7 svgs/d in women | |
| Vegetable variety | | Lowest quartile | 0 | Highest quartile | .75 |
| | | ≤14 unique vegetables/mo in men | | >22 unique vegetables/mo in men | |
| | | ≤15 unique vegetables/mo in women | | >23 unique vegetables/mo in women | |
| Fruit intake | | Lowest quartile | 0 | Highest quartile | .75 |
| | | ≤0.9 svgs/d in men | | >2.6 svgs/d in men | |
| | | ≤1.1 svgs/d in women | | >2.9 svgs/d in women | |
| Fruit variety | | Lowest quartile | 0 | Highest quartile | .75 |
| | | ≤6 unique fruits/mo in men | | >12 unique fruits/mo in men | |
| | | ≤8 unique fruits/mo in women | | >13 unique fruits/mo in women | |
| Whole grains | 0-3 | Lowest quartile | 0 | Highest quartile | 3 |
| | | ≤0.7 svgs/d in men | | >1.9 svgs/d in men | |
| | | ≤0.7 svgs/d in women | | >1.7 svgs/d in women | |
| Red and processed meat | 0-3 | Highest quartile | 0 | Lowest quartile | 3 |
| | | >1.5 svgs/d in men | | ≤0.6 svgs/d in men | |
| | | >1.2 svgs/d in women | | ≤0.5 svgs/d in women | |
| Sugar-sweetened beverages and highly processed foods/refined grains | 0-3 | | | | |
| SSB intake | | SSB: ≥7 svgs/wk | 0 | SSB: None | 1.5 |
| HPF/RG intake | | HPF/RG, highest quartile | 0 | HPF/RG, lowest quartile | 1.5 |
| | | >39% kcal in men | | ≤25% kcal in men | |
| | | >40% kcal in women | | ≤24% kcal in women | |
| Total Score | 0-12 | | | | |

Abbreviations: svgs/d, servings per day; mo, month; svgs/wk, servings per week; SSB, sugar-sweetened beverages; HPF/RG, highly processed foods/refined grains

**eTable 1. 2020 American Cancer Society Diet Guideline Score, Continued**

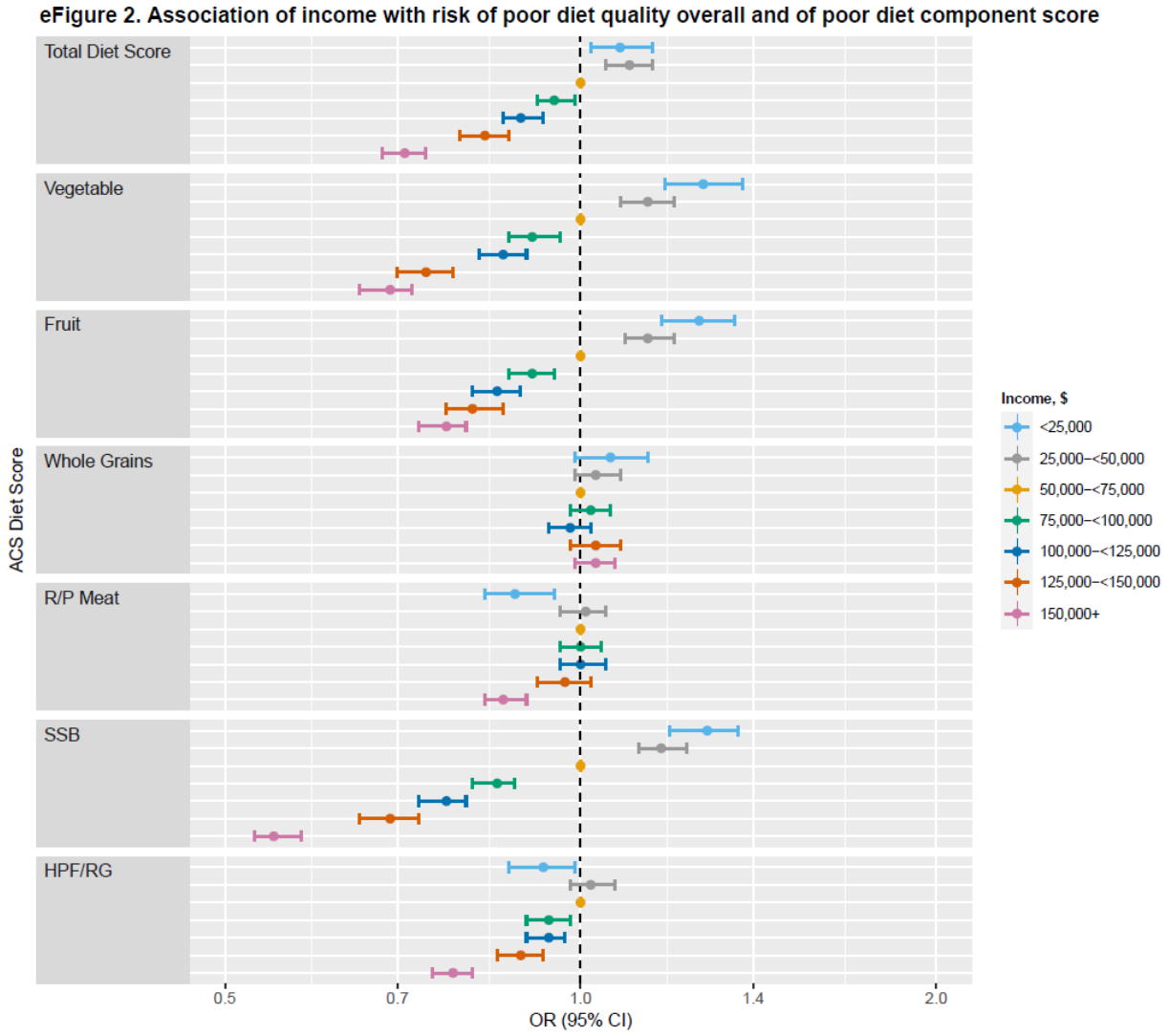
[a] Components scored based on sex-specific distribution quartiles. Cutpoints for quartiles 2 and 3 are as follows for men and women respectively: vegetable intake: quartile 2: >2.1 to ≤3.2 and >2.4 to ≤3.7, quartile 3: >3.2 to ≤4.9 and >3.7 to ≤5.7; vegetable variety: quartile 2: >14 to ≤18 and >15 to ≤19, quartile 3: >18 to ≤22 and >19 to ≤23; fruit intake: quartile 2: >0.9 to ≤1.6 and >1.1 to ≤1.9, quartile 3: >1.6 to ≤2.6 and >1.9 to ≤2.9; fruit variety: quartile 2: >6 to ≤10 and >8 to ≤11, quartile 3: >10 to ≤12 and >11 to ≤13; whole grain intake: quartile 2: >0.7 to ≤1.3 and >0.7 to ≤1.1, quartile 3: >1.3 to ≤1.9 and >1.1 to ≤1.7; red and processed meat intake: quartile 2: >0.6 to ≤1.0 and >0.5 to ≤0.8, quartile 3: >1.0 to ≤1.5 and >0.8 to ≤1.2; highly processed foods/refined grains intake: quartile 2: >25% to ≤32% and >24% to ≤32%, quartile 3: >32% to ≤39% and >32% to ≤40%, except sugar-sweetened beverages which were categorized as none, >0 to <3 servings/week, ≥3 to <7/week, 7+ per week. Intermediate scores are 0.25 and 0.5, 1 and 2, and 0.5 and 1.0 for subscores ranging from 0 to 0.75, 0 to 3, and 0 to 1.5 respectively.

**eFigure 1.** Association of Race and Ethnicity With Risk of Poor Diet Quality Overall and Poor Diet Component Scores



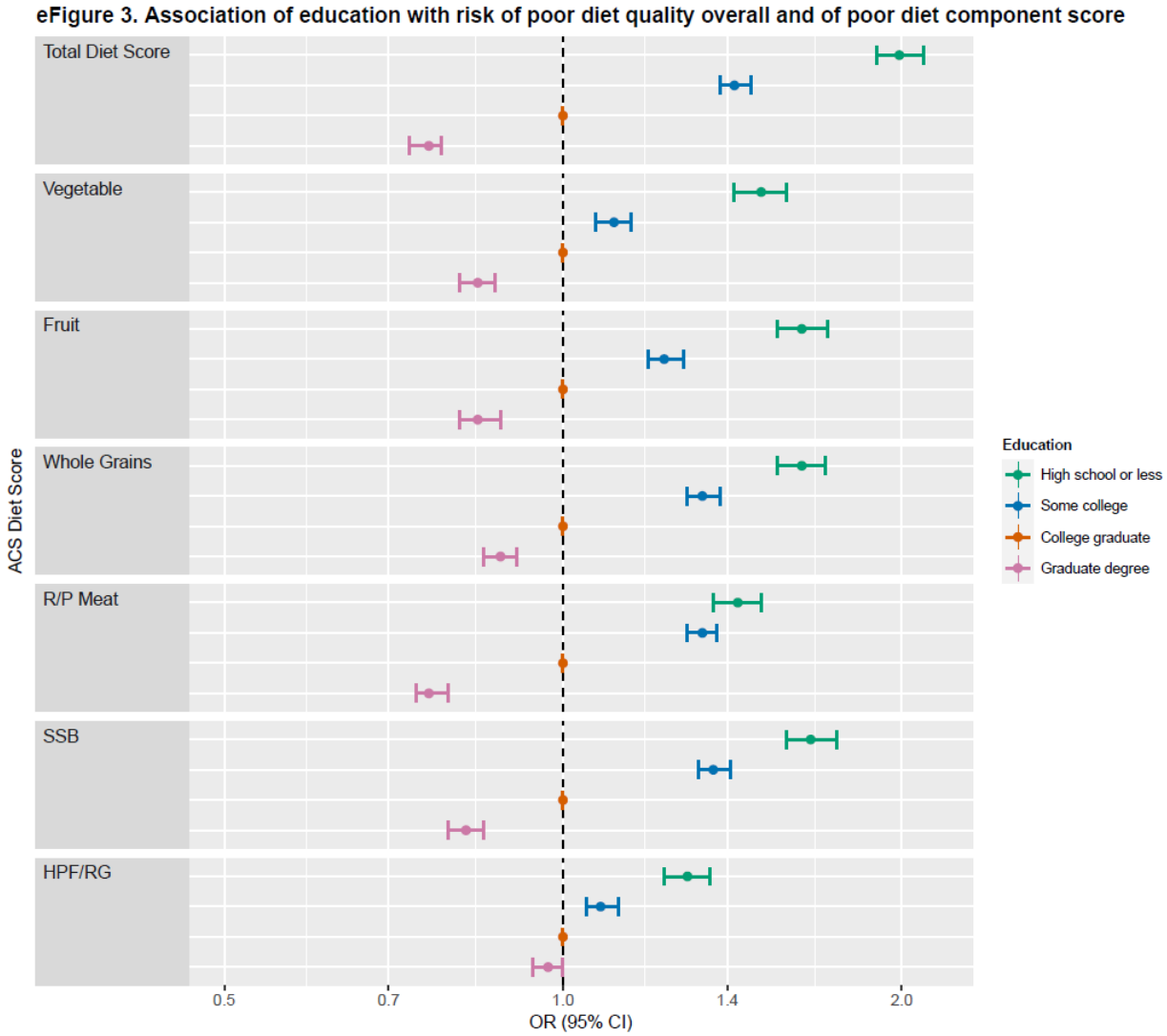

Odds ratio (OR) and 95% confidence interval (95% CI) of lowest quartile of ACS diet score, overall, or of low diet component score (see Table 2 footnotes), according to race/ethnicity (referent group: White). Models included age, sex, energy intake, income, education, RUCA code and residence in a food desert (Model 2). AI/AN=American Indian/Alaska Native; ACS=American Cancer Society; ANHPI=Asian/Native Hawaiian/Pacific Islander.

**eFigure 2.** Association of Income With Risk of Poor Diet Quality Overall and Poor Diet Component Scores



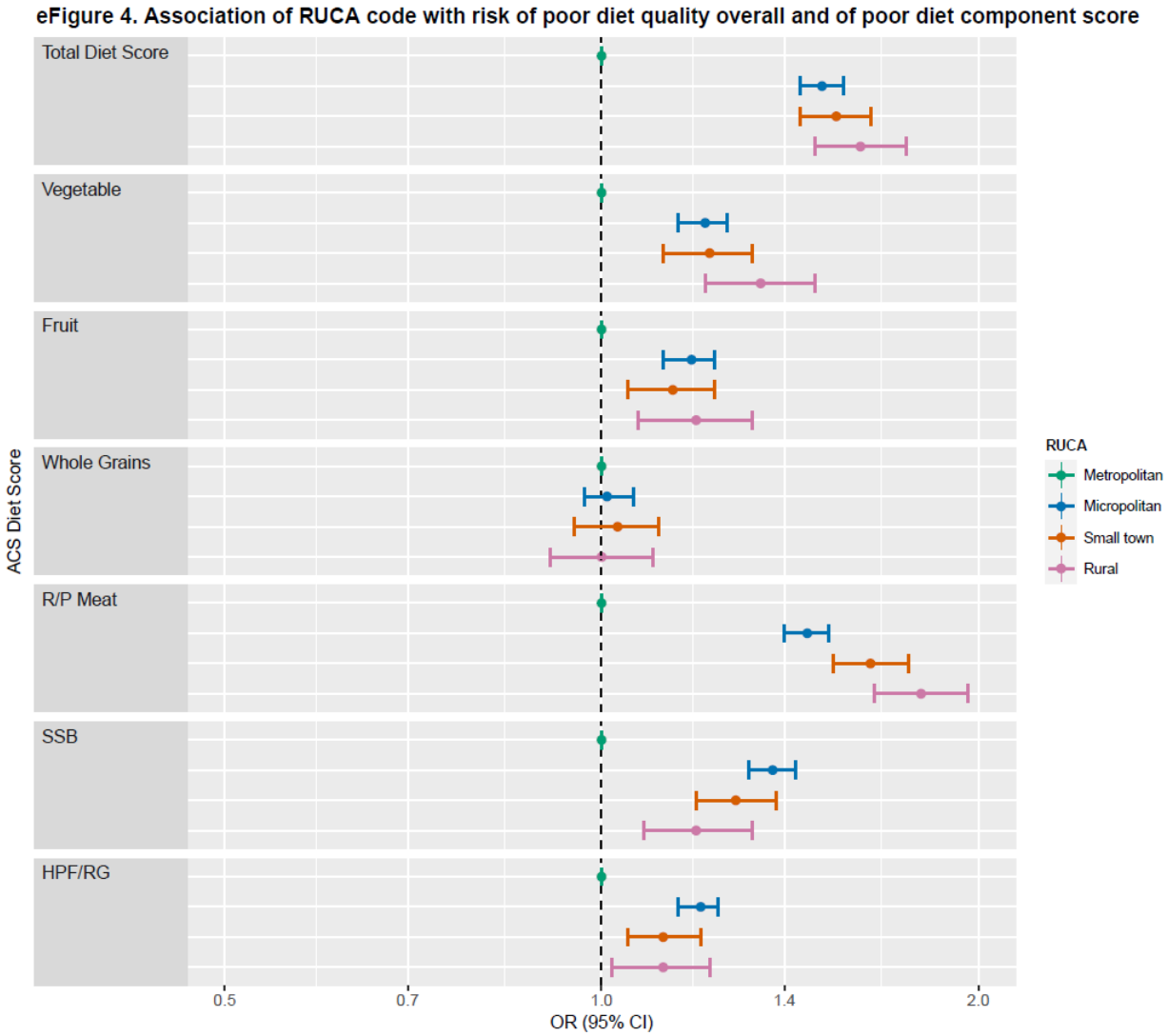

Odds ratio (OR) and 95% confidence interval (95% CI) of lowest quartile of ACS diet score, overall, or of low diet component score (see Table 2 footnotes), according to income (referent group: $50,000-<75,000). Models included age, sex, energy intake, race/ethnicity, education, RUCA code and residence in a food desert (Model 2).

**eFigure 3.** Association of Education With Risk of Poor Diet Quality Overall and Poor Diet Component Scores



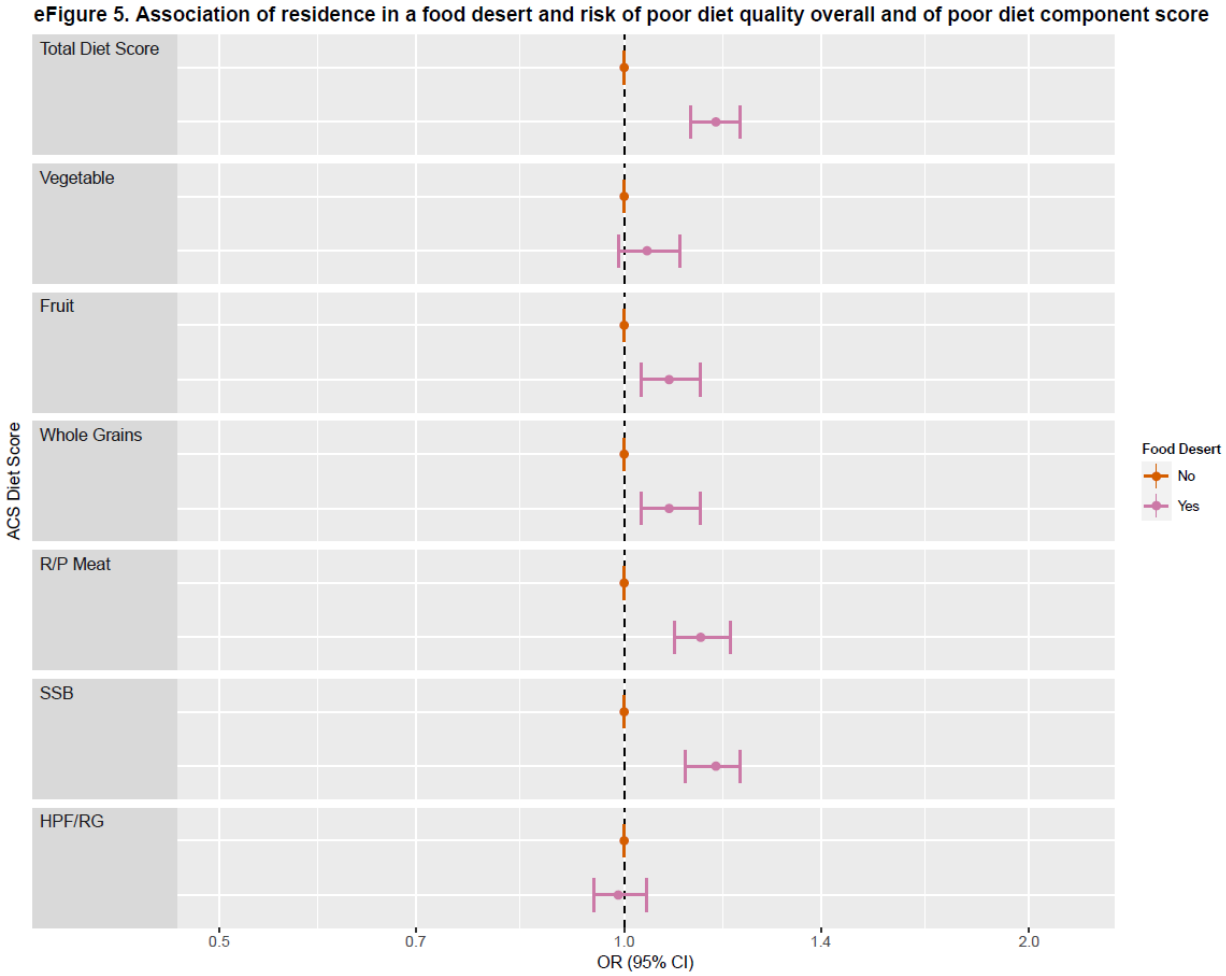

Odds ratio (OR) and 95% confidence interval (95% CI) of lowest quartile of ACS diet score, overall, or of low diet component score (see Table 2 footnotes), according to education (referent group: college graduate). Models included age, sex, energy intake, race/ethnicity, income, RUCA code and residence in a food desert (Model 2).

**eFigure 4.** Association of RUCA Code With Risk of Poor Diet Quality Overall and Poor Diet Component Scores




Odds ratio (OR) and 95% confidence interval (95% CI) of lowest quartile of ACS diet score, overall, or of low diet component score (see Table 2 footnotes), according to RUCA code (Rural Urban Commuting Area code, referent group: metropolitan). Models included age, sex, energy intake, race/ethnicity, income, education, and residence in a food desert (Model 2).

**eFigure 5.** Association of Residence in a Food Desert and Risk of Poor Diet Quality Overall and Poor Diet Component Scores




Odds ratio (OR) and 95% confidence interval (95% CI) of lowest quartile of ACS diet score, overall, or of low diet component score (see Table 2 footnotes), according to residence in a food desert (referent group: no). Models included age, sex, energy intake, race/ethnicity, income, education and RUCA code (Model 2).

**eTable 2.** Social and Demographic Factors Associated With Poor Diet Quality by Race and Ethnicity[a]

| | Race/ethnicity | | | | | | |
|---|---|---|---|---|---|---|---|
| | White | Black | Hispanic | ANHPI | AI/AN | Other | p-int |
| **RUCA**[b] | | | | | | | 0.01 |
| Metropolitan | 1.00 (Ref) | 1.15 (1.07-1.25) | 0.82 (0.77-0.87) | 0.67 (0.60-0.74) | 1.07 (0.93-1.22) | 0.73 (0.63-0.84) | |
| Non-metropolitan | 1.51 (1.46-1.56) | 1.87 (1.38-2.54) | 1.52 (1.30-1.78) | 1.09 (0.65-1.81) | 1.43 (1.09-1.88) | 0.75 (0.44-1.27) | |
| **Income, $**[c] | | | | | | | 0.01 |
| <25,000 | 1.12 (1.04-1.20) | 1.11 (0.87-1.41) | 0.75 (0.60-0.93) | 0.44 (0.25-0.79) | 1.07 (0.73-1.58) | 0.49 (0.29-0.85) | |
| 25,000-<50,000 | 1.10 (1.05-1.16) | 1.19 (1.01-1.39) | 0.82 (0.71-0.95) | 0.83 (0.58-1.17) | 1.10 (0.82-1.48) | 0.85 (0.62-1.18) | |
| 50,000-<75,000 | 1.00 (Ref) | 1.06 (0.91-1.24) | 0.78 (0.69-0.89) | 0.56 (0.42-0.75) | 1.08 (0.83-1.41) | 0.75 (0.56-1.02) | |
| 75,000-<100,000 | 0.95 (0.91-0.99) | 1.01 (0.84-1.22) | 0.78 (0.69-0.89) | 0.54 (0.41-0.70) | 0.86 (0.64-1.15) | 0.62 (0.44-0.87) | |
| 100,000-<125,000 | 0.88 (0.84-0.92) | 1.05 (0.85-1.31) | 0.81 (0.71-0.93) | 0.63 (0.49-0.80) | 0.92 (0.66-1.28) | 0.55 (0.35-0.87) | |
| 125,000-<150,000 | 0.81 (0.77-0.85) | 1.16 (0.86-1.55) | 0.80 (0.66-0.95) | 0.68 (0.51-0.91) | 0.87 (0.56-1.34) | 0.73 (0.46-1.17) | |
| 150,000+ | 0.69 (0.66-0.72) | 1.19 (0.97-1.47) | 0.65 (0.57-0.74) | 0.50 (0.42-0.61) | 0.90 (0.64-1.25) | 0.51 (0.35-0.75) | |
| **Education**[d] | | | | | | | <0.0001 |
| High school or less | 2.03 (1.93-2.13) | 1.17 (0.84-1.64) | 1.48 (1.24-1.77) | 1.01 (0.52-1.95) | 1.91 (1.26-2.89) | 1.44 (0.84-2.47) | |
| Some college/2-year degree | 1.43 (1.38-1.47) | 1.40 (1.22-1.61) | 1.17 (1.07-1.29) | 0.98 (0.76-1.27) | 1.56 (1.30-1.88) | 1.08 (0.84-1.38) | |
| College graduate | 1.00 (Ref) | 1.17 (1.02-1.34) | 0.82 (0.74-0.90) | 0.68 (0.58-0.81) | 1.08 (0.86-1.36) | 0.61 (0.47-0.79) | |
| Graduate degree | 0.74 (0.72-0.77) | 1.11 (0.98-1.26) | 0.70 (0.62-0.78) | 0.50 (0.42-0.58) | 0.69 (0.52-0.91) | 0.57 (0.44-0.74) | |

Abbreviations: ANHPI, Asian/Native Hawaiian, Pacific Islander; AI/AN, American Indian/Alaskan Native; RUCA, rural-urban commuting area

[a] For exposures with statistically significant interactions. Poor diet quality is defined as a diet score in the bottom 25% sex-specific quartile

[b] Models included age, sex, energy intake, race/ethnicity, income, education, RUCA code and residence in a food desert, and a race*RUCA interaction term

[c] Models included age, sex, energy intake, race/ethnicity, income, education, RUCA code and residence in a food desert, and a race*income interaction term

[d] Models included age, sex, energy intake, race/ethnicity, income, education, RUCA code and residence in a food desert, and a race*education interaction term

**eTable 3.** Social and Demographic Factors Associated With Poor Diet Quality by Rural-Urban Commuting Area[a]

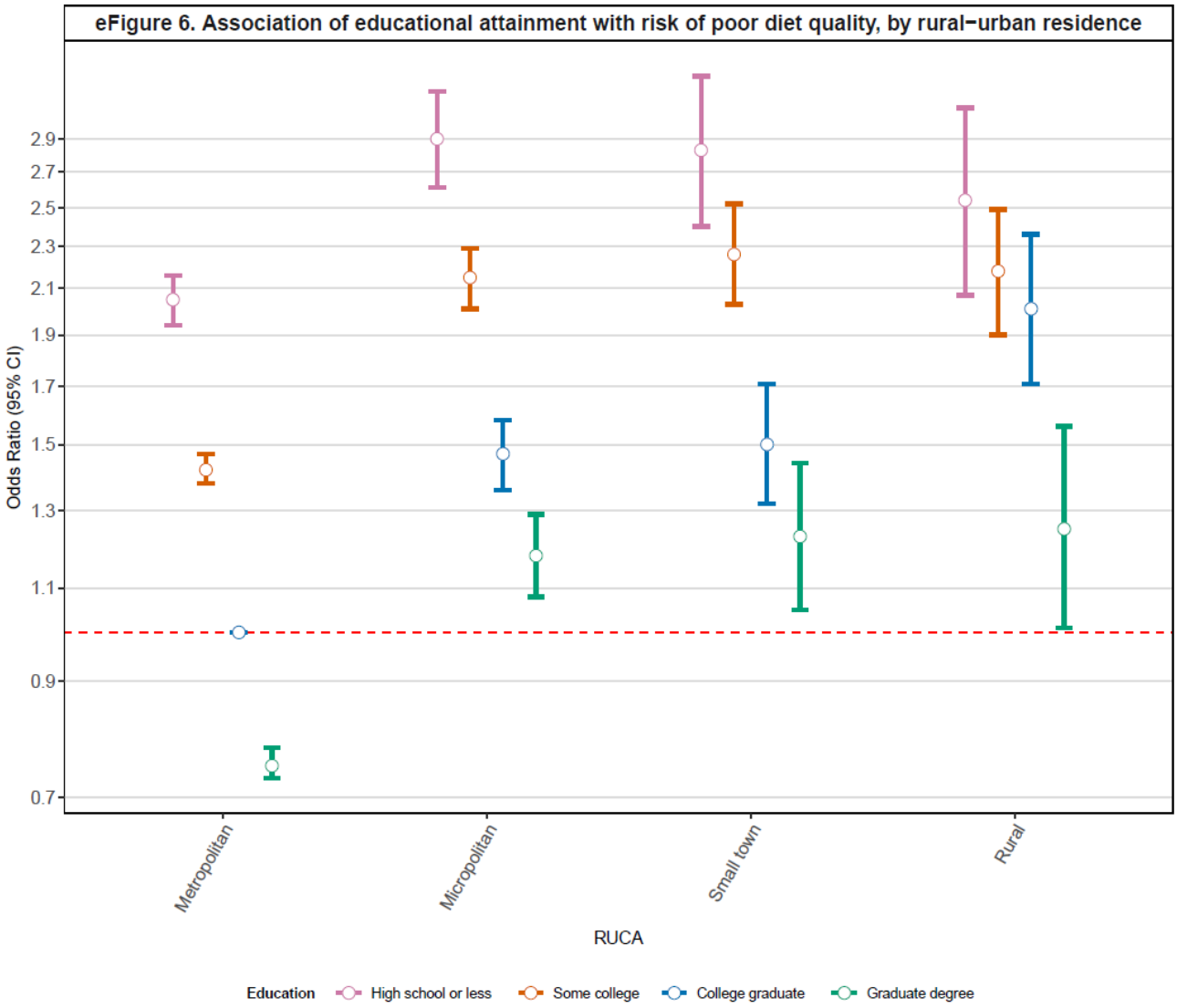
| | Rural-Urban Commuting Area | | | | |
|---|---|---|---|---|---|
| | Metropolitan | Micropolitan | Small town | Rural | p-int |
| **Education**[b] | | | | | 0.03 |
| High school or less | 2.05 (1.94-2.16) | 2.90 (2.61-3.21) | 2.83 (2.40-3.32) | 2.54 (2.07-3.10) | |
| Some college/2-year degree | 1.42 (1.38-1.47) | 2.15 (2.01-2.29) | 2.26 (2.03-2.52) | 2.18 (1.90-2.49) | |
| College graduate | 1.00 (Ref) | 1.47 (1.36-1.58) | 1.50 (1.32-1.71) | 2.01 (1.71-2.36) | |
| Graduate degree | 0.75 (0.73-0.78) | 1.18 (1.08-1.29) | 1.23 (1.05-1.44) | 1.25 (1.01-1.56) | |
| **Residing in a food desert**[c] | | | | | 0.02 |
| No | 1.00 (Ref) | 1.53 (1.47-1.60) | 1.53 (1.42-1.65) | 1.65 (1.50-1.80) | |
| Yes | 1.22 (1.15-1.28) | 1.58 (1.44-1.73) | 1.89 (1.59-2.25) | 1.62 (1.25-2.08) | |

[a] For exposures with statistically significant interactions. Poor diet quality is defined as a diet score in the bottom 25% sex-specific quartile

[b] Models included age, sex, energy intake, race/ethnicity, income, education, RUCA code and residence in a food desert, and a RUCA*education interaction term

[c] Models included age, sex, energy intake, race/ethnicity, income, education, RUCA code and residence in a food desert, and a RUCA*food desert interaction term

**eFigure 6.** Association of Educational Attainment With Risk of Poor Diet Quality, by RUCA




Odds ratio (OR) and 95% confidence interval (95% CI) of lowest quartile of ACS diet score overall by attained education, stratified by RUCA code (Rural Urban Commuting Area code) classification. Models included age, sex, energy intake, race/ethnicity, income, education, RUCA code and residence in a food desert, and a RUCA*education interaction term. Referent group: metropolitan/college degree). $P_{interaction}<0.03$