



# Relationship Between Dietary Fiber and Allergy Prevalence in a College Population

Brandy Moser, BS, BA and Jesse Stabile Morrell, PhD  
Department of Agriculture, Nutrition, and Food Systems

## Introduction

### Allergic Diseases

- Rates of allergic diseases have been increasing globally, including in the United States, particularly among children and young adults.<sup>1,2</sup>
- Allergic diseases encompass multiple inflammatory diseases such as asthma and allergic rhinitis.
- National College Health Assessment identified 21% and 8.9% of college students have been diagnosed with allergies and asthma, respectively.<sup>3</sup>
- Allergic diseases place a high strain on the quality of life of college students, due to missing classes and interference with college activities.<sup>4</sup>

### Fiber Intake

- Fiber is identified as a potential modifiable risk factor in the pathology of allergic diseases, but evidence is limited and inconsistent.<sup>5</sup>
- Dietary fiber is a non-digestible carbohydrate.<sup>6</sup>
- The Dietary Guidelines of America stress the importance of dietary fiber consumption, yet among ages 19-59 in the United States, less than 10% of women and 3% of men meet the dietary fiber intake recommendations.<sup>7</sup>

## Objective

To characterize the relationship between dietary fiber intake and the prevalence of the allergic diseases, seasonal allergies and asthma, in a college student population.

## Methods

- Data were collected at a midsized northeast university from the ongoing cross-sectional College Health Assessment and Nutrition Survey (CHANAS) between 2012-2021.
- All participants provided consent (UNH IRB #5524)
- Fiber intake measured as a 3-day average using an online self-reported food record (Diet and Wellness Plus)
- Allergy status identified via online questionnaire self-reported diagnosis ever of asthma or seasonal allergies.
- Students' average fiber intake (g/day) were grouped into quartiles; differences in allergy and asthma prevalence across quartiles were evaluated via chi-square tests and stratified by sex.
- Logistic regression used to predict odds of seasonal allergy and asthma among lowest quartile fiber intake controlling for BMI, smoking status, and alcohol consumption, and stratified by sex.
- All statistical analyses performed using SPSS Statistics 27 and significance established as  $P < 0.05$ .

## Study Population Demographics & Characteristics

### Study population demographics and characteristics according to sex

	Men	Women
	Mean $\pm$ SD or n(%)	Mean $\pm$ SD or n(%)
Age (y)	19.2 $\pm$ 1.3	18.8 $\pm$ 1.0
Sex (n[%])	1350 (32.6%)	2875 (67.4%)
BMI (kg/m <sup>2</sup> )	24.3 $\pm$ 3.8	23.0 $\pm$ 3.6
Dietary calories (kcal/day)	2490.3 $\pm$ 779.5	1704.4 $\pm$ 483.2
Smoking Status (n[%])	114 (8.4%)	87 (3.1%)
Alcohol Use (n[%])	1098 (81.3%)	2104 (75.5%)
<b>Allergic Diseases</b>		
Seasonal Allergies (n[%])	504 (37.3%)	1052 (37.8%)
Asthma (n[%])	261 (19.3%)	531 (19.1%)
<b>Fiber Intake</b>		
Total Fiber Intake (g/day)	22.1 $\pm$ 10.8	19.9 $\pm$ 8.8
Adjusted Fiber Intake (g/1000kcal)	9.0 $\pm$ 3.6	11.9 $\pm$ 4.8
Met Fiber Recommendation (n[%])	165 (12.2%)	508 (18.2%)

No statistically significant difference in allergy prevalence between sex, but sex is a suggested effect modifier in the relationship of fiber and allergic disease. All descriptives and analyses are stratified by sex

### Prevalence of Population with Allergic Disease

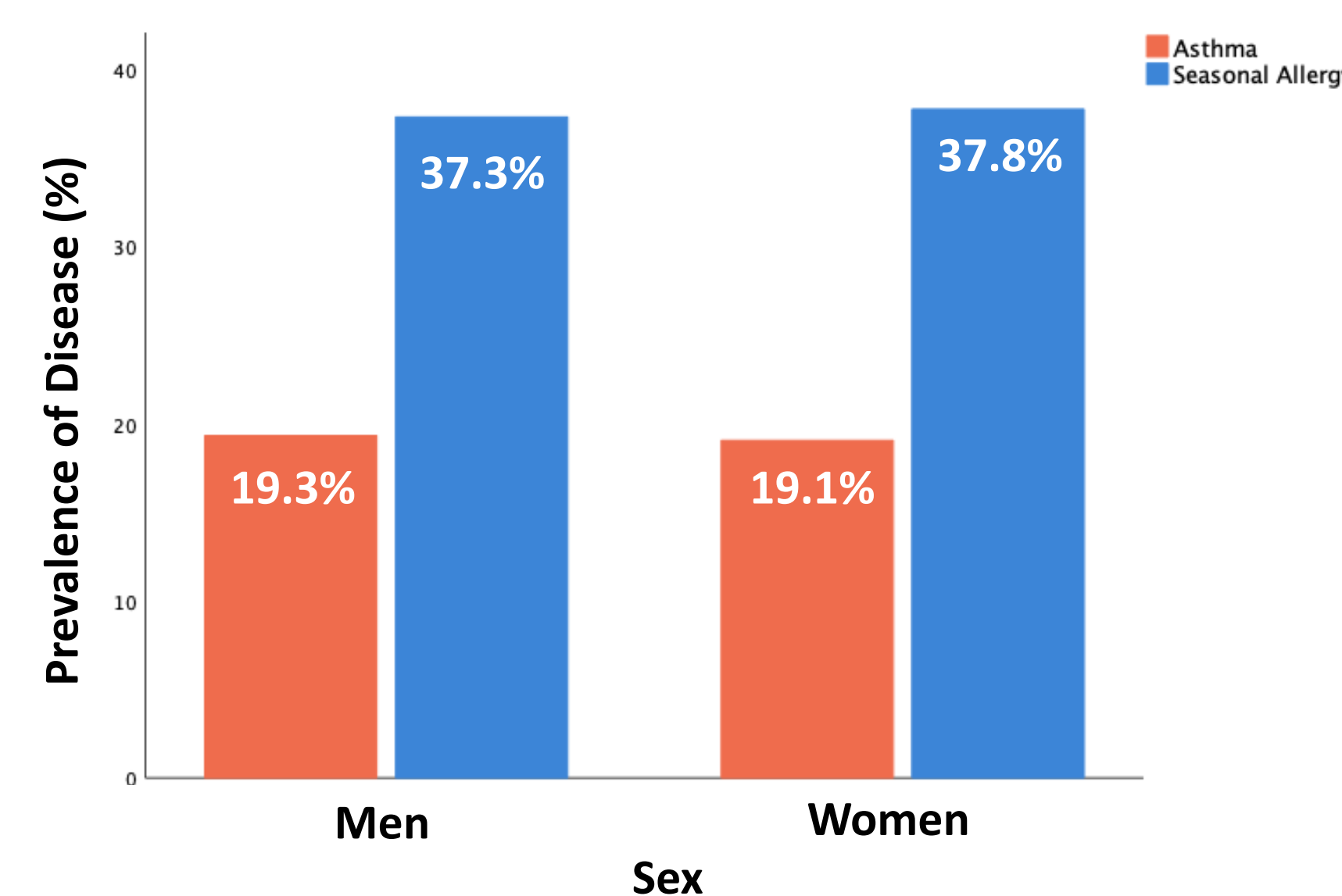


Figure 1. No statistically significant difference in allergy prevalence was found according to sex. The final sample included n=4,225 participants, of which 32.6% are men (n=1350) and 67.4% are women (n=2875)

### Yearly Average Daily Fiber Intake

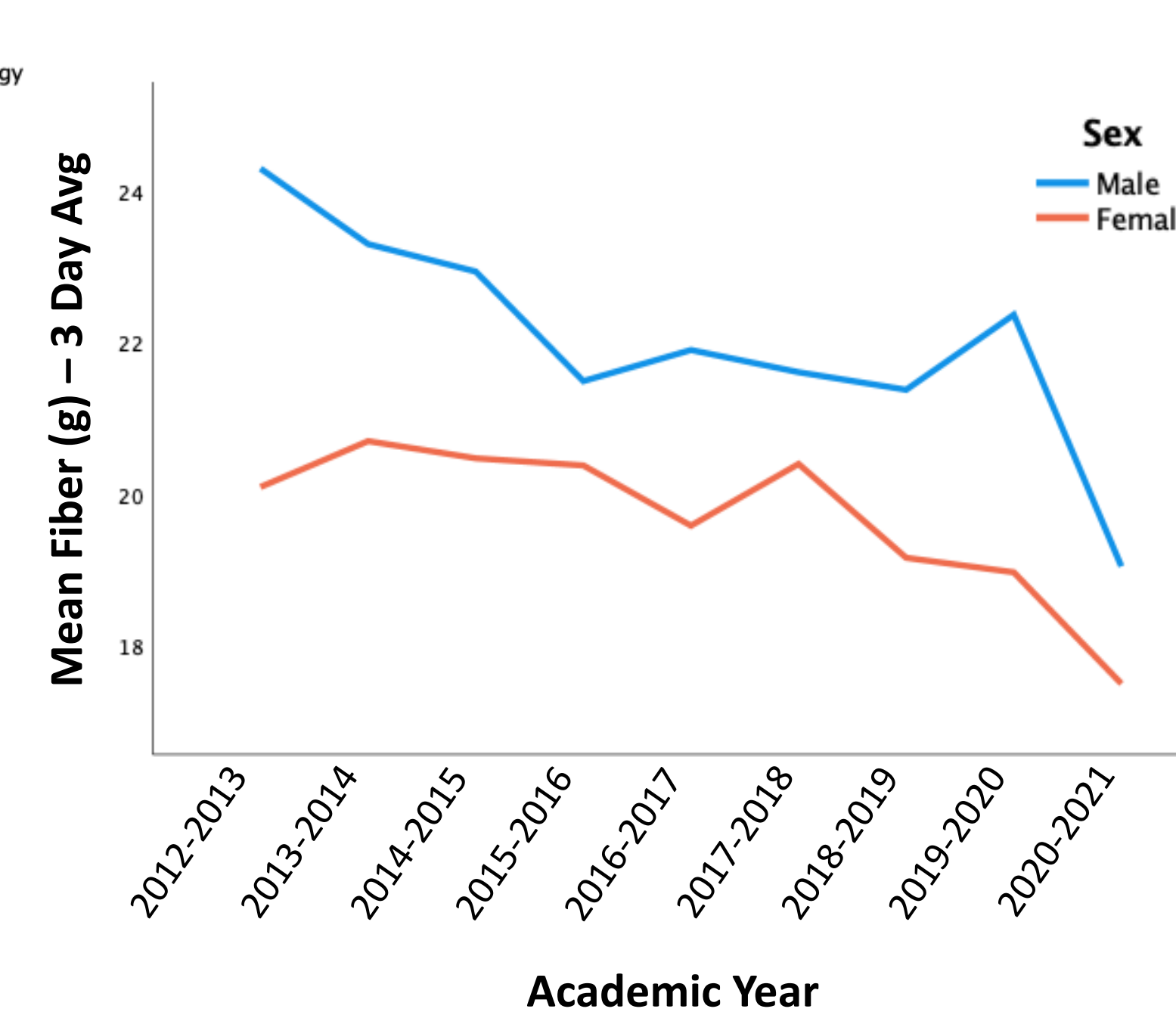


Figure 2. Population includes cohorts from 2012-2021. Figure displays average fiber intake of each year's student cohort.

## Prevalence Differences

Chi-squared analysis indicated quartile fiber consumption is associated with seasonal allergy prevalence in men ( $X^2=10.657$ ,  $df=3$ ,  $p=0.014$ ) and women ( $X^2=15.526$ ,  $df=3$ ,  $p=0.001$ ), particularly among lower fiber in women.

## Key Findings

- Population has an above average rate of seasonal allergies and asthma
- Fiber intake was found predictive of seasonal allergies in females
- No clear associations between fiber and asthma, instead BMI is strongest predictor

## Conclusion

Our findings suggest fiber intake is related to seasonal allergies but not asthma, with a stronger relationship among females.

## Future Directions

This study further emphasizes the need to investigate potential dietary risk factors for allergic diseases and to inform institutions on key dietary priorities for college student health as fiber intake continues to decrease and rates of seasonal allergies increase.

## Acknowledgements

Project funded by the New Hampshire Agriculture Experiment Station and USDA National Institute of Food and Agriculture Hatch Project 1010738 and the Department of Agriculture, Nutrition, and Food Systems

## References

- Pawankar R. *World Allergy Organization Journal*. 2014
- Saeed MA et al. *Annals ATS*. 2020
- Reports\_ACHA-NCHAIIc. Accessed December 12, 2021. [https://www.acha.org/NCHA/ACHA-NCHA\\_Data/Publications\\_and\\_Reports/NCHA/Data/Reports\\_ACHA-NCHAIIc.aspx](https://www.acha.org/NCHA/ACHA-NCHA_Data/Publications_and_Reports/NCHA/Data/Reports_ACHA-NCHAIIc.aspx)
- Jolicoeur LM et al. *Journal of Asthma*. 2009
- Sdona E et al. *Nutrients*. 2021
- Makki K et al. *Cell Host Microbe*. 2018
- Dietary Guidelines for Americans, 2020-2025. :164.

## Odds of Seasonal Allergies

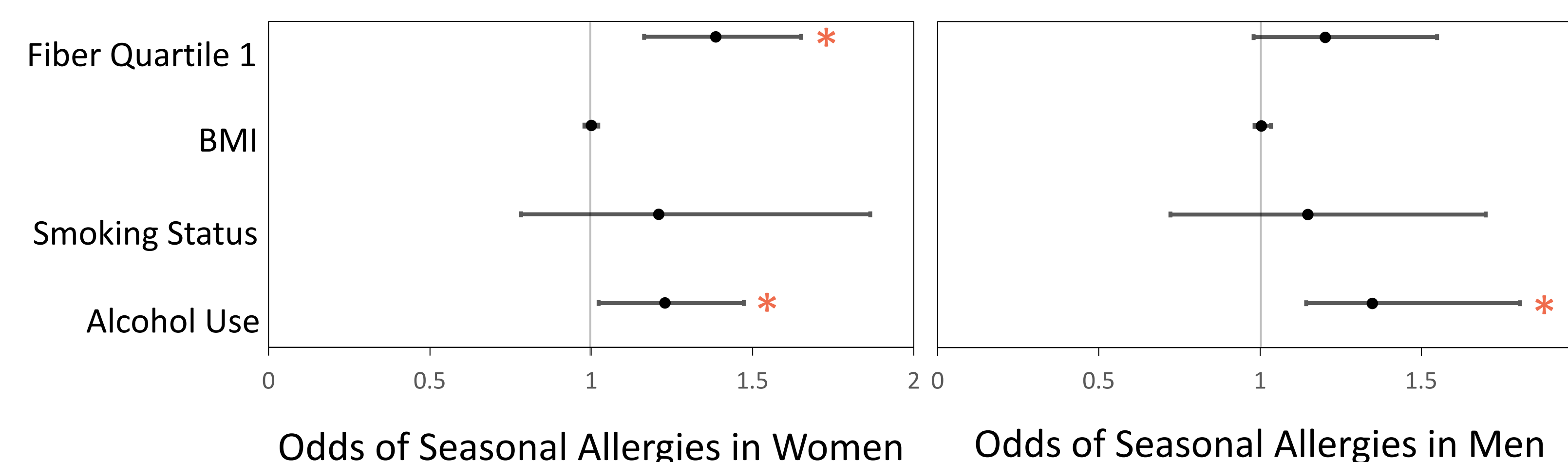


Figure 3. Odds of seasonal allergies stratified by sex. Results of logistic regression predicting odd of seasonal allergies by lowest quartile fiber intake compared to all other quartiles, controlling for BMI, smoking status, and alcohol use. Fiber Quartile 1 was defined as <13.62g/day for women and <15.01g/day for men. \* Statistical significance at  $\alpha < 0.05$