Identifying Sources of Poor Nutrition for Americans 2017-2018: Comparisons of Food Consumption and Nutrient Intake by Food Source and Demographic Characteristics

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DACSS 604 Advanced Data Driven Storytelling

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August 28th, 2023

Target Audience: The audience I want to write to is members of the U.S. Departments of Agriculture Food Nutrition Services (USDA). The USDA Food Nutrition Services are in charge of establishing nutrition programs at the federal level, so understanding what food sources are dominating food group and nutrient intake for different populations and which populations are not getting enough nutrients will play a part in their decision making. I expect the audience to understand the topic and variables well but do not expect them to have any quantitative/data analytic background. They should understand the negative and positive outcomes of each nutrient and food group. I also expect them to care more about the importance of the analysis and the results than how the data and variables are measured since they come from a credible source.

Identifying Sources of Poor Nutrition for Americans 2017-2018: Comparisons of Food Consumption and Nutrient Intake by Food Source and Demographic Characteristics

In the United States, people are not consuming the recommended amount of food groups and nutrients on a daily basis, which leads to more health complications and deaths. According to 2017–2018 data from the National Health and Nutrition Examination Survey (NHANES), More than 2 in 5 adults (42.4%) and 1 in 5 children ages 2 to 19 (19.3%) have obesity, respectively (Fryar et al., 2020). Obesity can be caused by the over and underconsumption of different food groups and nutrients. For example, 12.3% and 10.0% of surveyed adults met Fruit and Vegetable intake recommendations (n = 294,566), respectively, according to the 2019 Behavioral Risk Factor Surveillance System Survey (Lee et al., 2019). In addition, around 2 in 5 adults have high Cholesterol, according to the CDC in 2022 (CDC, 2022). Obesity, over and underconsumption of certain food groups and nutrients can lead to a greater risk of Heart

Disease, Stroke, Type 2 diabetes and forms of cancer, which all cause many deaths in America (CDC, 2022).

To decrease these risks, it is important to understand what food sources are dominating food group and nutrient intake for different populations. Specifically, it is important to know where different populations are over and under consuming food groups and which populations are not getting enough nutrients from different food sources. In this report, I will analyze the impact of food sources on food/nutrient intakes for different age/income levels. I will do this by finding differences in

. I hope these insights help guide decision making to help establish health policies and nutritional programs in the USA that focus on helping populations that are not getting the correct amounts of food groups and nutrients at home and/or away from home.

Method

Data

The two datasets used for this analysis are 2017-2018 Food and Nutrient Density by Food Source and Demographic Characteristics. The datasets come from the Economic Research Service's website, which is a subdivision in the United States Department of Agriculture (USDA). The data is derived from the 2017-2018 National Health and Nutrition Examination Survey (NHANES) , Food Patterns Equivalents Database (FPED) and Dietary Guidelines for Americans (USDA). The 2017–2018 National Health and Nutrition Examination Survey records food consumption for individuals over 2 non consecutive days, and the data only samples from first-day intakes (ERS, 2021). A total of 7,641 participants in the survey provided complete food consumption intakes for Day 1 (CDC, 2020). The 2017–2018 NHANES survey's target

population is a representative sample of the United States. More details about NHANES and Food Consumption and Nutrient Intake datasets are provided at the end of this document.

Measures

Food Group and Nutrient Density are evaluated in terms of density, which is the daily average amount of food/nutrients for each 1,000 calories in a person's diet. More information about how Food Group and Nutrient Density can be found in the datasets documentation at the end of this document.

Variables

Age Group. Age Group is separated into three categories: Children age 2–19, Adults age 20–64, and Seniors age 65 and older.

Income Level. Like Age Group, Income Level is separated into 3 categories: Low Income (household income <= 185 % of the poverty line), Middle Income (between 185- 300 % of the poverty line) and High Income (> 300 % of the poverty line).

Food Source. Food source can be defined as where individuals obtained their food from. The food sources that were analyzed are as follows: Total, At Home, Total Away from Home, Restaurants, Fast Food, School, and Other Away from Home Places. At Home food source is defined as preparing your food at home using goods from retail stores. Total Away from home is the daily average intake of nutrient/food group for all away from home food sources (Restaurants, Fast Food, School, and Other Away from Home Places). Other Away from Home food sources include community food programs, street vendors and vending machines (ERS, 2021). School only applies to children ages 2-19, so the averages for school will be omitted for

Adults and Seniors. More information about food sources can be found in the dataset documentation at the end of this document.

   Nutrients. The nutrients provided in the dataset are as follows: Total and Saturated Fat (grams), Sodium (milligrams), Cholesterol (milligrams), Calcium (milligrams), Fiber (grams), and Iron (milligrams). These nutrients are in line with the official Dietary Guidelines for Americans 2020-2025.
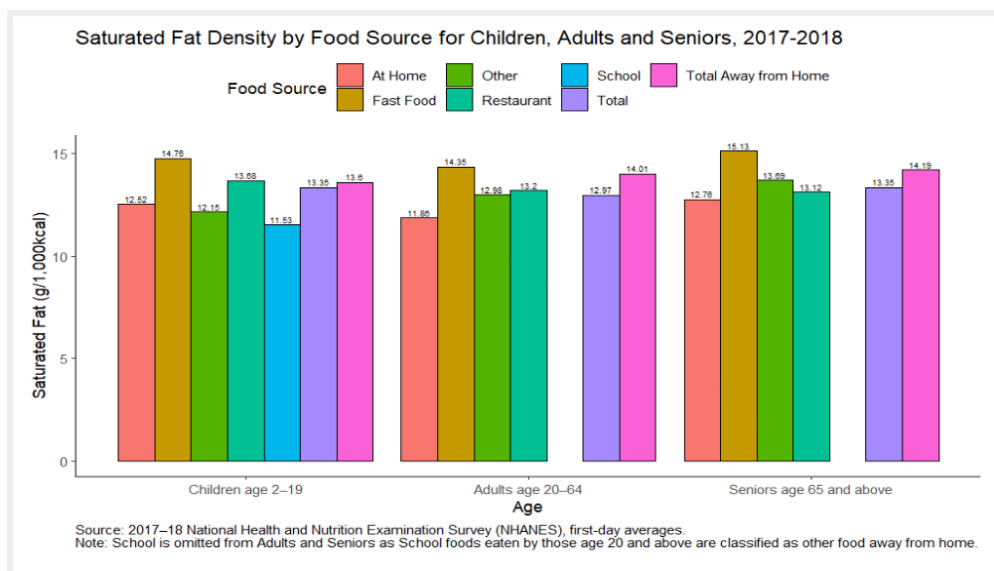
   Food Group. The food groups provided in the dataset are as follow: Added sugar (teaspoons), Discretionary Oils and Fats (grams), Dairy (cup), Fruit (cup), Vegetables (cup), Grains (ounces), and Protein foods (ounces). These food groups are derived from official Dietary Guidelines for Americans 2020-2025.

Procedure

   I will conduct my analysis using three way associations in the form of bar graphs using R. The format of the graph will be as follows: Age and income level as independent variables on the horizontal axis, Daily average intake of food group and nutrient per 1,000 calories as dependent variables on the vertical axis, with those averages aggregated by Food Source, the second independent variable. I will be looking for patterns of high and low densities between different age groups and income levels and differences in density between At Home and Away from Home food sources for different age groups and income levels.
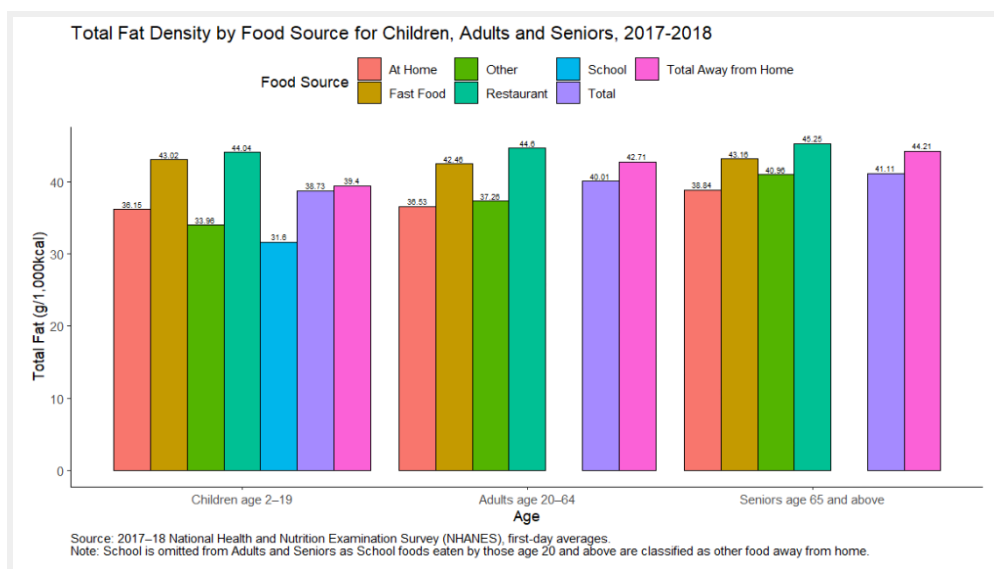
Results

AGE GROUP

Saturated Fat Density by Food Source for Children, Adults and Seniors, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
Note: School is omitted from Adults and Seniors as School foods eaten by those age 20 and above are classified as other food away from home.
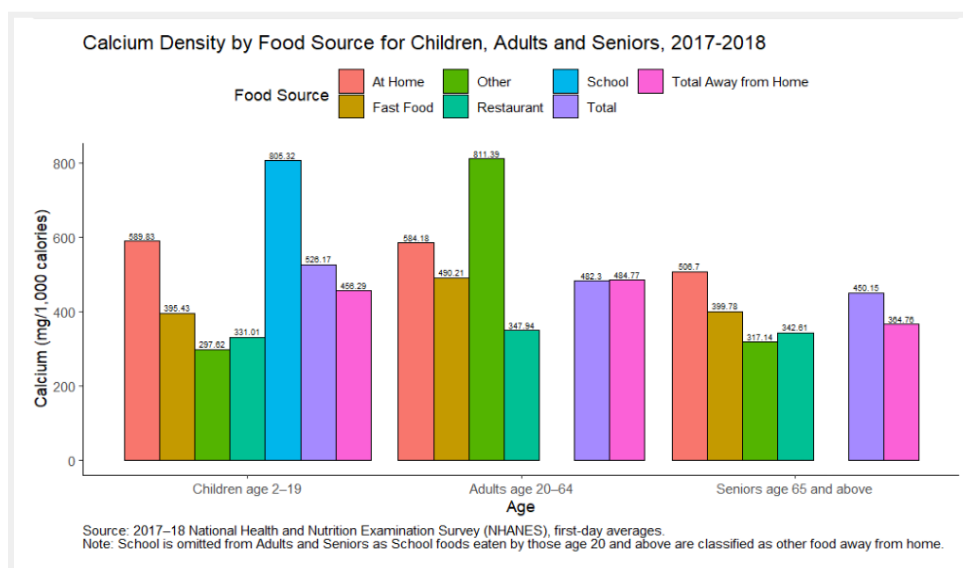
In the figure above, for every 1,000 calories, all age groups have higher daily average intakes of Saturated Fat at Away from home food sources (Total) compared to At Home food sources. In addition, Saturated Fat density at Fast Food restaurants ranked the highest for each Age group out of all food sources. Adults consume 2.49 more grams of Saturated Fat per 1,000 calories at Fast Food restaurants compared to At Home, followed by Seniors (2.37g), and Children (2.24g).

For Adults and Seniors, Saturated Fat density At Home ranked the lowest compared to all food sources away from home. For Children However, Saturated Fat density at school ranked the lowest compared to At Home food sources and all other food sources away from Home.

Total Fat Density by Food Source for Children, Adults and Seniors, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
Note: School is omitted from Adults and Seniors as School foods eaten by those age 20 and above are classified as other food away from home.

In General, for every 1,000 calories, away from home food sources (Total) have the highest daily average intake of Total Fat compared to At Home food sources for all age groups. In addition, the daily average Total Fat intake per 1,000 calories for Adults eating Away from home is 6.18 more grams than what they consume At Home, which is a larger difference than Children (2.95 g, 36.15 g At Home, 39.4 g Away from home) and Seniors (5.37 g, 44.21 At Home, 38.84g Away from home). However, the daily average Total Fat intake per 1,000 calories for Children eating at Restaurants (44.04 g) and Fast Food (43.02 g) establishments is 7.89 and 6.87 more grams than what they consume At Home, respectively.

Calcium Density by Food Source for Children, Adults and Seniors, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
Note: School is omitted from Adults and Seniors as School foods eaten by those age 20 and above are classified as other food away from home.
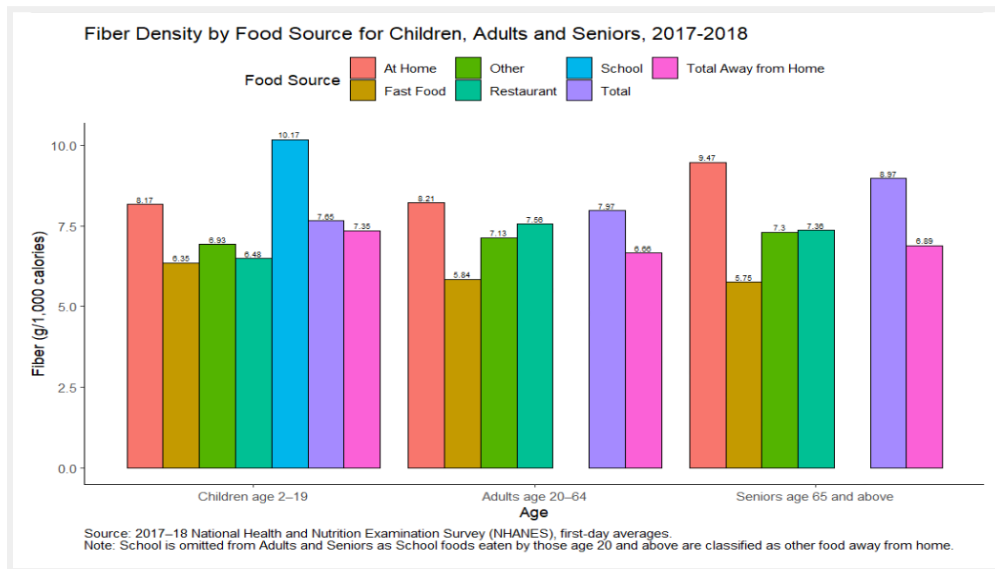
Typically, for every 1,000 calories, At Home food sources have the highest daily average intake of Calcium compared to all away from home food sources (Fast Food ,Restaurant, Other) for 2 of the 3 age groups. However, Adults have the highest daily average intake of Calcium when eating at Other away from home food sources (811.39 mg/1,000 calories) compared to At Home (584.18 mg/1,000 calories), Fast Food establishments (490.21 mg/1,000 calories), and Restaurants (347.94 mg/1,000 calories). Seniors have the lowest daily average intake of Calcium per 1,000 calories At Home (506.7 mg), which is 77.48 mg and 83.13mg less than Adults and Children, respectively.
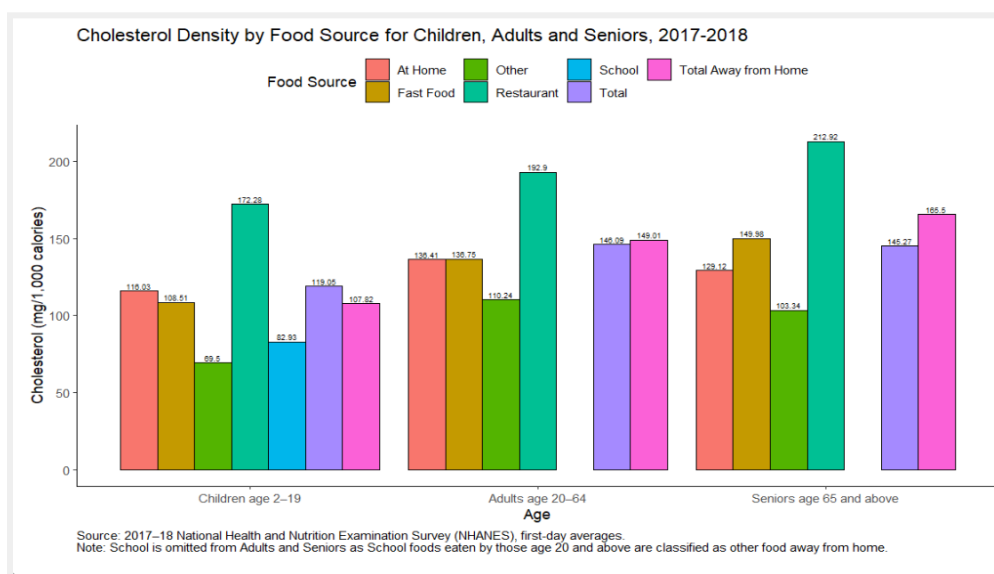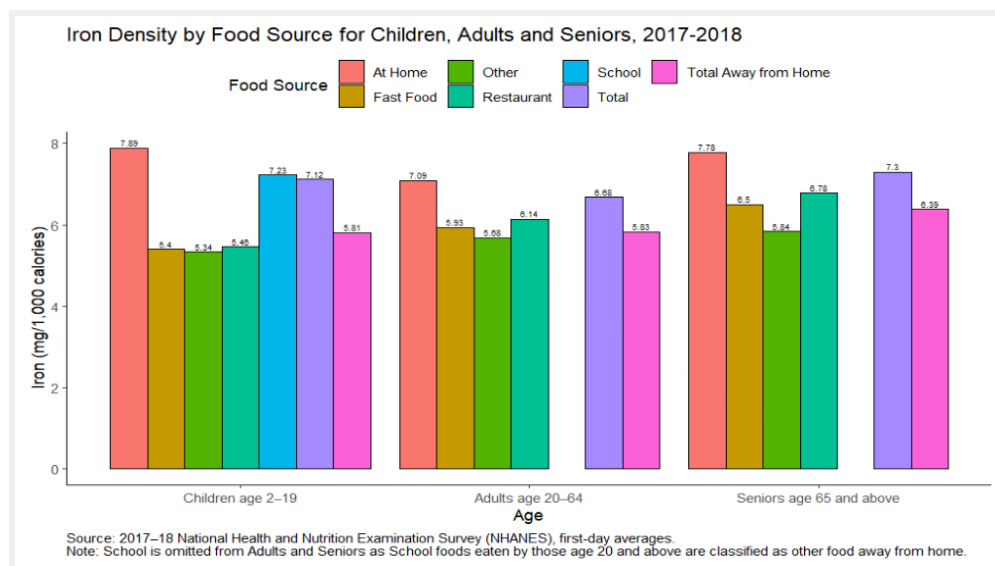

In general, for every 1,000 calories, Adults and Seniors have higher daily average intakes of Cholesterol at Away from home food sources compared to At Home food sources. In addition, the daily average Cholesterol intake per 1,000 calories for Seniors eating Away from home is 165.5 mg, which is 16.49 mg higher than the daily average intake for Adults (149.01 mg). However, Children have a lower daily average intake of Cholesterol at Away from home food sources compared to At Home food sources. Out of all away from home food sources (Fast Food,
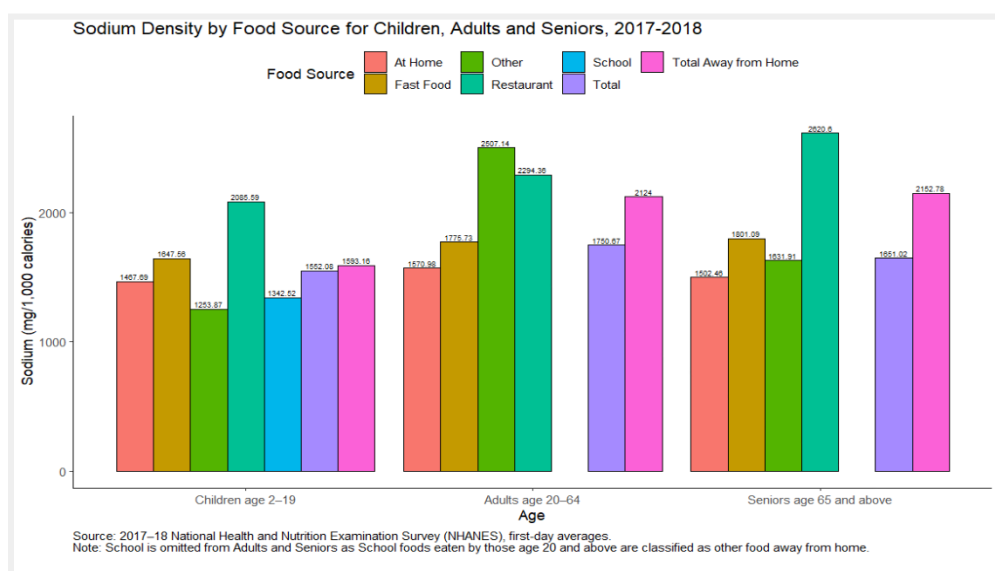
Restaurant, Other), Restaurants have the highest daily average intake of Cholesterol for all age groups.


In the figure above, for every 1,000 calories, At Home food sources have the higher daily average intake of Fiber compared to Away from home food sources for all age groups. In addition, the daily average Fiber intake per 1,000 calories for Seniors eating Away from home is 2.58 grams less than what they intake At Home, which is a larger difference than Adults (1.55g, 8.21 At Home, 6.66 Away from home) and Children (0.82g, 8.17g At Home, 7.37 Away from home).

Looking at Iron density, for every 1,000 calories, At Home food sources have the higher daily average intake of Iron compared to Away from home food sources for all age groups. In addition, the daily average Iron intake per 1,000 calories for Children eating Away from home is 2.08 mg less than what they intake At Home, which is a larger difference than Adults (1.26 mg, 7.09 mg At Home, 5.83 mg Away from home) and Seniors (1.39 mg, 7.78 mg At Home, 6.39 mg Away from home).
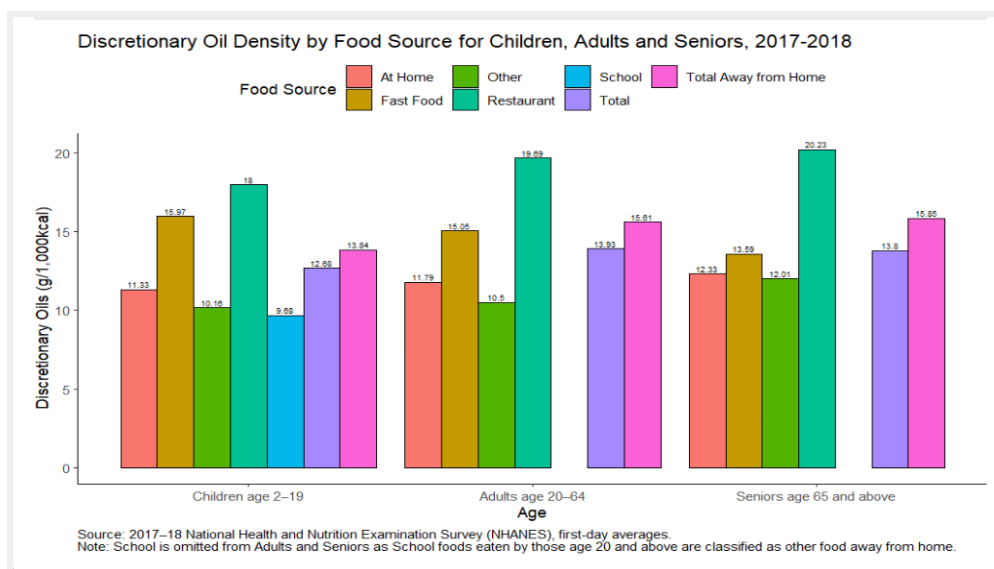

In General, for every 1,000 calories, Away from home food sources (Total) have the higher daily average intake of Sodium compared to At Home food sources for all age groups. However, Children and Seniors are consuming more Sodium at Restaurants compared to At Home, whereas Adults are consuming more sodium at Other away-from-home food sources. For example, the daily average Sodium intakes per 1,000 calories for Children and Seniors eating at restaurants were 617.9 and 118.14 more milligrams than what they consume At Home respectively, whereas Adults eating at Other away-from-home places consume 936.16 more miligrams of Sodium than they do At Home.

Discretionary Fat Density by Food Source for Children, Adults and Seniors, 2017-2018
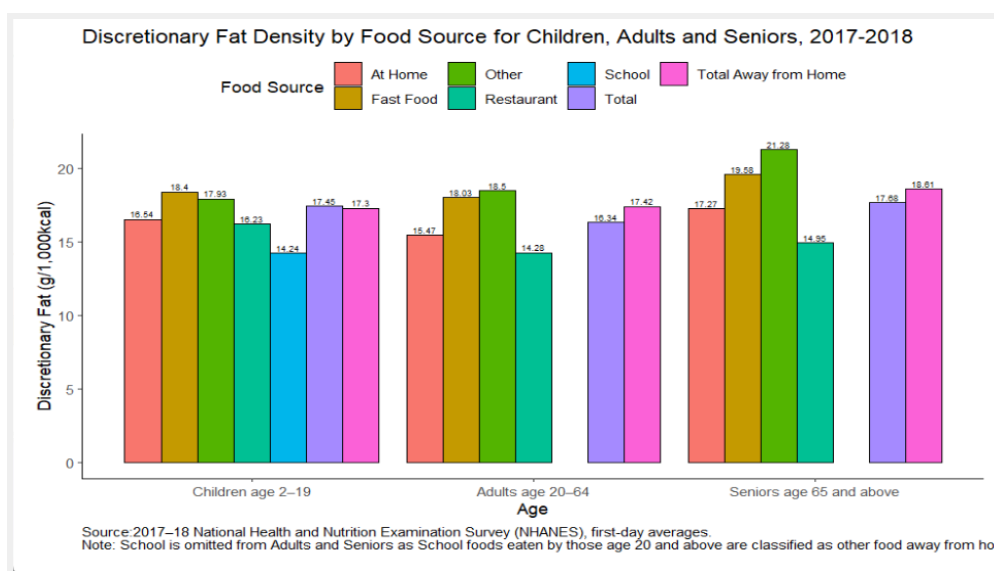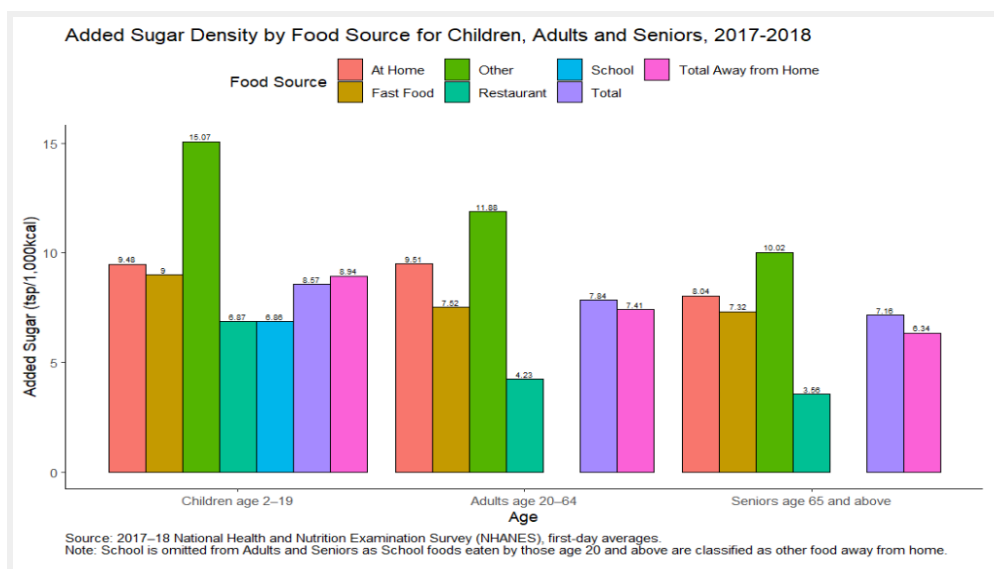
For all age groups, Discretionary Fat density is lower At Home compared to Away from Home. However, the average amount of daily Discretionary Fat per 1,00 calories in one's diet for away from home food sources excluding school (Fast Food, Restaurant, Other) rank differently for each age group. For example, Other away-from-home places, Fast food, and Restaurants rank 1st, 2nd and 3rd in Discretionary Fat density for Adults and Seniors, respectively. On the contrary, Fast food ranked 1st, Other away-from-home places ranked 2nd, and Restaurants ranked 3rd in Discretionary Fat density for Children (density values for Fast food, Restaurants and Other away from home food sources are 18.4 g/1,000kcal, 17.92 g/1,000kcal and 16.23g/kcal, respectively).

The gap between Other away from home places Discretionary Fat density and At Home Discretionary Fat density is much higher for Seniors than for Children and Adults. Among Seniors, Other away-from-home places Discretionary Fat density is higher than At Home Discretionary Fat density by 4.01 g/1,000kcal. Among Children and Adults, Other away from home places Discretionary Fat density is higher than At Home Discretionary Fat density by 1.39 g/1,000kcal and 3.03 g/1,000kcal, respectively.

Discretionary Oil Density by Food Source for Children, Adults and Seniors, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
Note: School is omitted from Adults and Seniors as School foods eaten by those age 20 and above are classified as other food away from home.
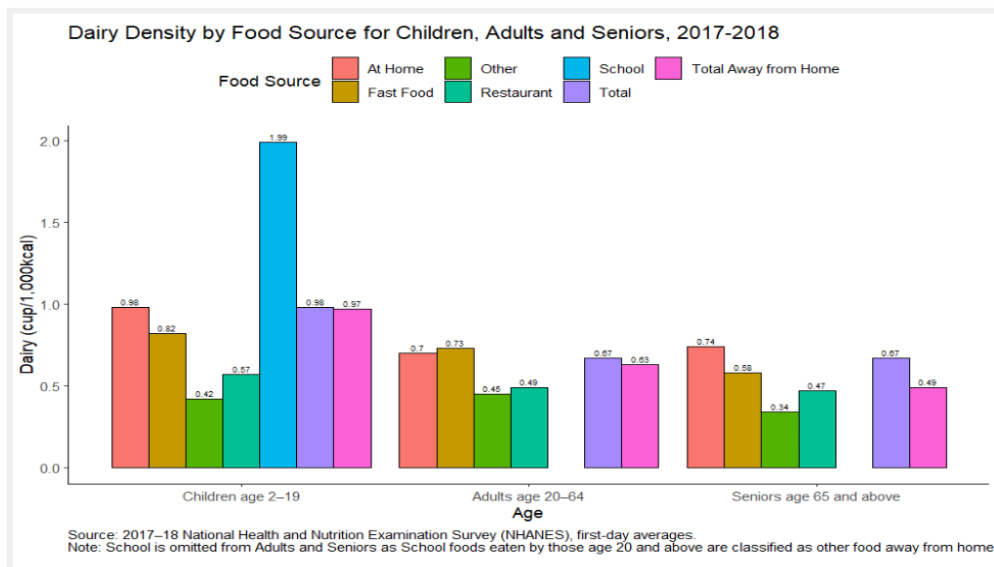
For all age groups, Discretionary Oils Density is highest when people consume food at Restaurants compared to At Home and away from home food sources (Fast Food, Other). For example, for each 1,000 calories, Adults consume a daily average of 19.69 grams of Discretionary oils when eating at Restaurants, which is a higher amount compared to At Home (11.79g), at Fast Food establishments (15.05g), and at Other away from home places (10.5g).

More specifically, Children have the largest difference in Discretionary Oils Density between At Home and at Fast food restaurants compared to Adults and seniors. For example, the difference in Discretionary Oils Density between At Home and at Fast food restaurants for Children is 4.64 g per 1000 calories, which is a larger difference than Adults (3.28g/1000kcal) and Seniors (1.26/1000kcal).

Added Sugar Density by Food Source for Children, Adults and Seniors, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
Note: School is omitted from Adults and Seniors as School foods eaten by those age 20 and above are classified as other food away from home.

In general, Added Sugar density is higher when individuals consume food at Other away from home sources compared to At Home food sources for all age groups. However, the difference in Added sugar density between Other away from home and At Home food sources is largest for Children compared to Adults and Seniors. Among Children, the difference in Added Sugar density between At Home and Other away from home sources is 5.59 tsp per 1000 calories, which is a larger difference than Adults (2.37tsp/1000kcal) and Seniors (1.98tsp/1000kcal).

Dairy Density by Food Source for Children, Adults and Seniors, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
Note: School is omitted from Adults and Seniors as School foods eaten by those age 20 and above are classified as other food away from home.
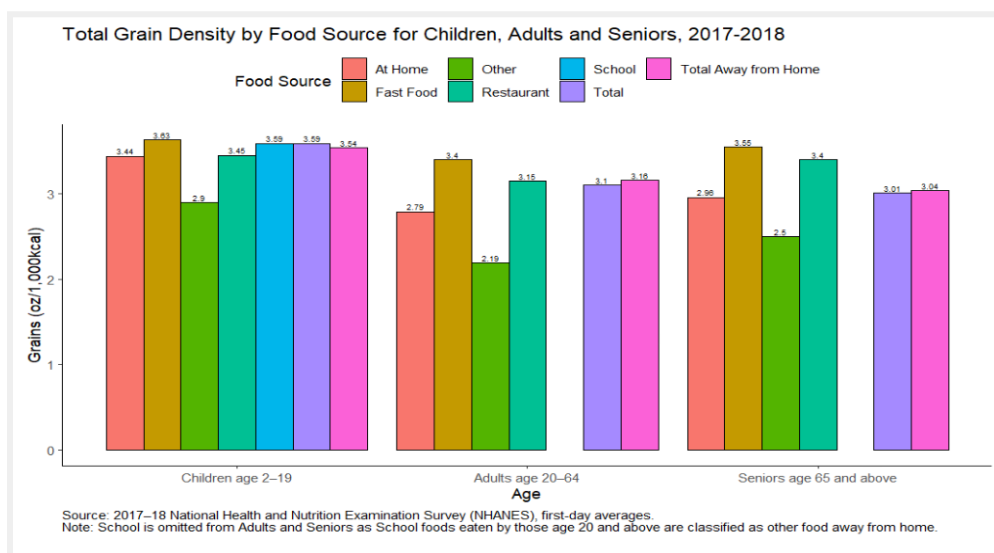
In the figure above, Seniors have the largest difference in Dairy Density between At Home and Total away from home food sources compared to Adults and Children. For example, for each 1,000 calories, Seniors consume a daily average of 0.25 less cups of Dairy when eating Away from home compared to At Home. Children are consuming more dairy per 1,000 calories at school compared to all other food sources.
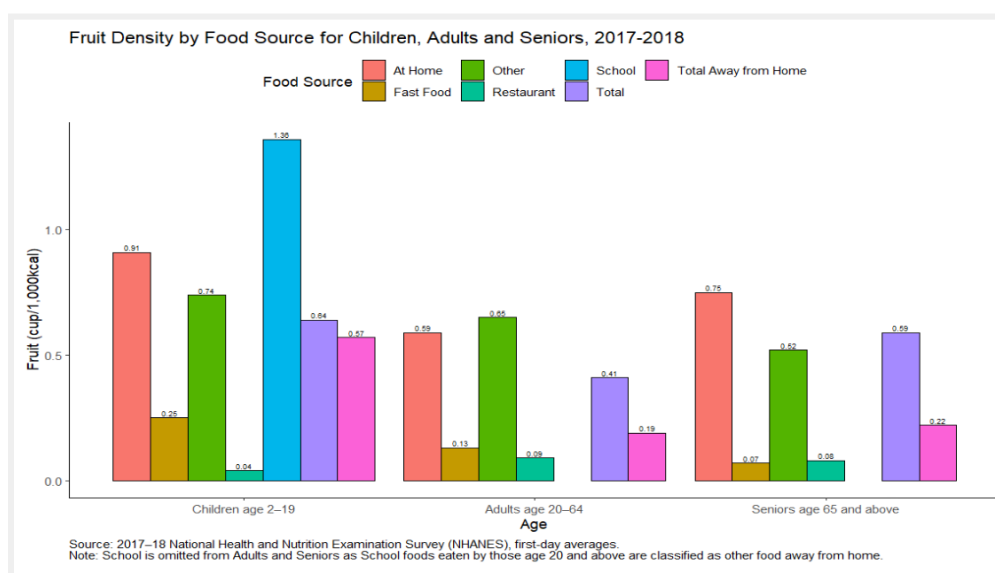

In general, Adults consume less Fruit per 1000 calories At Home than Children and Seniors. For each 1,000 calories, Adults consumed a daily average of 0.59 cups of Fruit At Home, which is 0.16 and 0.32 cups less than the amount consumed by Seniors (0.75 cups) and Children (0.91 cups), respectively. Adults and Seniors Daily average intakes of Fruit per 1,000 calories At Home are over 3 times more than Away from home. Children are consuming more Fruit per 1,000 calories at School compared to all other food sources.

Vegetable Density by Food Source for Children, Adults and Seniors, 2017-2018
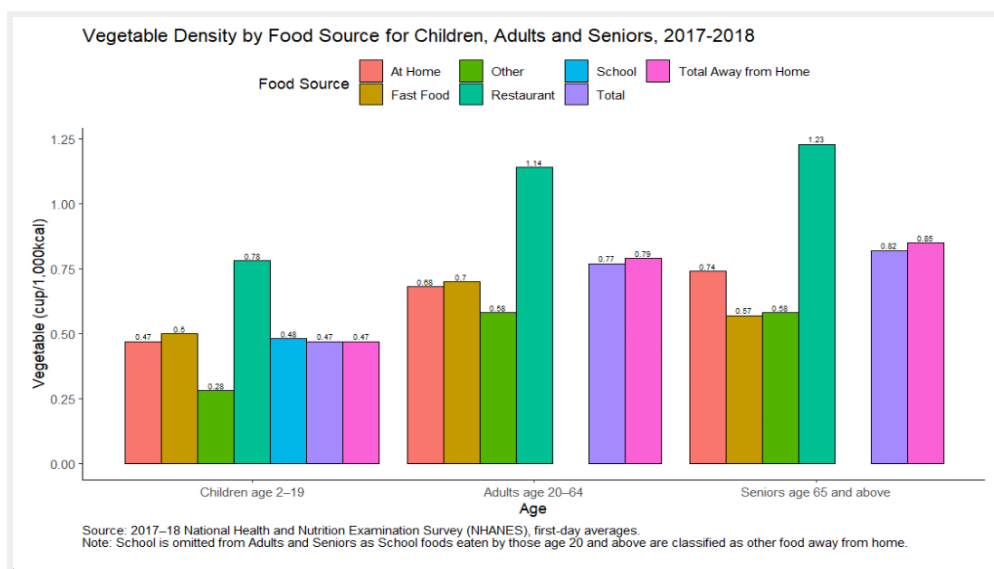
For each 1,000 calories, Children consume a daily average of 0.47 cups of Vegetables At Home, which is lower than Adults (0.68 cups) and Seniors (0.74 cups). For all age groups, Total Vegetable Density is higher when people consume food at Restaurants compared to At Home and other away from home food sources (Fast Food, Other). In addition, Children consumed 0.78 cups of vegetables per 1000 calories, which is 0.36 cups/1000kcal and 0.42 cups/1000kcal less than Adults (1.14 cups/1000kcal) and Seniors (1.23 cups/1000kcal), respectively.

Total Grain Density by Food Source for Children, Adults and Seniors, 2017-2018

In the figure above, for each 1000 calories, the daily average intake of Total Grains is lower when the food source is from Home compared to Total away from home for all age groups. Adults have the largest difference in the daily average intake of Total Grains between At Home and Total away from home sources and the lowest At Home Grain intake. For example, for every 1000 calories, Adults consume 2.79 oz of grains at home, which is 0.37 oz/1000kcal less than the amount they consume Away from home.
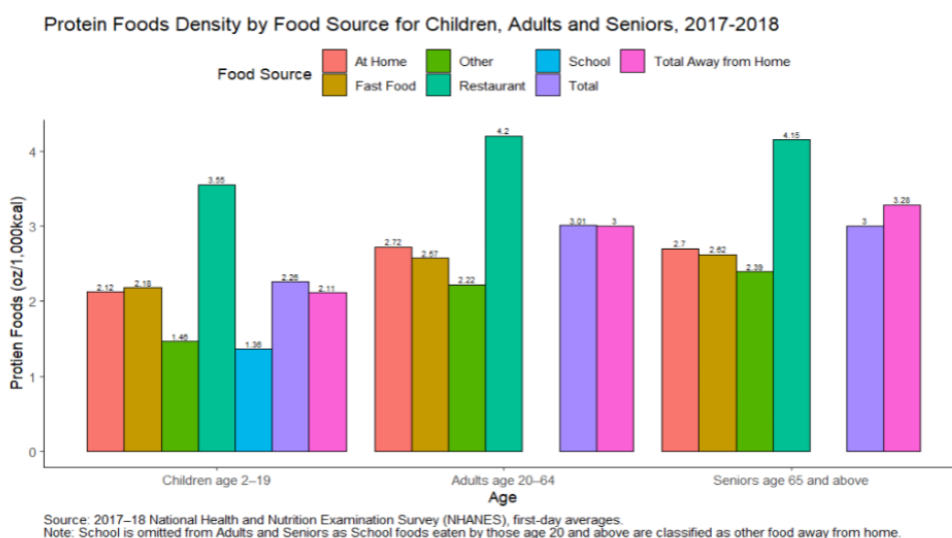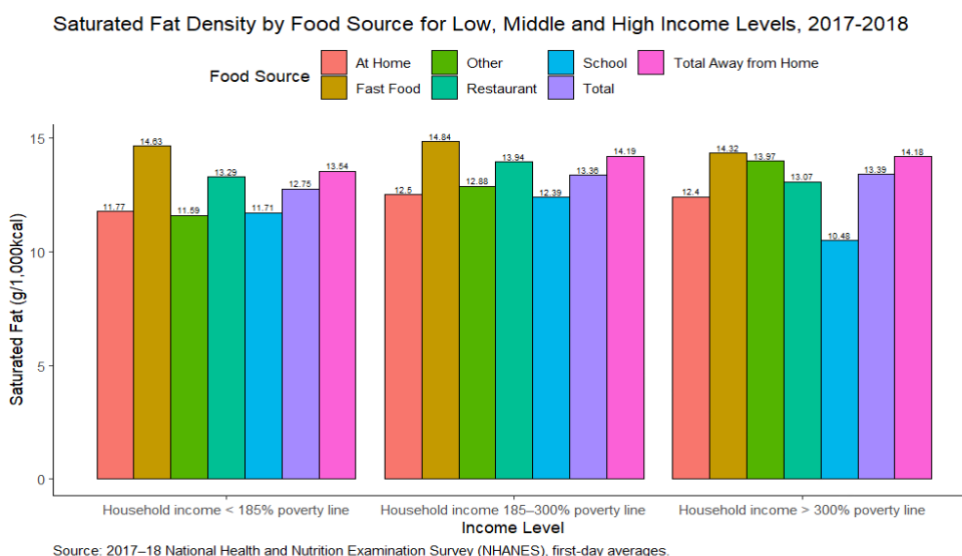

In general, for every 1,000 calories, the daily average intake of Protein Foods is higher at Restaurants compared to At Home and and other away from home food sources (Fast Food, Other) for all age groups. For example, Adults consume a daily average of 4.2 ounces of Protein Foods per 1,000 calories at Restaurants, 1.48oz higher than the amount consumed At Home (2.72 oz/1000kcal).
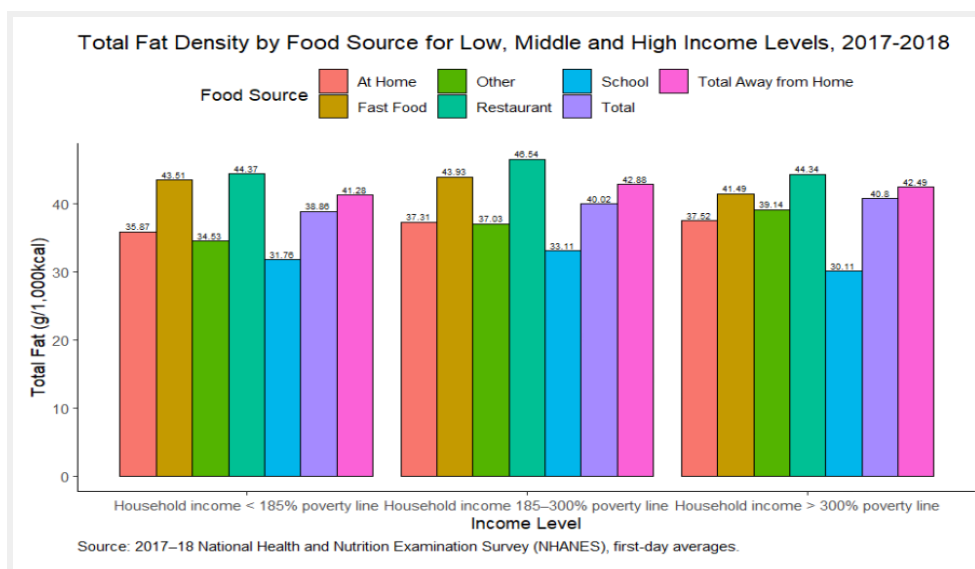
Children are consuming about the same amount of Protein foods per 1,000 calories At Home (2.12 oz/1000kcal) and at Away from home (2.11 oz/1000kcal), whereas Adults and Seniors are consuming more Protein foods away from home compared to At Home. In addition,

for every 1,000 calories, Seniors and Adults are consuming 0.38 and 0.28 more ounces of Protein Foods Away from home than At Home, respectively.
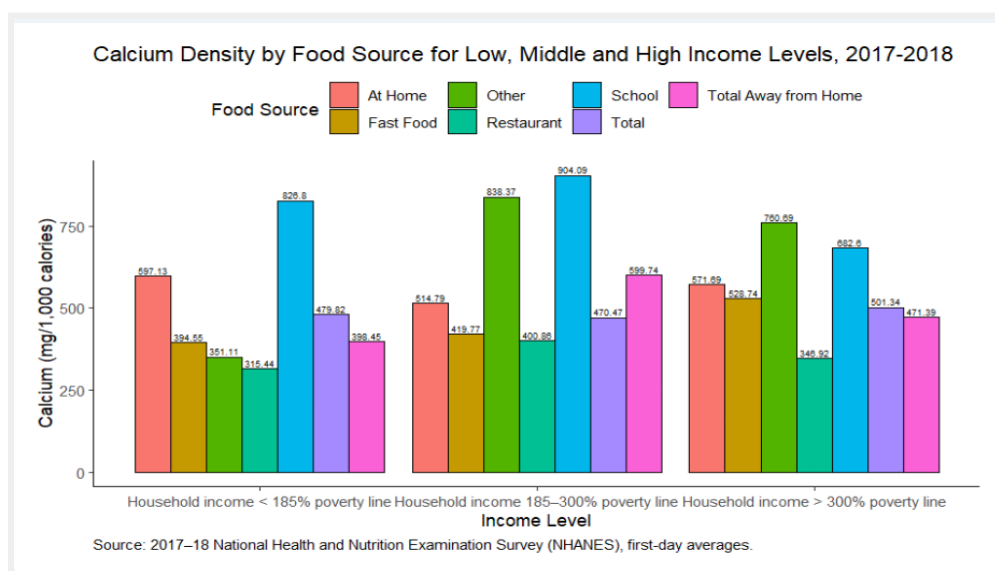
INCOME LEVEL

Saturated Fat Density by Food Source for Low, Middle and High Income Levels, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.

In general, the daily average consumption of Saturated Fat per 1,000 calories is higher at Fast Food establishments compared to At Home, Restaurants, and Other away-from-home food sources for all levels of income. In addition, Low income individuals have the largest difference in daily Saturated Fat consumption per 1,000 calories between At Home and Fast food sources, followed by Middle income and High income individuals. For example, the daily average Saturated Fat intake per 1,000 calories for Low income individuals at Fast Food establishments is 2.86 grams higher than At Home, which is larger than the difference for Middle (2.34 grams) and High income Individuals (1.92 grams). However, High income individuals have the largest difference in daily Saturated Fat consumption per 1,000 calories between At Home and Other away from home food sources, consuming 1.57 g/1,000kcal more at Other away-from-home food sources compared to At Home.

Total Fat Density by Food Source for Low, Middle and High Income Levels, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
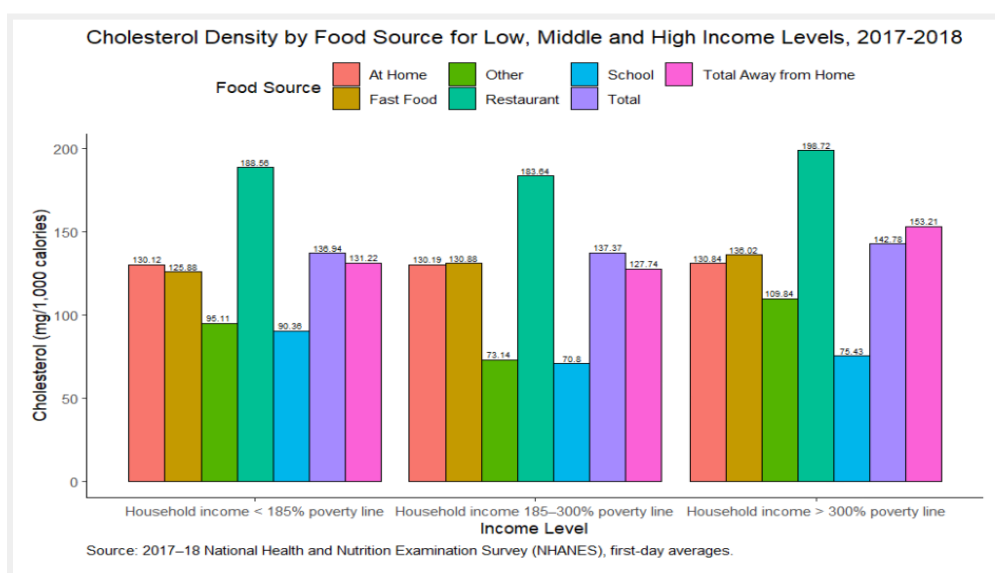
In the figure above, for every 1,000 calories, Away from home food sources (Total) have the higher daily average intake of Total Fat compared to At Home food sources for all income levels. In addition, the daily average Total Fat intake per 1,000 calories for Middle income individuals Away from home is 5.57 grams higher than At Home, which is larger than the difference for Low (5.41 grams) and High income Individuals (4.97 grams).

Calcium Density by Food Source for Low, Middle and High Income Levels, 2017-2018

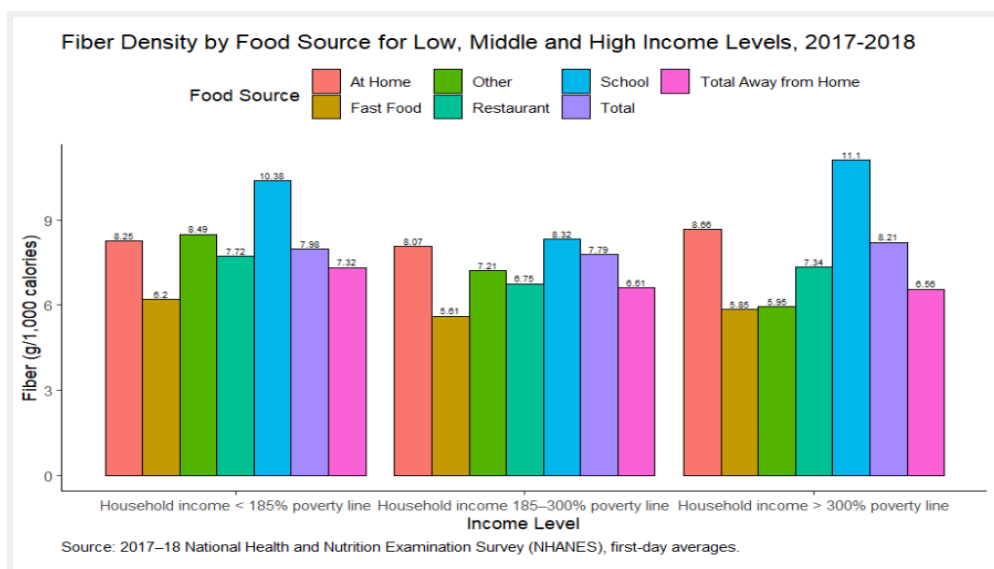Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.

Low Income individuals consume a daily average of 597.13mg of Calcium per 1,000 calories At Home, which is higher than amounts consumed At Home for Middle Income
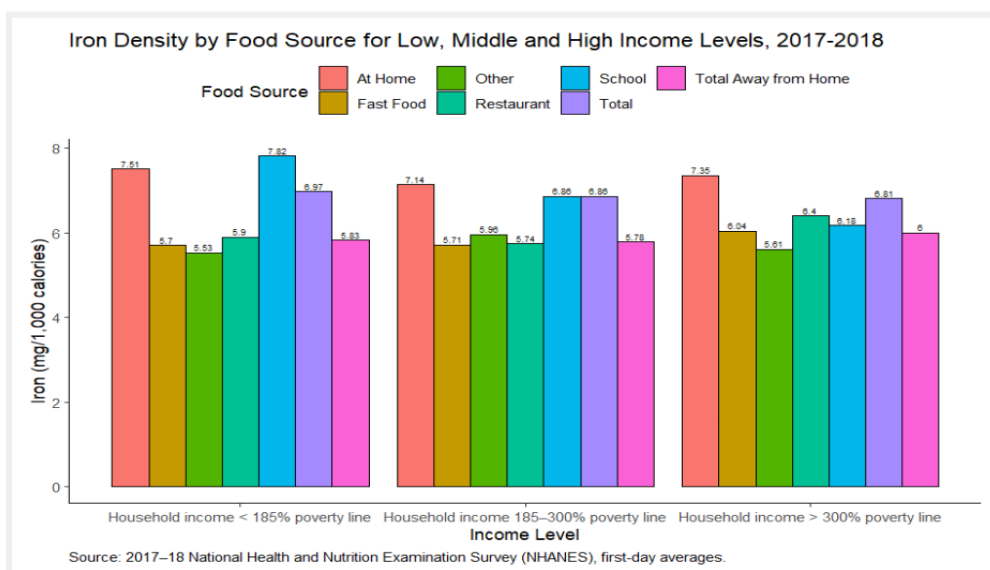
(514.79mg) and High Income (571.69mg) individuals. For Food away from home excluding school (Fast Food, Restaurant, Other), Low Income individuals have the lowest Calcium density in each of those categories compared to Middle and High Income individuals. For example, Low Income individuals consumed a daily average of 351.11 mg of Calcium per 1,000 calories at Other away from home places, which is much lower compared to Middle Income (838.37 mg) and High Income (760.69 mg).


Here, High income individuals have a higher Cholesterol density when consuming food Away from home compared to Middle and Low income individuals. In addition, for every 1,000 calories, High income individuals consumed a daily average of 153.21 mg of Cholesterol Away from home, which is 25.47mg and 21.99mg higher than Middle and Low income individuals, respectively. All levels of income are intaking the most Cholesterol per 1,000 calories at Restaurants compared to all other food sources.

Fiber Density by Food Source for Low, Middle and High Income Levels, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
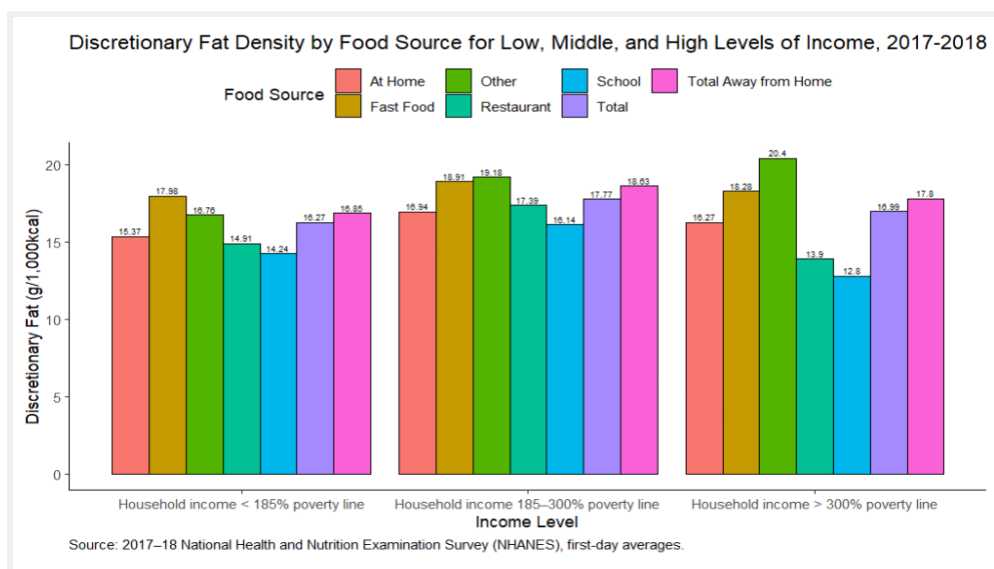
In General, for every 1,000 calories, At Home food sources have the higher daily average intake of Fiber compared to Away from home food sources for all income levels. However, High income individuals have the highest difference in daily fiber consumption per 1,000 calories between At Home and Away from home food sources, followed by Middle income and Low income individuals. For example, the difference in the daily average Fiber intake per 1,000 calories for High income individuals between At Home and Away At Home food sources is 2.1 grams, which is higher than the difference for Middle (1.46 grams) and Low income Individuals (0.93 grams).

Iron Density by Food Source for Low, Middle and High Income Levels, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
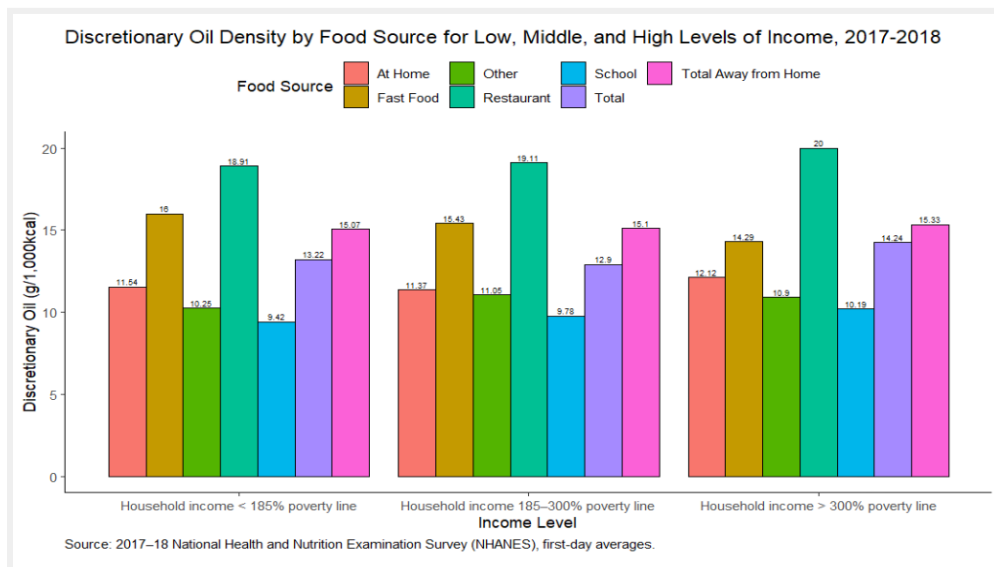
In the figure above, for every 1,000 calories, At Home food sources have the higher daily average intake of Iron compared to Away from home food sources for all income levels. The difference between daily average intakes of Iron At Home and Away from home are almost the same for all income levels.
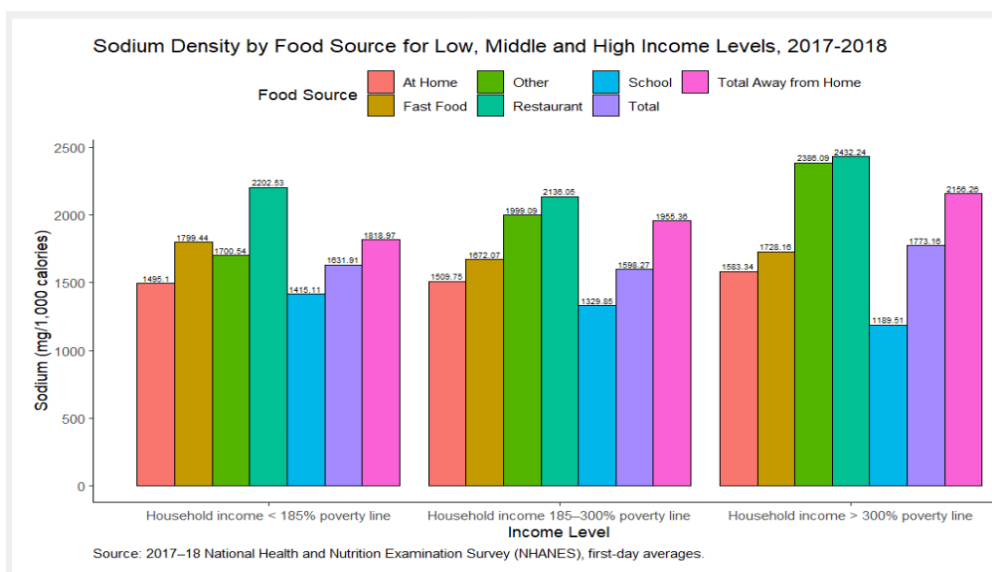
Sodium Density by Food Source for Low, Middle and High Income Levels, 2017-2018
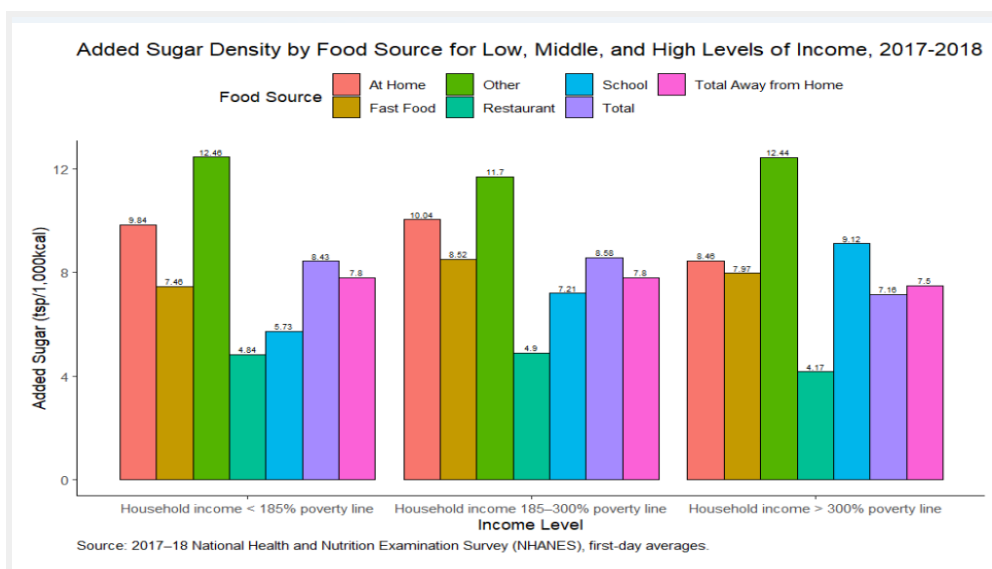
For every 1,000 calories, Away from home food sources (Total) have the higher daily average intake of Sodium compared to At Home food sources for all income levels. In addition, the daily average Sodium intake per 1,000 calories for High income individuals Away from home is 572.92 mg higher than At Home, which is larger than the difference for Middle (445.61 mg) and Low income Individuals (323.87 grams). Looking specifically at Other away from home food sources, High income individuals consumed a daily average of 2386.09 mg per 1,000 calories, which is 387 mg and 685.55 mg more than Middle and Low income individuals, respectively.

Discretionary Fat Density by Food Source for Low, Middle, and High Levels of Income, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.

In general, for every 1,000 calories, Other away from home food sources have the higher daily average intake of Discretionary Fat compared to all other away from home food sources (Fast Food ,Restaurant) for 2 of the 3 income levels. However, for Low income individuals, Fast Food establishments have the highest daily average intake of Discretionary Fat per 1,000 calories (17.98 grams) compared to all other away from home food sources (densities for Other away from home food sources and Restaurants are 16.76g and 14.91g, respectively).

Discretionary Oil Density by Food Source for Low, Middle, and High Levels of Income, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.
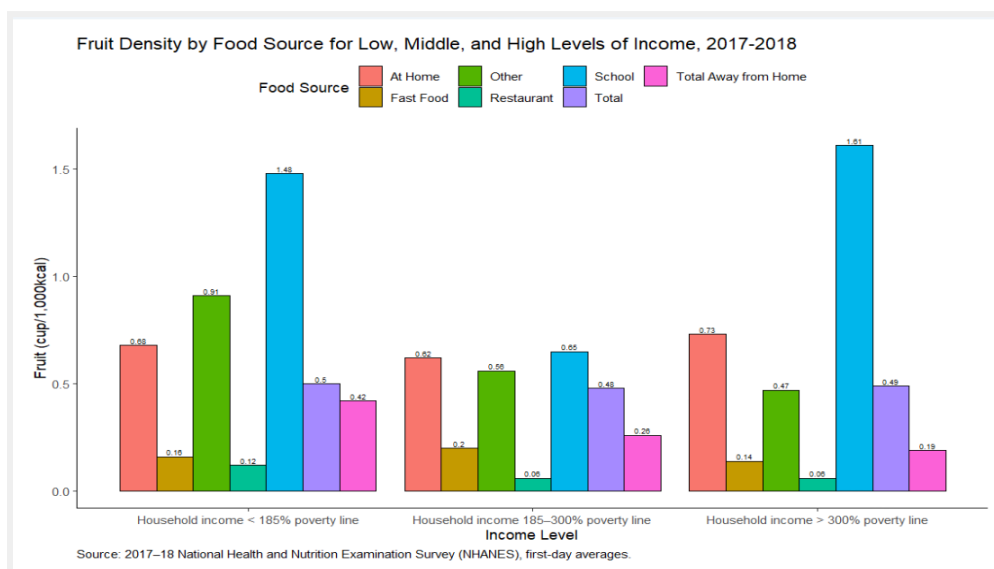
In the figure above, for every 1,000 calories, the daily average consumption of Discretionary Oil is higher when the food source is Away from home compared to At Home for all income levels. In addition, Restaurants provide the highest intake of daily Discretionary oils, followed by Fast food establishments and then Other away from home food sources. For example, High income individuals consumed a daily average of 20 grams per 1,000 calories when eating at Restaurants, which is higher than what they consume at Fast food establishments (14.29 grams) and at Other away from home food sources (10.9 grams).

Here, for every 1,000 calories, the daily average consumption of Added Sugars is higher when the food source is from Home compared to Total away from home for all income levels. However, Other away-from-home sources have the highest Added Sugar density compared to Fast Food establishments and Restaurants for all income levels. For example, the daily average consumption of Added Sugars for low income individuals at Other away-from-home sources is 12.46 teaspoons per 1,000 calories, which is higher than the amount consumed at Fast Food establishments (7.46 tsp/1,000kcal) and Restaurants (4.84 tsp/1,000kcal).

Dairy Density by Food Source for Low, Middle, and High Levels of Income, 2017-2018
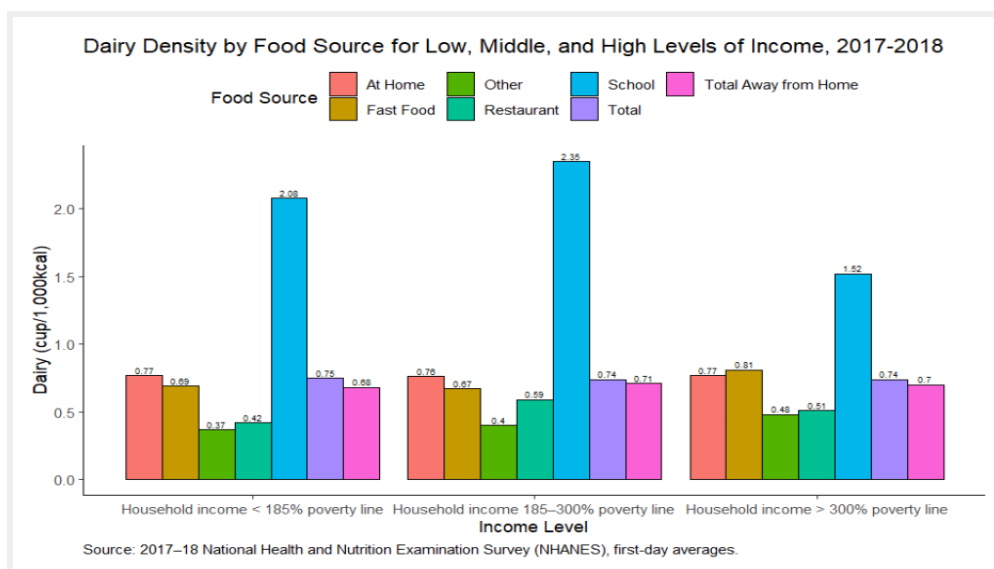
In the figure above, there is little difference between the daily average amount of Dairy intake per 1,000 calories At Home and Away from home food sources for all income levels. More specifically, there is a less than 0.1 cup/1000kcal difference between At Home and Away from home food sources for all income levels.

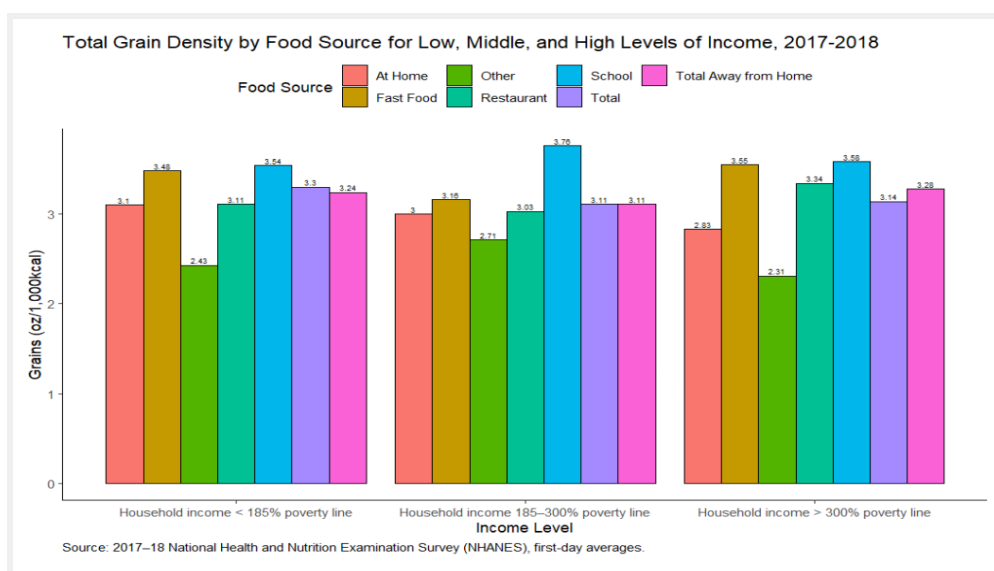Fruit Density by Food Source for Low, Middle, and High Levels of Income, 2017-2018

Looking at Fruit density, for every 1,000 calories, Low income individuals have the higher daily average consumption of Fruit Away from home (0.42 cups per 1,000 calories),
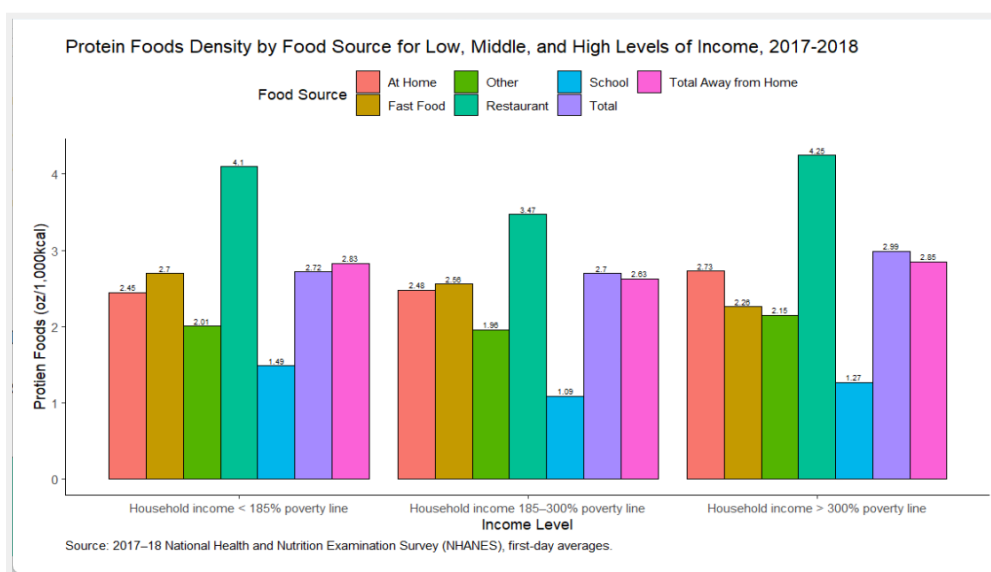
which is 0.16 cups higher than middle income (0.26cup/1000kcal) and double the amount

consumed by high income individuals (0.19 cup/1000kcal).
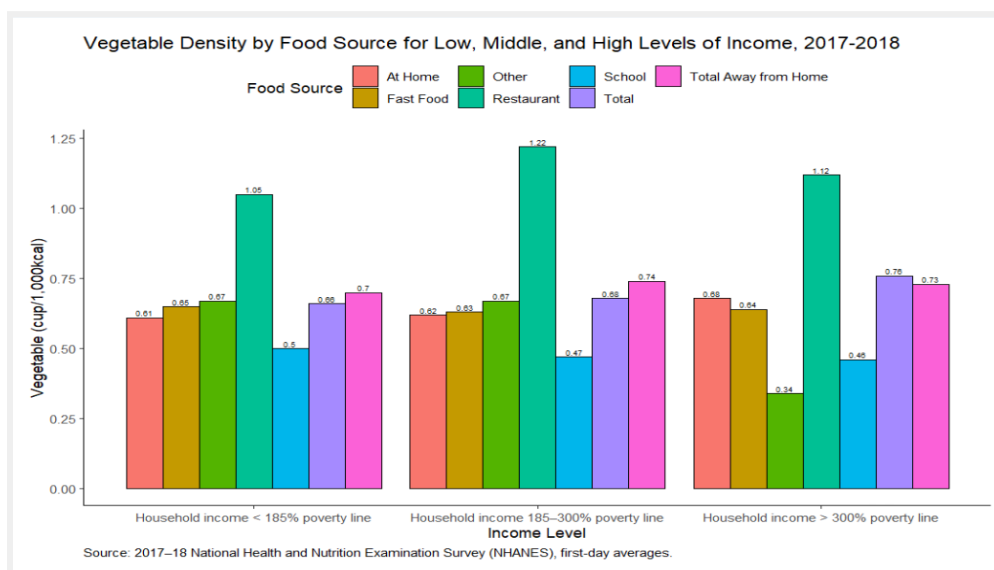
Here, for every 1,000 calories, the daily average consumption of Vegetables is higher

when the food source is from Restaurants compared to At Home and other away from home food

sources (Fast Food, Other). In addition, the daily average consumption of Vegetables is almost

the same At Home compared to the Total away from home for all income levels. The difference

in Vegetable densities between At Home and Total away from home are all lower than 0.15

cups/1000kcal for Low, Middle and High incomes.

Total Grain Density by Food Source for Low, Middle, and High Levels of Income, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.

In general, for every 1,000 calories, the daily average intake of Grains is smaller when the food source is from Home compared to Total away from home for all levels of income. Specifically, High income individuals have the largest difference in Grain density, as they consume 0.45 less ounces of Grains per 1,000 calories At Home than they do Away from home (Grain densities At Home and Away from home are 2.83 oz/1000kcal and 3.28 oz/1000kcal, respectively).

Protein Foods Density by Food Source for Low, Middle, and High Levels of Income, 2017-2018

Source: 2017–18 National Health and Nutrition Examination Survey (NHANES), first-day averages.

Typically, Low Income and Middle income individuals are consuming more Protein Foods per 1,000 calories at Fast Food establishments and restaurants compared to At Home. For

example, for every 1,000 calories, Low income individuals consume a daily average of 4.1 and 2.7 ounces of Protein Foods per 1,000 calories at restaurants and Fast food establishments, respectively, which is more than what they consume At Home (2.45oz). However, High Income individuals consume more Protein Foods per 1,000 calories At Home (2.73 oz) compared to Fast food establishments (2.26 0z), but not Restaurants (4.25 oz).

Discussion

Overall, there were many findings that suggest dietary reform for eating at home and away from home for all demographic characteristics. Children have high intakes of Sodium at Restaurants, high intakes of Saturated Fat and Discretionary Oils at Fast food establishments, high intakes of Added Sugar away from home, and low intakes of Vegetables and Iron at home. Adults have high intakes of Sodium, Saturated Fat, and Total Fat away from home, High Cholesterol and Discretionary Oil at Restaurants, low intakes of Protein, Vegetable, and Grains at home, and Low intakes of Fruit away from home. Seniors have high intakes of Sodium Cholesterol, and Discretionary Oils at Restaurants, high intakes of Saturated Fat at Fast Food establishments, low intakes of Calcium and Protein at home, and low intakes of Dairy and Fiber away from home. Low income individuals have high intakes of Sodium and Added Sugar away from home, high intakes of Saturated Fat and Discretionary Fat at Fast Food establishments, high intakes of Discretionary Oils and Cholesterol at Restaurants, low intake of Protein at home, and low intakes of Fruit and Calcium away from home. Middle Income individuals have high intakes of Sodium, Discretionary fat, and Total Fat away from home, high intakes of Saturated Fat at Fast Food Establishments, high intakes of Discretionary Oils and Cholesterol at Restaurants, low intake of Protein at home, and low intake of Fruit away from home. High income individuals

have high intakes of Sodium and Saturated Fat away from home, high intakes of Cholesterol at Restaurants, low intakes of Grains at home, and low intakes of Fruit and Fiber away from home.

I hope that by identifying these sources of poor nutrition for different age groups and income levels that it will help develop policies and programs for them that focus on increasing the consumption of healthy food groups and nutrients and decreasing the consumption of food groups and nutrients that can be detrimental to health. These actions will help prevent fatal diseases that are caused by poor diet.

One issue with my analysis is that I was not provided with the sample splits for each demographic characteristic. This hurts my analysis as the daily average intakes for some food groups and nutrients could be calculated off of a few samples, which would not represent a population fully. Also, the age groups are aggregated by many years (ex. Children ages 2-19), so the daily average intakes may not be a good representation when trying to compare to a specific age. To further enhance my work, revealing individual demographic characteristics for every participant in the 2017-2018 NHANES survey would help identify specific age groups (Ex young adults aged 18-22), for example, that are deficient in certain nutrients or over consuming unhealthy food groups.

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