

How Does Fiber Consumption Vary Across Demographics Throughout the United States?

Arianna Hernandez

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Introduction

Dietary fiber is a key component of a healthy diet, and its adequate intake has been associated with reduced risks of hypertension, obesity, type 2 diabetes, certain gastrointestinal disorders, cancers, stroke, and heart disease—the leading cause of death in the United States (1). Dietary Guidelines indicate that total dietary fiber intake should be 14 grams per 1000 calories each day, primarily from food sources rather than supplements (2).

Despite the well-established benefits of fiber, national surveys indicate that about 95% of the U.S. population fails to meet the recommended daily fiber intake, raising significant public health concerns. **In this project, we aim to explore fiber intake across various demographics—such as age, gender, and race—using data from the National Health and Nutrition Examination Survey (NHANES). Our primary focus will be on adults and teenagers aged 13 and older.**

The NHANES, conducted annually by the National Center for Health Statistics (NCHS), monitors the health and nutritional status of adults and children across the United States. Due to the COVID-19 pandemic, NHANES suspended all field operations in March 2020, leaving data collection for that cycle incomplete. To address this gap, NHANES compiled a nationally representative pre-pandemic dataset (2017–March 2020) using data from NHANES 2017–2018 and the partial 2019–2020 cycle. The survey data is categorized into Demographics, Dietary Data, Examination Data, Laboratory Data, Questionnaire Data, and Limited Access Data. For this study, we will focus on the Demographics (P_DEMO.XPT) and Dietary (P_DR1TOT.XPT) data files.

Methods

This analysis utilized data from the National Health and Nutrition Examination Survey (NHANES), which employs a stratified multistage probability design to select participants

from the non-institutionalized population. The selection process is conducted using a computer program that identifies primary sampling units (PSUs), neighborhoods, households, and individuals. The survey is conducted in two stages: the first dietary recall interview is conducted in-person at the Mobile Examination Center (MEC), followed by a second interview via telephone 3 to 10 days later, during which a professional collects demographic and health-related information.

Demographic and nutritional data were extracted from the National Center for Health Statistics (NCHS) website. These datasets were merged using the sequence number (SEQN) to match each respondent's records across the two datasets. The merged data was then subsetted to include relevant variables for the research question:

- SEQN = Sequence Number
- DR1TFIBE = Fiber in grams
- DRQSDT6 = People following a High Fiber Diet
- DR1_300 = Compare food consumed yesterday to usual
- DR1DAY = The day the data was taken
- RIDAGEYR = Age at the time of survey in Years
- RIDAGEMN = Age in Months for those under 2 years
- RIDRETH3 = Ethnic Category
- RIAGENDR = Gender
- DR1TKCAL = Kilocalories consumed

Initial data inspection was conducted to identify missing values, and any rows with missing data in the fiber intake variable (DR1TFIBE) were removed to ensure accurate analysis. The variable Age_range was created to categorize individuals into three age groups: Children under 13, Ages 13-49, Ages 50 and over; simplifying the analysis of fiber intake patterns across different demographic groups and in relation to USDA fiber recommendations.

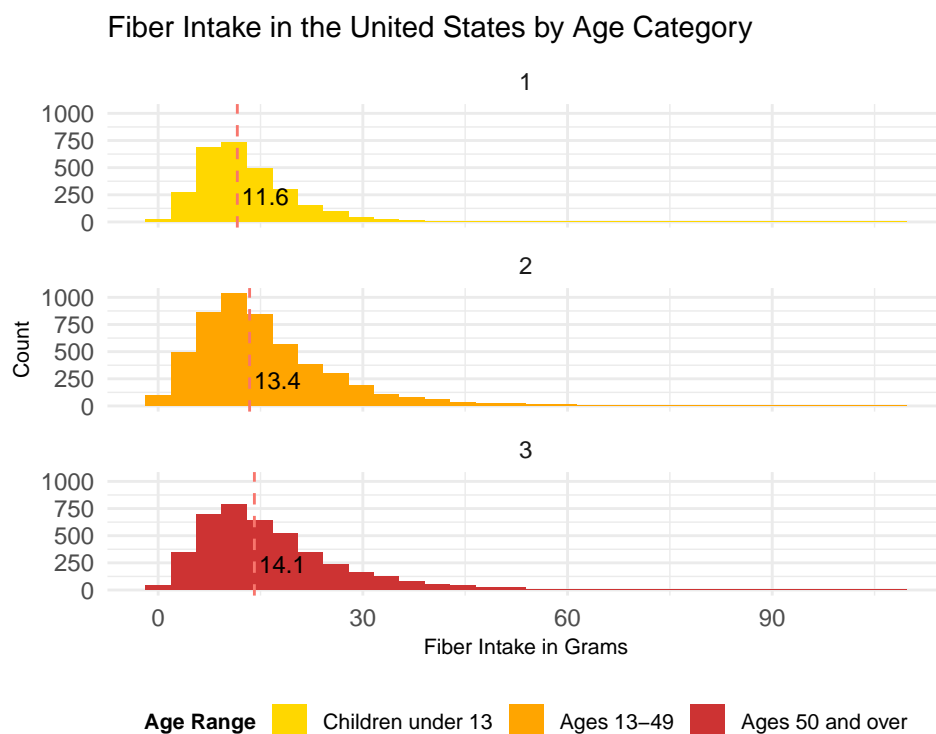
To assess the distribution of fiber intake across age groups, a bar graph was constructed with fiber intake data stratified by Age_range. A vertical dashed line was added to represent the median fiber intake, providing insight into typical fiber consumption within each age group. Additionally, caloric intake (DR1TKCAL) was analyzed to account for varying energy needs across individuals and assess its relationship with fiber consumption.

Data were further cleaned by creating labels for key variables, including Gender (RIAGENDR), Ethnicity (RIDRETH3), and Food Intake Comparison (DR1_300). This labeling enhanced the clarity of the data and improved the understanding of the results.

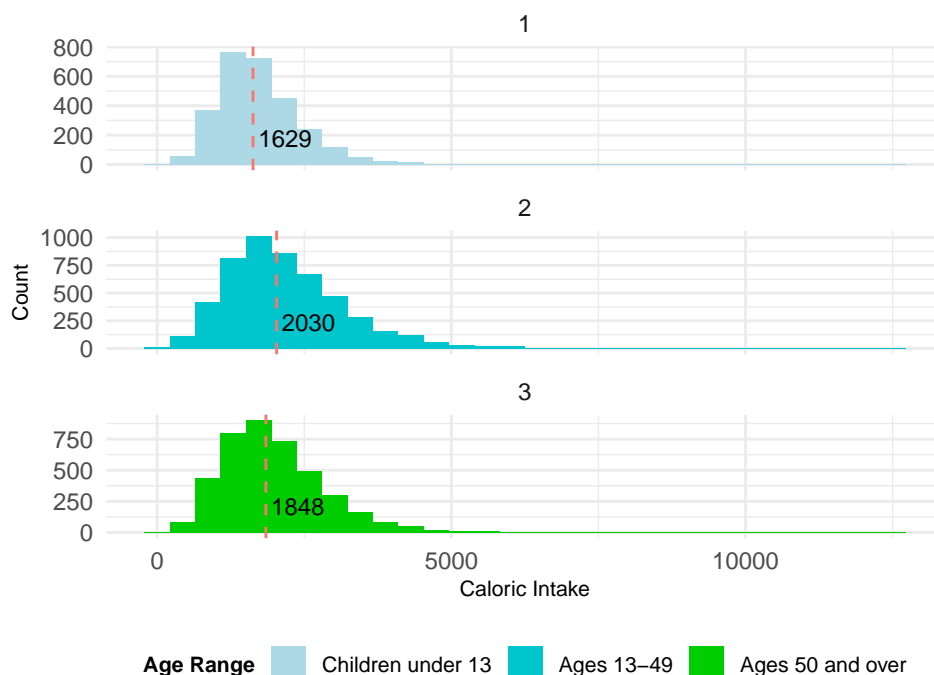
Descriptive statistics were generated for each age group and its findings were compared to individuals who reported following a high-fiber diet. A series of visualizations were created, including boxplots and bar graphs, to explore potential differences in fiber intake by Gender, Ethnicity, and Age_range. Specifically, a boxplot was generated to examine the overall distribution of fiber intake between genders, and additional boxplots and bar graphs with error lines were used to explore differences across ethnic groups, gender, and age categories. The

resulting data visualizations and summary statistics provided insights into patterns of fiber consumption within the U.S. population across various demographic groups.

Preliminary Results



Caloric Intake in the United States by Age Category



Across the different age groups, fiber intake displayed a consistent overall pattern, with the majority of individuals consuming low amounts of fiber, though a few notably high values suggested potential outliers. The dashed lines on the bar graphs, representing the median fiber intake for each age group, highlighted that most adults, regardless of age, consumed less than 15 grams of fiber per day—a value significantly below recommended levels.

Analysis of caloric consumption revealed a similar trend. Even when adjusting for calorie intake, the median fiber intake for each age group fell below national dietary guidelines, which recommend a minimum of 14 grams of fiber per 1,000 kilocalories consumed. This finding reinforces the widespread under-consumption of dietary fiber across age demographics.

Table 1: Fiber Intake Across Age Ranges in the U.S.

Ages	Count	Mean	Median	Sd	Min	Max
0-12 years old	2846	12.78665	11.6	7.020745	0	73.8
13-49 years old	5118	15.55592	13.4	10.233922	0	107.8
50+ years old	4115	16.41509	14.1	10.489811	0	103.4

Similar to the patterns observed in the previous graph, the data reveals a broad range of fiber intake across the population. Among adults aged 13-49, the maximum recorded fiber intake

reached 107.8 grams, the highest across all age groups, with the older population (50+) closely following at 103.4 grams. While these values are considerably higher than the average, they remain within plausible dietary limits and therefore cannot be classified as statistical outliers. These extreme values highlight a small subset of individuals who may follow significantly high-fiber diets.

Table 2: People Who Reported Consuming a High Fiber Diet

Fiber(grams)	Kcal	Diet Variation	Age(years)	Ethnicity	Gender
24.9	1627	Usual	80	Other Race - Including Multi-Racial	Female
29.9	2093	Usual	32	Non-Hispanic White	Female
15.9	1240	Usual	79	Non-Hispanic White	Male
16.9	1448	Usual	10	Other Hispanic	Male
44.5	2840	Usual	56	Non-Hispanic Asian	Male
18.1	1273	Usual	63	Other Hispanic	Female

To further explore the high fiber values, we examined individuals who self-reported following a “high fiber” diet. Interestingly, many participants still consumed less than the recommended daily fiber intake. This includes one individual under the age of 13, whose intake fell significantly short of the guidelines.

Among these individuals, only one consumed what could be considered a truly high fiber amount at 44.5 grams per day. However, none of these individuals account for the extreme values identified in the previous graph, which suggests that the highest fiber intakes are not necessarily linked to self-reported dietary habits.

Additionally, no specific ethnic or gender group emerged as disproportionately represented among those reporting a “high fiber” diet. Most of the individuals in this group were over the age of 50, indicating that older adults may be more likely to be conscious of their intake.

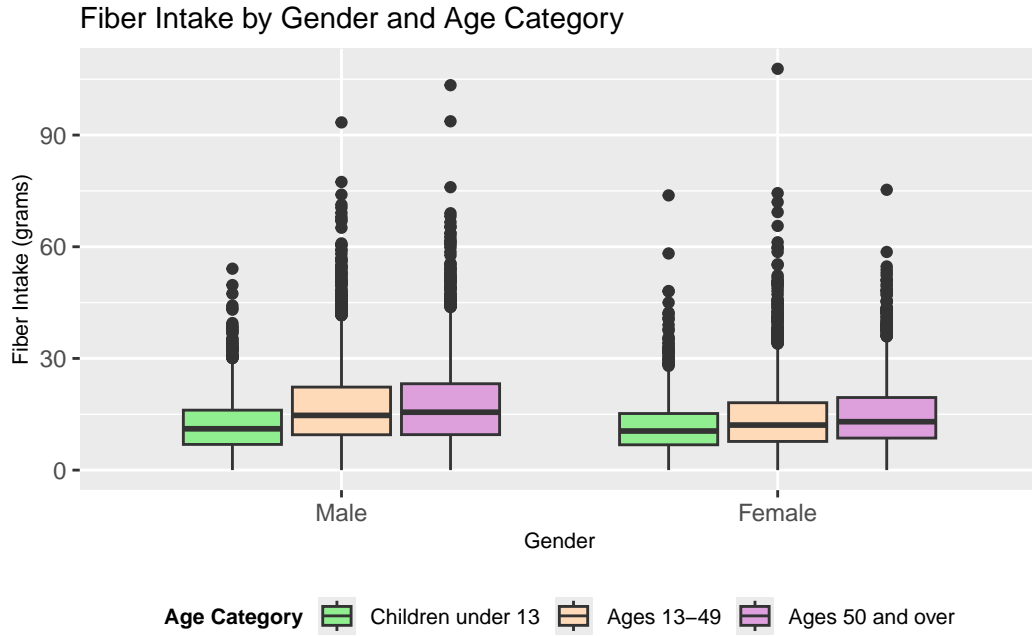


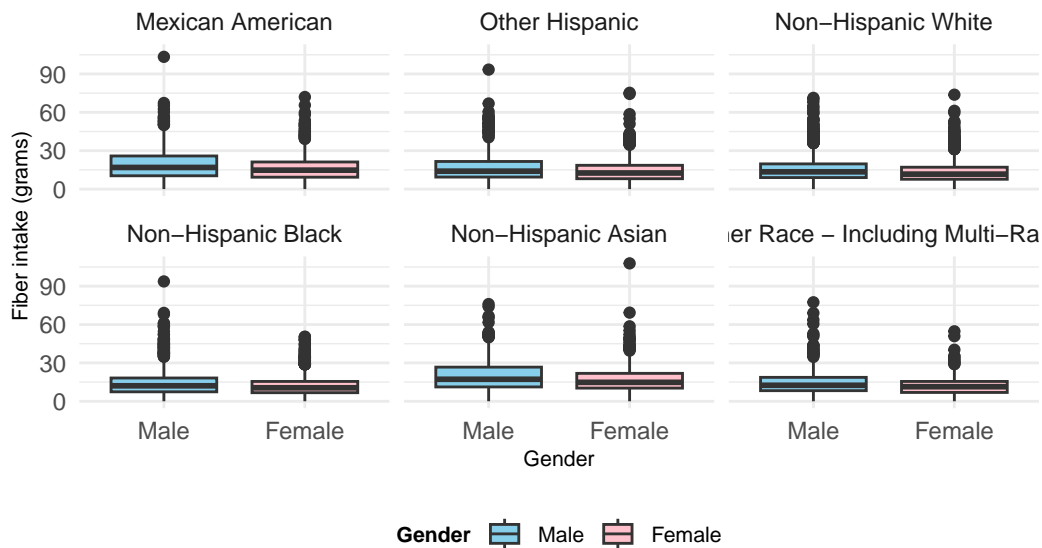
Table 3: Summary of Fiber Intake Across Genders in the U.S.

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Males	0	8.8	13.8	16.03930	20.7	103.4
Females	0	7.7	12.0	13.76146	17.7	107.8

Although there are no grand differences between genders, males tend to consume slightly higher amounts of fiber compared to females. The median fiber intake for adult males across all age groups is 13.8 grams per day, while females have a slightly lower median intake of 12 grams per day.

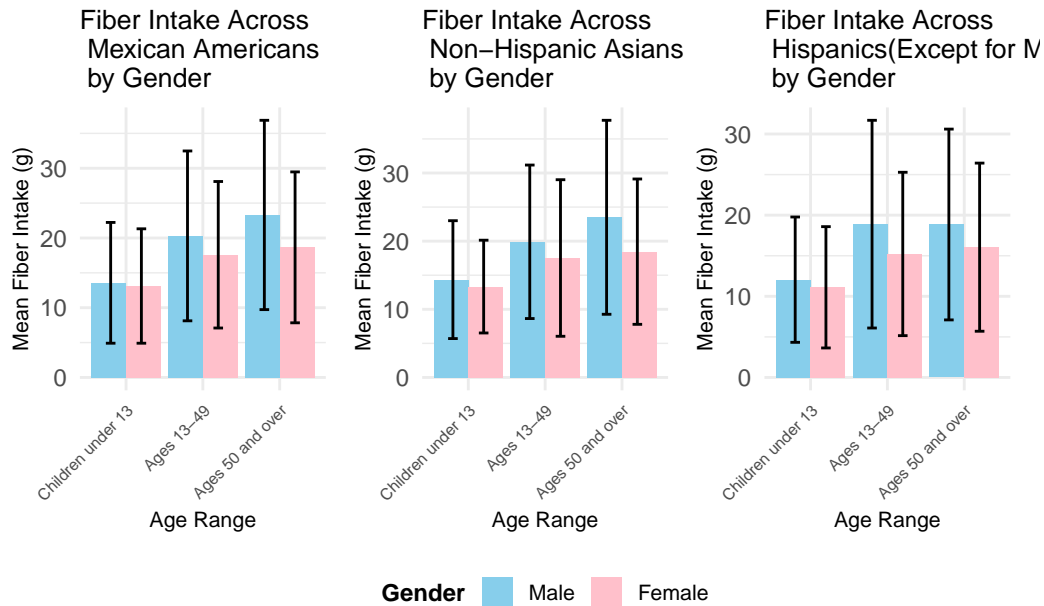
Both genders exhibit a wide range of fiber consumption values, which is consistent with expectations given the large and diverse sample size.

Fiber Intake Across different Ethnic Groups and Genders in the United States



Noticeable differences in fiber intake were observed across ethnic groups, with the highest consumption reported among Mexican Americans and Non-Hispanic Asians. When examining gender differences within these groups, almost all showed disparities, with males consistently consuming more fiber than females.

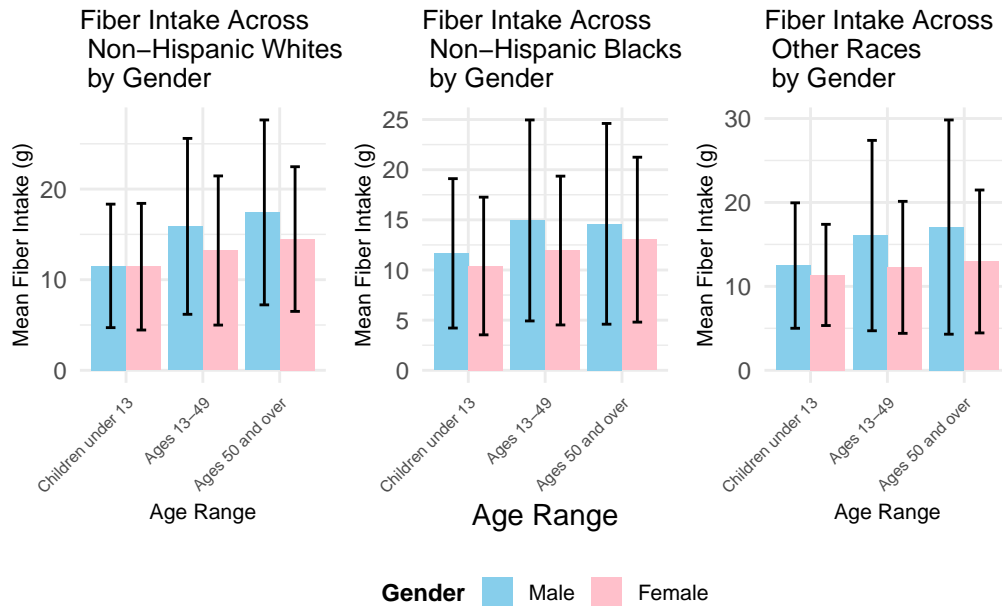
The most noticeable gender differences were found among Non-Hispanic Asians (2.4 grams) and Mexican Americans (2.1 grams), where males had higher average intake compared to females. For a closer examination of these values, please refer to the interactive charts available on my website.



Mexican Americans and Non-Hispanic Asians demonstrate higher median fiber consumption compared to most other groups. Among Mexican Americans, gender differences in fiber intake are notable: adults under 50 years old show a 2-gram difference between males and females, while the gap increases to nearly 4 grams among adults over 50. Notably, Mexican American males over 50 years old are closest to meeting the recommended daily fiber intake, with a median of 20.35 grams.

For Non-Hispanic Asians, males over 50 also approach the recommended guidelines, consuming significantly more fiber than females in the same age category—over 7 grams more on average. Interestingly, Non-Hispanic Asian adults under 50 consume fiber at rates similar to Mexican Americans of the same age group.

In contrast, other Hispanic groups show lower overall fiber consumption of the three. The gender gap is most prominent for adults between 13-49. Despite these trends, fiber intake across all groups and genders remains below the recommended levels.



Non-Hispanic Blacks, Non-Hispanic Whites, and other race groups exhibit the lowest patterns of fiber consumption among all ethnic groups analyzed. While men over 50 years old within these groups tend to consume more fiber than other age and gender categories, their median intake still falls significantly short of the recommended levels for their age group.

Conclusion

This analysis confirmed that overall fiber consumption across the United States remains well below recommended levels. The NHANES survey provided deeper insights into these patterns, revealing that individuals aged 13–49 typically have the highest individual fiber intakes, while those aged 50 and older exhibit higher median fiber consumption—particularly among males.

Unusually high fiber intake values skewed the data, making age group comparisons less straightforward. To address this, we analyzed survey respondents who reported following a “high fiber diet.” Interestingly, these individuals were not among those with the highest fiber intake values in the dataset. The highest recorded intake was 107.8 grams, while the maximum for individuals reporting a “high fiber diet” was only 44.5 grams. More than half of this group still fell below the recommended intake levels for Americans, and most reported that their fiber consumption was typical for them.

Gender differences in fiber consumption were evident across all age groups, with males consistently consuming more fiber than females. While this could partially be attributed to overall differences in dietary intake, further analysis is required to better understand the gender gap.

When examining fiber consumption across ethnic groups, Mexican Americans and Non-Hispanic Asians emerged as having higher median intakes compared to Non-Hispanic Whites, Non-Hispanic Blacks, and individuals from other race groups. However, even within these higher-consuming groups, fiber intake remained below recommended levels for most individuals. These findings suggest the need for targeted nutritional interventions, particularly for older adults and groups with consistently low intake levels.

Future research should expand the scope of analysis to include additional variables such as macronutrient distribution, water consumption, and demographic factors like pregnancy status or nativity (U.S.-born vs. foreign-born), socioeconomic status, education, and other key factors would provide a more nuanced understanding of fiber consumption disparities. Comparing survey data across multiple years, particularly pre- and post-pandemic, could also reveal important trends over time. This expanded approach could help identify the populations most at risk for fiber underconsumption and guide more effective strategies to address these nutritional gaps.

Sources

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