

# The Impact of Factors That May Affect the Gut Microbiome on Childhood Obesity in a Rural Community

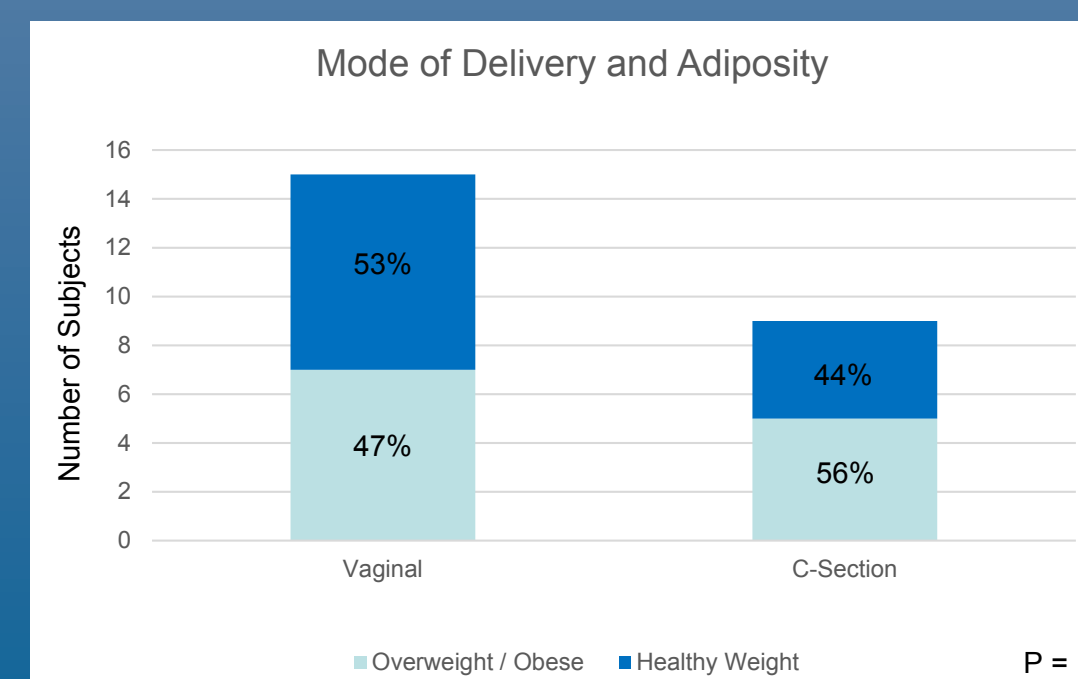
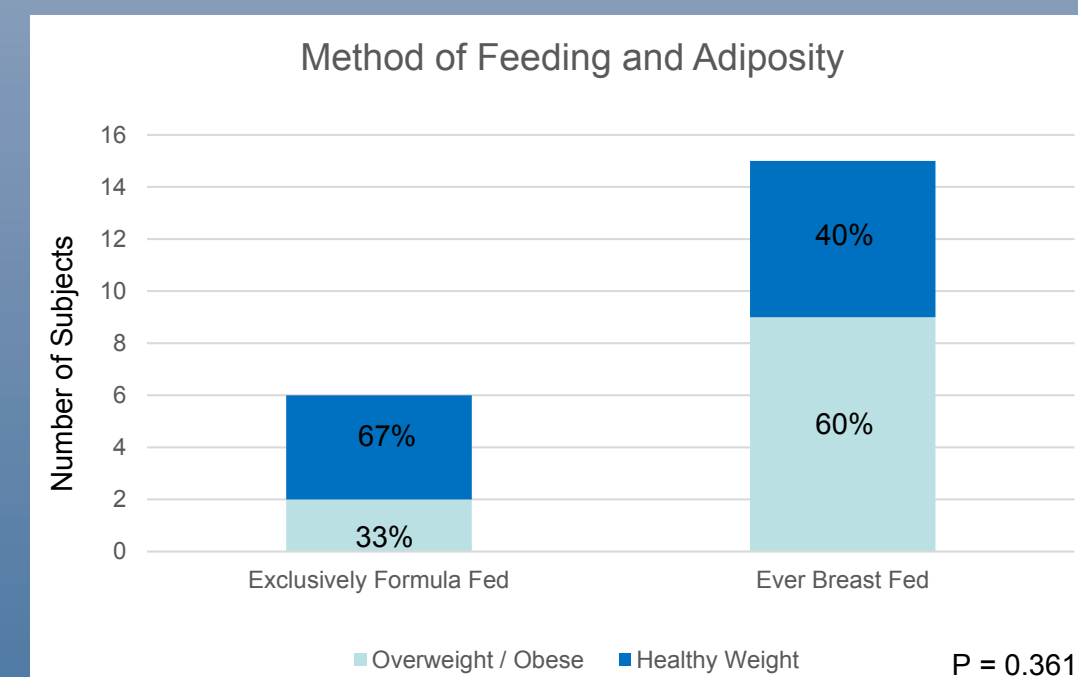
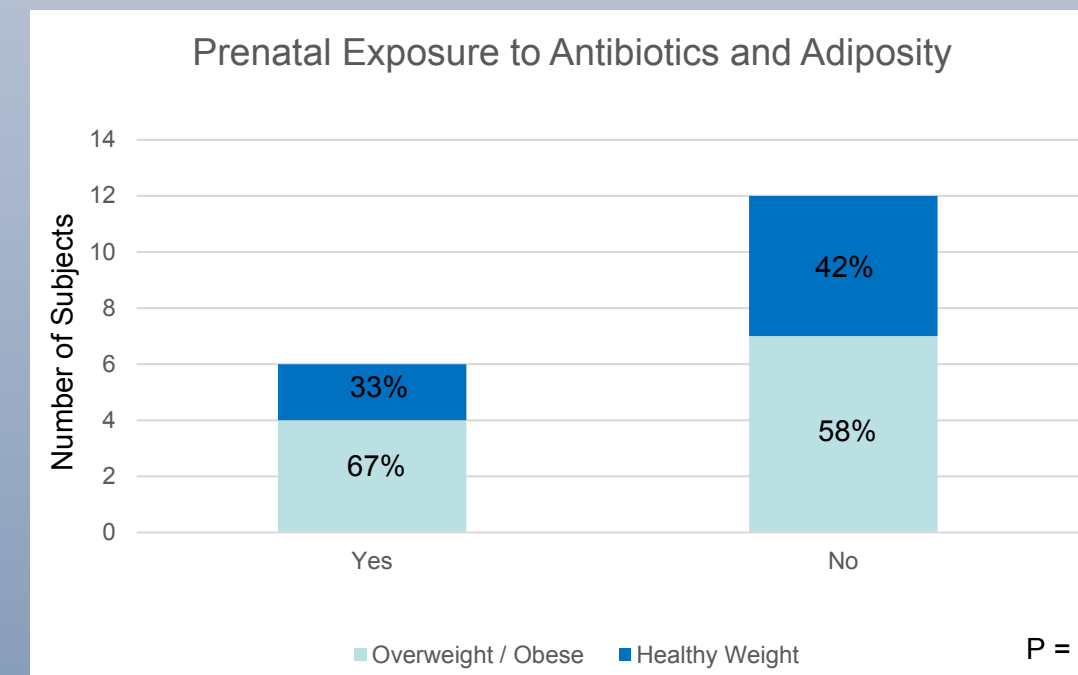
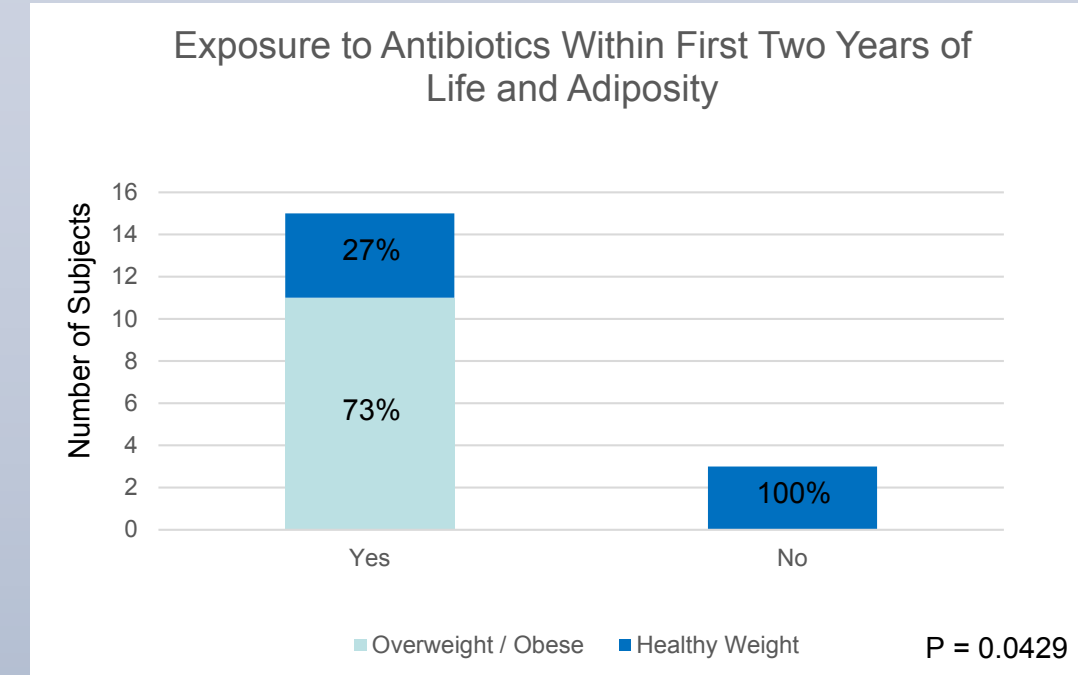
Brian Barnacle, M3; Huaping Wang, PhD; Craig Griebel, MD  
 Rural Student Physician Program  
 University of Illinois College of Medicine at Peoria

## Introduction/Background

There is a growing body of evidence that alterations in the gut microbiome may contribute to obesity.<sup>1</sup> Several studies have found correlations between factors that could potentially disrupt the gut microbiome and childhood obesity.<sup>2,3,4,5</sup> Our study examined whether these correlations could be found in rural populations. We hypothesized that exposure to antibiotics in utero, exposure to antibiotics during the early years of life, delivery by cesarean section, and exclusive formula feeding were independently associated with a higher risk of childhood obesity. Furthermore, we hypothesized that probiotic consumption was associated with a lower risk of childhood obesity.

## Methods

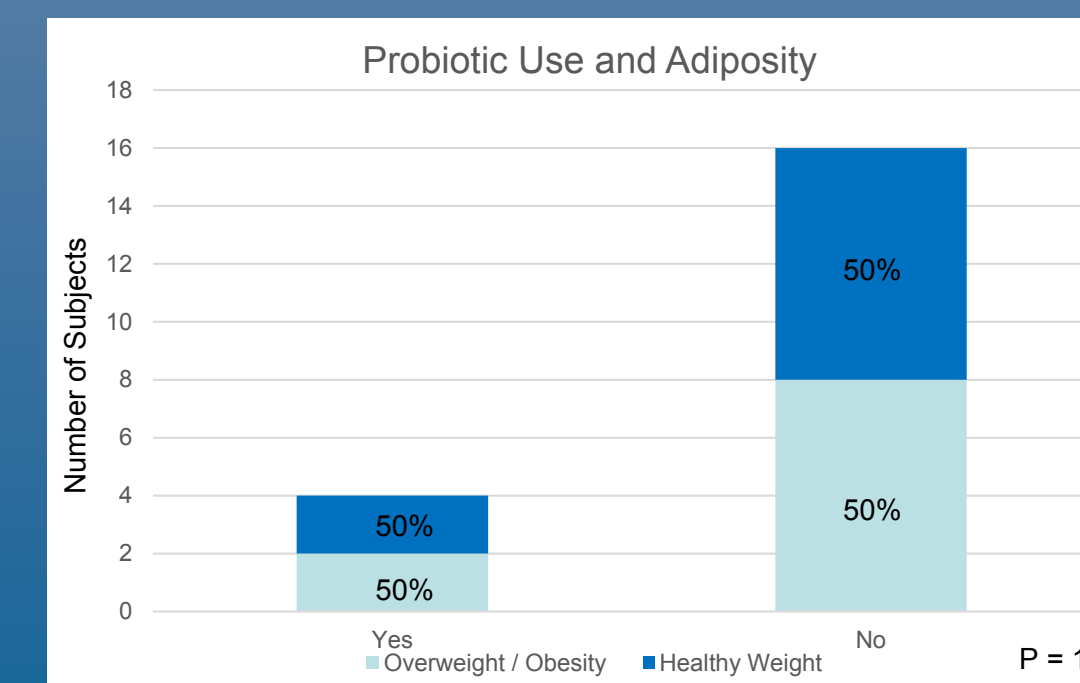
We offered an anonymous survey to parents/guardians checking their children in for appointments at the OSF Galesburg Clinic and the OSF Galesburg Medical Group. Data was collected between February 23, 2018 and March 9, 2018. Children age 2-13 were included in the study. Parents/guardians were surveyed about their child's gender, age, height, and weight in order to calculate BMI-age-for-percentile. We defined a healthy weight to be between the 5th and 85th percentile and overweight/obese to be greater than the 85th percentile. Parents/guardians were asked to provide their child's racial/ethnic background and their zip code to ensure that the sample was representative and only included subjects living in a rural location. We also surveyed parents/guardians about their child's risk factors relating to possible alterations to the gut microbiome. Fischer's exact test was used to determine if there were statistically significant associations between overweight/obesity and the risk factors.



## Results

We collected data from 24 volunteers. Ages of the children ranged from 2 to 13 years, with a median age of 6, a mean age of 6.29, and standard deviation of 3.36. 10 (41.67%) of the children were female and 14 (58.33%) were male. 1 (4.17%) of the children was African American, 17 (70.83%) were white, and 6 (25%) identified with two or more racial/ethnic groups. 12 (50%) children were determined to have a healthy weight, 5 (20.83%) were overweight, and 7 (29.17) were obese. All of the participants reported living in zip codes associated with rural towns in Illinois.

We found a statistically significant association between early childhood exposure to antibiotics and adiposity (P = 0.0429). 18 volunteers recalled whether or not their children received antibiotics during the first two years of life. 15 children received antibiotics and 3 children did not receive antibiotics. Of the children that received antibiotics, 11 (73.33%) were overweight or obese and 4 (26.67%) were a healthy weight. All 3 children who did not receive antibiotics were a healthy weight. We found no statistically significant associations between prenatal antibiotic use and adiposity (P = 1), between exclusive formula feeding and adiposity (P = 0.3615), between cesarean section delivery and adiposity (P = 1), and between probiotic consumption and adiposity (P = 1).



## Conclusions

This study found that the association between early life antibiotic exposure and adiposity also exists in rural populations. Early life exposure to antibiotics may alter the gut microbiome in ways that increase the risk of childhood overweight and obesity.<sup>2</sup> The association between early life exposure to antibiotics and obesity can help providers to identify children at risk of overweight and obesity later in life. Further research is needed to identify the pathophysiology of this association and to develop strategies to counteract this risk factor.

## References

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