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# Vast difference of obesity in American children compared to children worldwide

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# Vast Difference of Obesity in American Children Compared to Children Worldwide

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## Abstract

According to the Centers for Disease Control and Prevention in the last 30 years, obesity has more than doubled in children and quadrupled in adolescents. Since 1980 the percentage of children aged 6-11 years in the United States who were obese increased from 7% in 1980 to 18% in 2012. The purpose of the research was to collate, analyze, and compare body mass index (BMI)-for-age percentile results of children participating in a summer nutrition research program in Arkadelphia, AR, with the BMI-for-age percentiles of children in Arkansas, the United States and worldwide. The BMI-for-age percentiles for each participant in the program during the eight years of the study were compiled by age, gender and ethnicity into one document. Some participants repeated the program multiple years, and their BMI-for-age percentile changes were tracked from year to year. A total of 408 students (189 males and 219 females) ages 3-14 were studied from 2007-2014. Within those gender groups were three ethnicities: Caucasian (220), African American (178), and Hispanic (6), as well as four without ethnicity listed. Summer research BMI-for-age percentile weight status category results were 1% underweight, 62% healthy weight and 37% overweight/obese. Results are similar for Arkansas (2% underweight, 59% healthy weight, and 39% overweight/obese) and the United States (4% underweight, 64% healthy weight, and 32% overweight/obese). The numbers vary with worldwide statistics of 15% underweight, 65% healthy weight, and 20% overweight/obese. Results of the children who participated more than one summer in the eight summer research program were: 128 students who had been evaluated returned to the summer program for two (96), three (29), or four years (3). The results showed that 99 participants' weights remained the same, 14 gained weight, 11 lost weight, and 4 fluctuated between weight loss and weight gain.

## Introduction

Obesity in childhood has become a worldwide health crisis. The global prevalence of overweight and obesity has increased significantly since 1990 with a total of 43 million overweight or obese children.<sup>1</sup> In the United States since 1985, childhood obesity has more than doubled in children and quadrupled in adolescents. Approximately, 12.7 million (17%) of children and adolescents aged 2-19 years are affected by obesity in childhood.<sup>2</sup> According to the Arkansas Center for Health Improvement, the 2013 data for school age children in Arkansas listed more males (23%) than females (20%) obese and a higher percentage of females (18%) than males (17%) overweight. The percentage of underweight students was similar for both genders (2%, respectively). A comparison of overweight and obesity by ethnicity in Arkansas found that Hispanic students had the highest rates at 49%, African American students at 42%, Native American students at 40%, Caucasian students at 36% and Asian students at 32%.<sup>3</sup> The research study compared overweight/obesity data collected from students participating in an eight year summer nutrition research program in Arkadelphia with Arkansas, United States and worldwide statistics.

## Methods

Each summer from 2007-2014, children participating in a nutrition research program have had their height measured and have been weighed, a BMI has been calculated, and a BMI-for-age percentile determined using the National Centers for Health Statistics growth charts. Based upon the percentile, a weight status category has been assigned. The Centers for Disease Control and Prevention list the weight status category as follows: underweight is less than the 5<sup>th</sup> percentile, healthy weight is the 5<sup>th</sup> percentile to less than the 85<sup>th</sup> percentile, overweight is the 85<sup>th</sup> percentile to less than the 95<sup>th</sup> percentile and obese is equal to or greater than the 95<sup>th</sup> percentile.

Data were entered into an Excel spreadsheet and analyzed to calculate total number of participants for all summers as well as a breakdown of percentages by gender, ethnicity, and weight status category. Statistical analysis was performed using SPSS Statistics (version 21.0, 2012, IBM Corporation). Analysis of variance between ethnicity and weight status category and gender and weight status category were performed.

Longitudinal data were entered into an Excel spreadsheet and calculated to find the changes in weight status category by the number of years participants attended. Data were further analyzed to determine weight change based upon gender and ethnicity in the program.

## Results

Data from the 408 participants (189 males and 219 females) ages 3-14 were collected. Within the gender groups, there were 220 Caucasians, 178 African Americans, 6 Hispanic and 4 other. Weight status category results were 1% underweight, 62% healthy weight, and 18% overweight and 19% obese. There was a statistically significant effect of the ethnicity on weight status category  $F(3,414) = 2.96, p = 0.03$ . There was not a statistically significant effect of gender on weight status category  $F(3,414) = 1.86, p = 0.14$ .

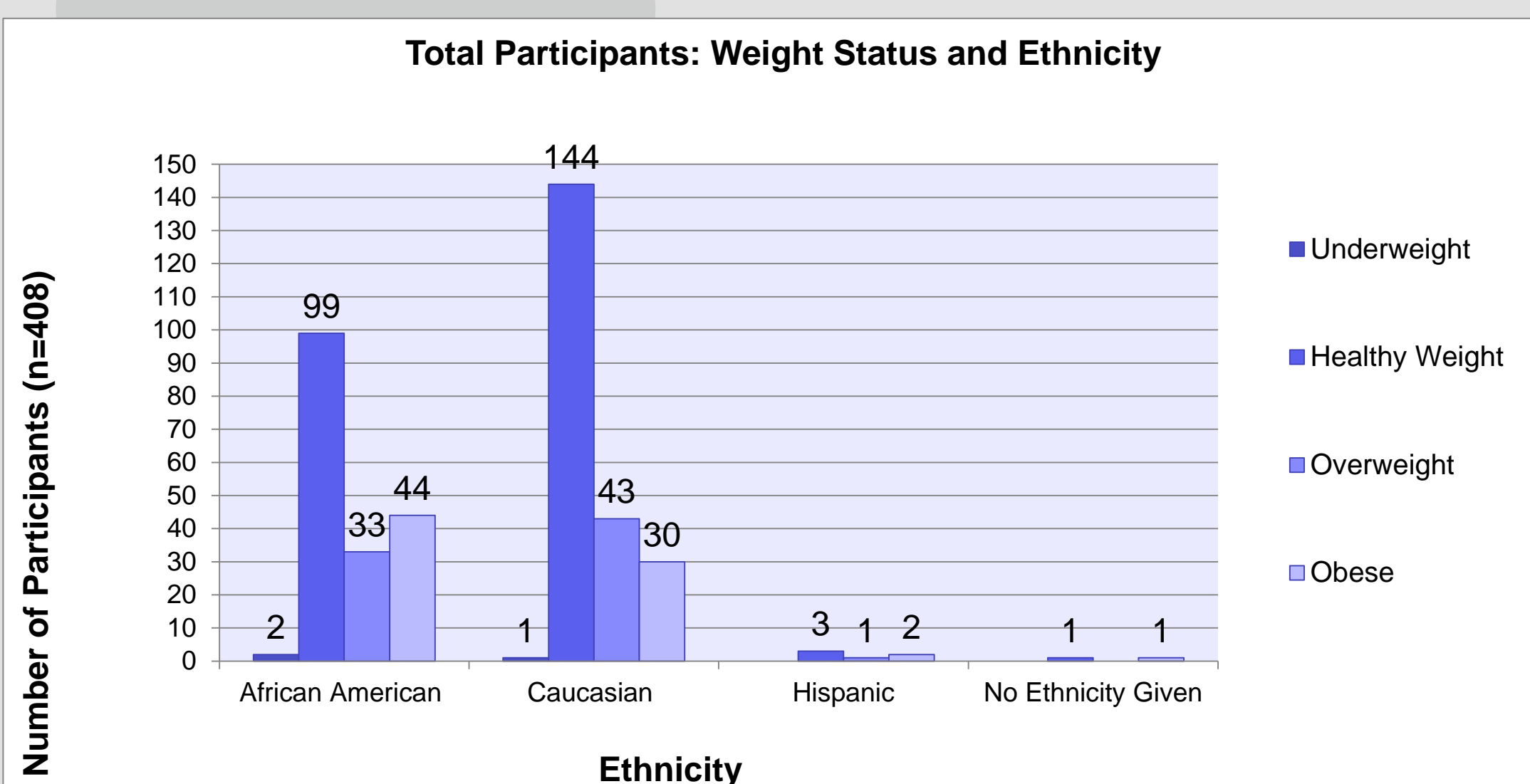


Figure 1. Total participants comparing weight and ethnicity



Figure 2. Comparison of weight status between African American and Caucasian

## Results

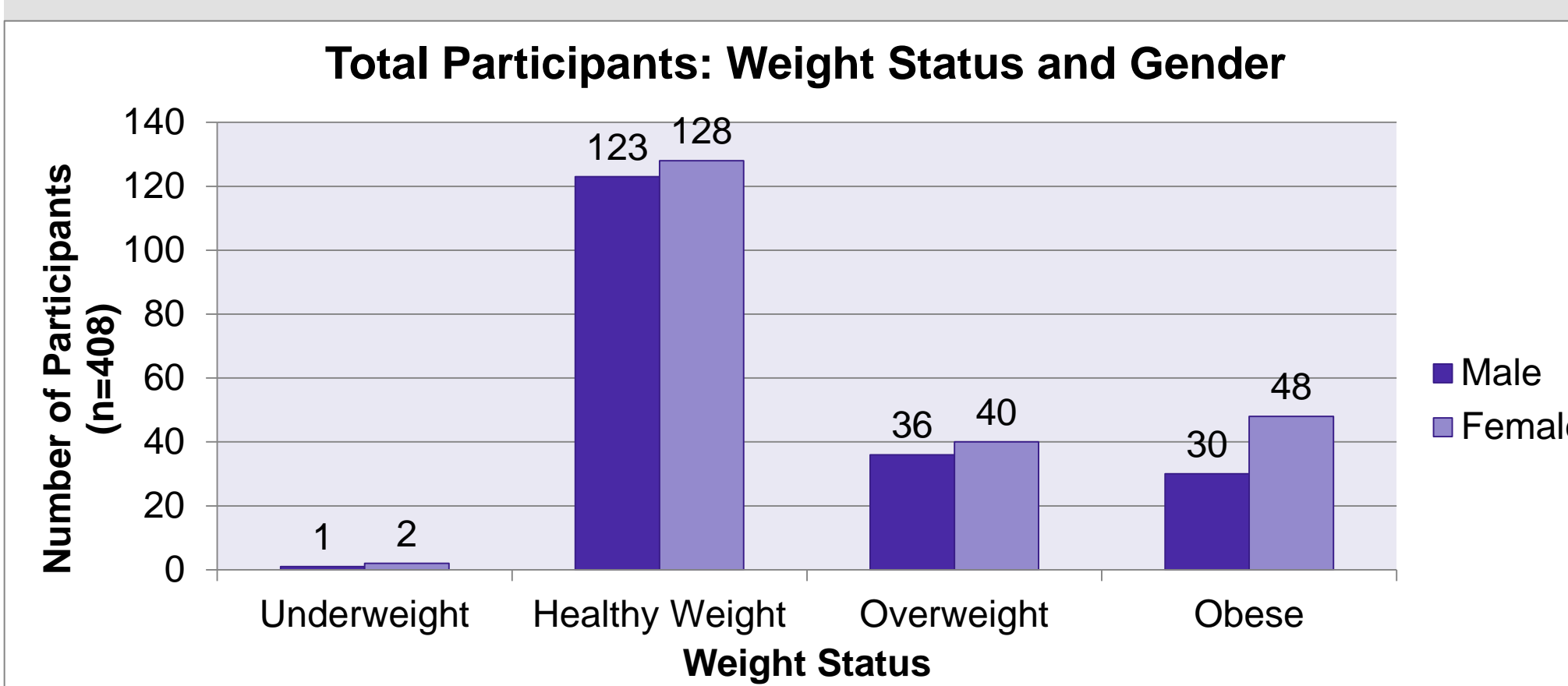


Figure 3. Total participants comparing weight and gender

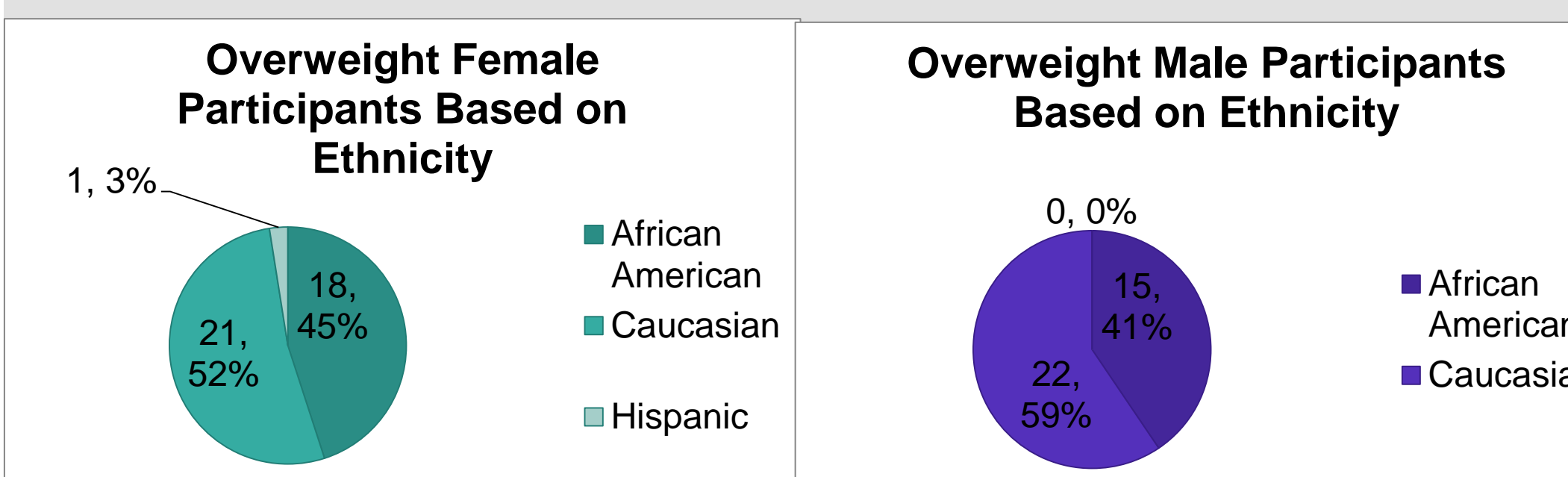


Figure 4. Percentage of overweight females by ethnicity

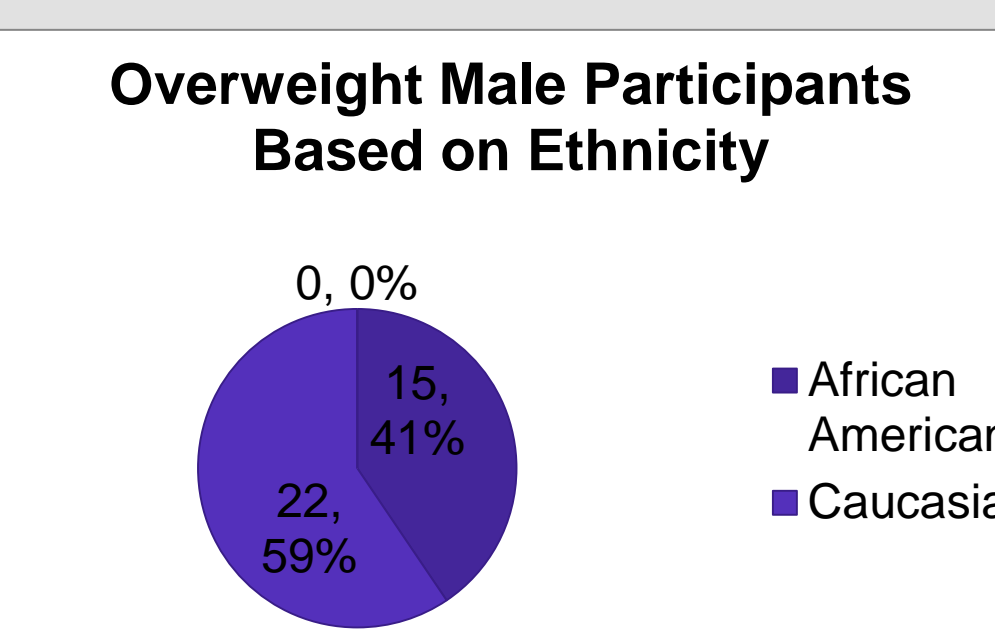


Figure 5. Percentage of overweight males by ethnicity

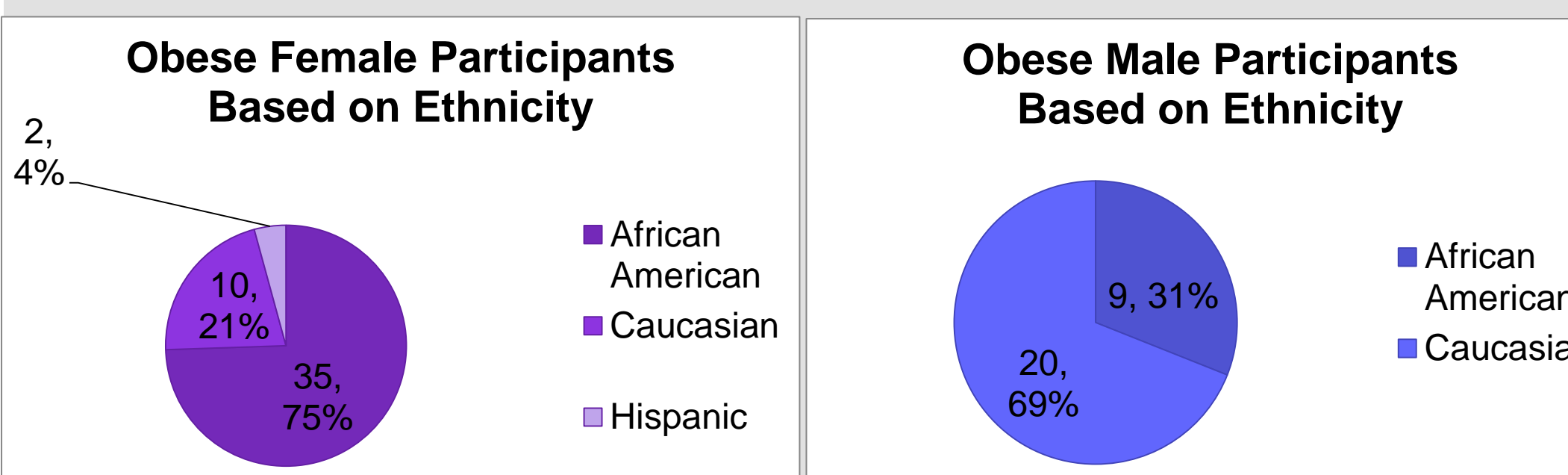


Figure 6. Percentage of obese females by ethnicity

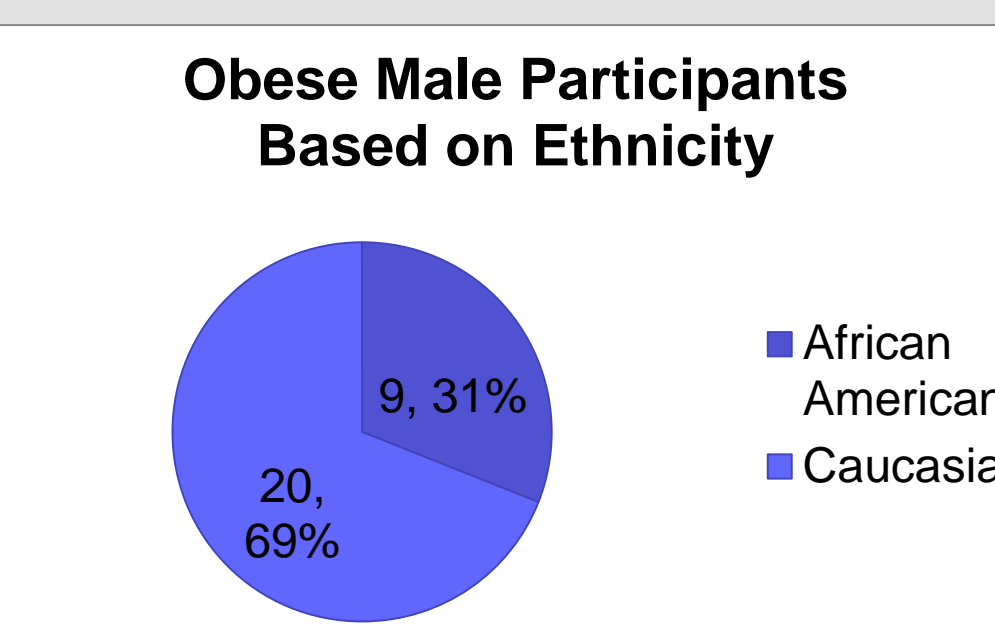


Figure 7. Percentage of obese males by ethnicity

## Results: Repeated Summers

Longitudinal data were collected for children continuing in the program for multiple summers. A total of 128 students (74 female and 54 male) of the 408 participants were tracked for two years (96), three years (29) and four years (3). Of the 128, there were 71 Caucasians, 56 African Americans and 1 Hispanic. The results showed that 99 participants' weights remained the same, 14 gained weight, 11 lost weight, and 4 fluctuated between weight loss and weight gain.

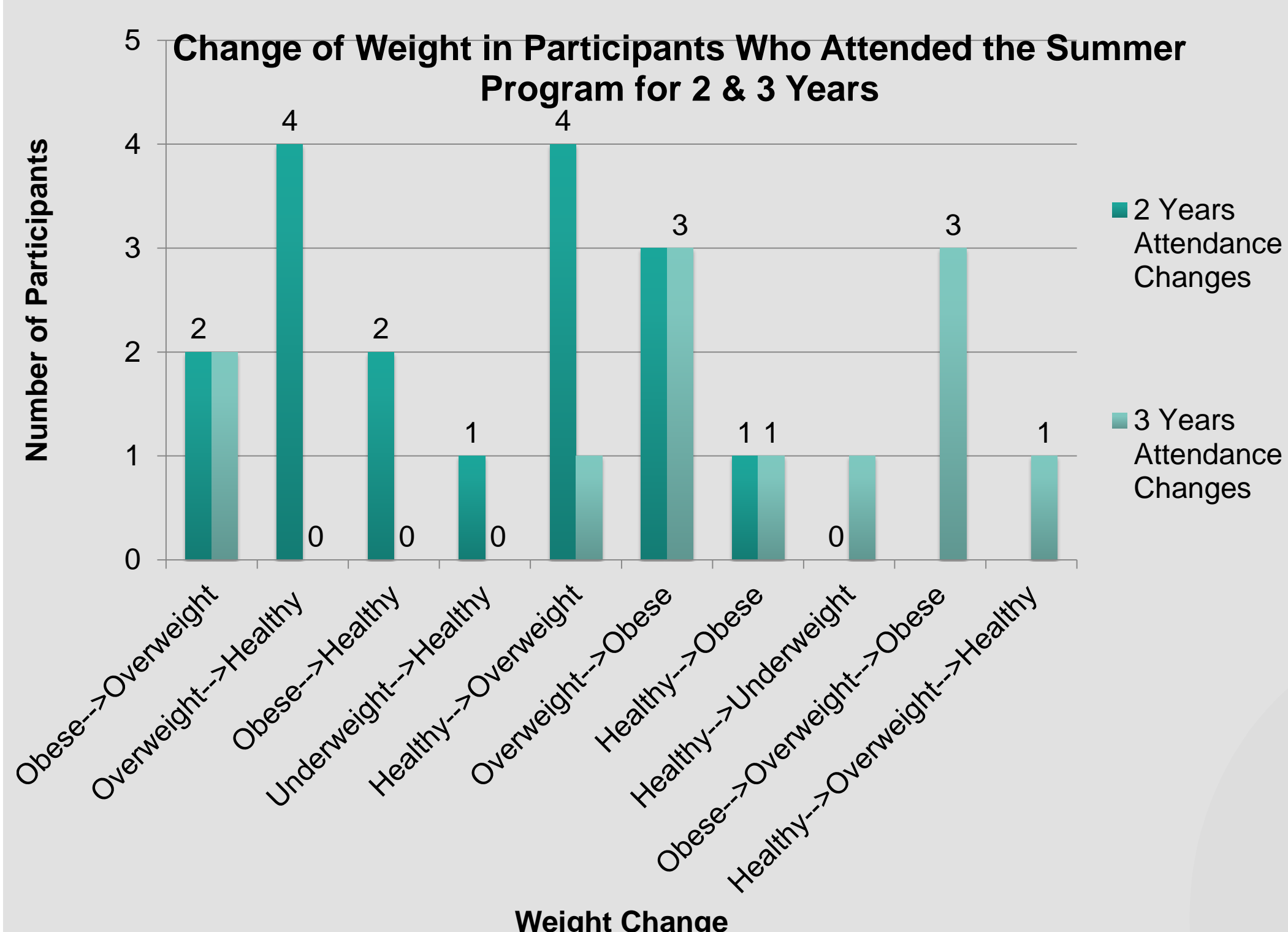


Figure 8. Comparison of weight status categories for repeating participants based upon gender, ethnicity and years attended

## Results: Repeated Summers

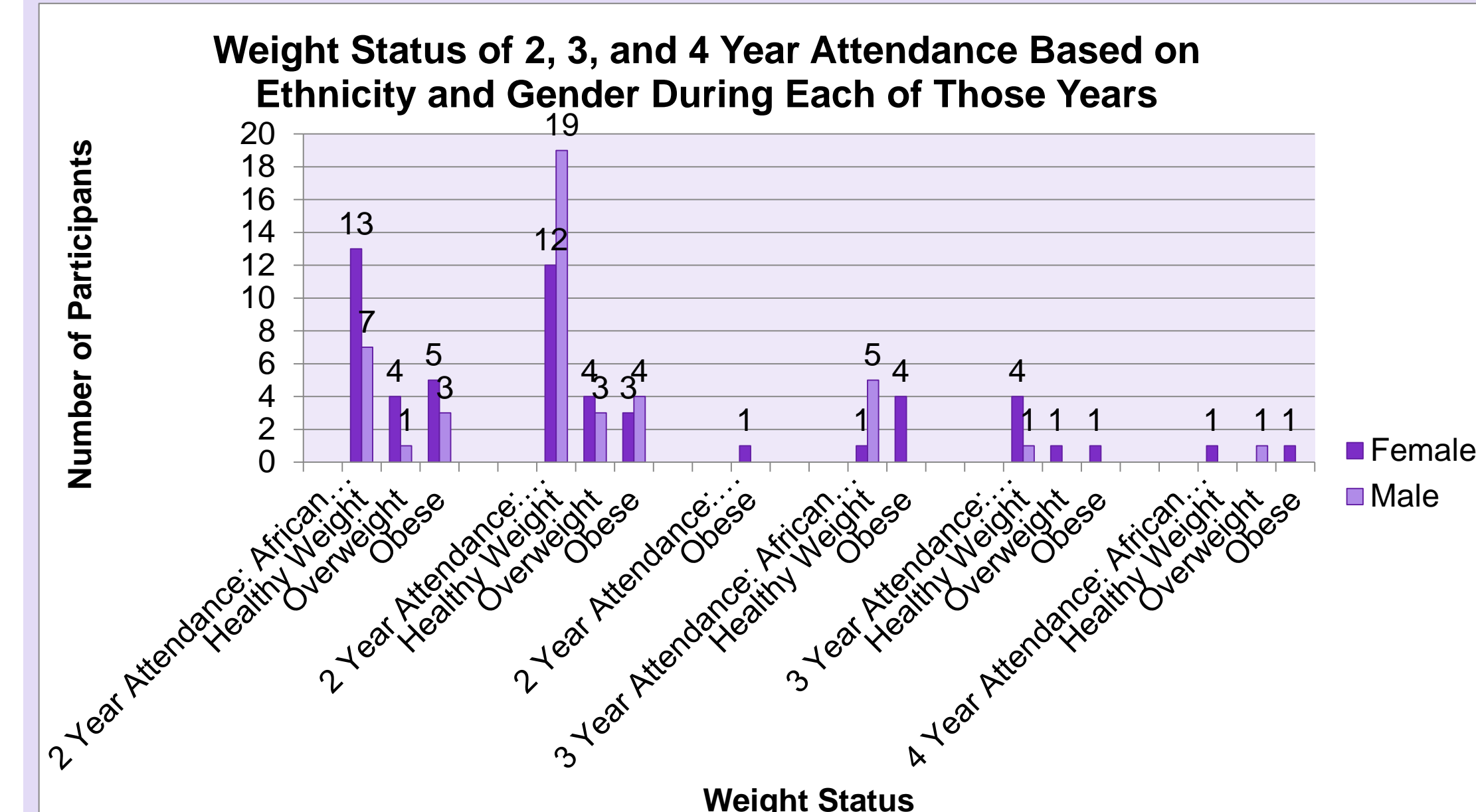


Figure 9. Comparison of weight status categories for repeating participants based upon gender, ethnicity and years attended

## Comparison of Weight Status

Location	Underweight	Healthy Weight	Overweight	Obese
Summer Research	1%	62%	18%	19%
Arkadelphia, AR Perritt Primary (Pre-K-1 <sup>st</sup> )	4.27%	67.07%	17.07%	11.59%
Arkadelphia, AR Central Primary (2 <sup>nd</sup> -3 <sup>rd</sup> )	0.78%	65.63%	16.41%	17.19%
Arkadelphia, AR Peake Elementary (4 <sup>th</sup> -5 <sup>th</sup> )	2.13%	58.16%	21.28%	18.44%
Goza Middle School (6 <sup>th</sup> -8 <sup>th</sup> )	1.80%	50.90%	16.67%	30.63%
Arkansas	2.10%	59.10%	17.30%	21.50%
United States	3.60%	64.60%	14.90%	16.90%
Worldwide	15%	64.90%	14.90%	5.20%

Table 1. Statistics of children's weight status categories in Summer Research, Arkadelphia, Arkansas, U.S., and globally

## Conclusion

Data collected during summer research compared to Arkadelphia Schools, Arkansas, the United States, and the world show varying percentages in each weight category. The results differ, as is evident in the percentages of obese children in the research study (19%), Arkansas (22%), the United States (17%), and the world (5%). Although there is a lower percentage of obese children in the world, the World Health Organization findings report that this number is increasing.<sup>1</sup>

## References

- Wang Y, Lim H. The global childhood obesity epidemic and the association between socio-economic status and childhood obesity. *International Review of Psychiatry* [online]. June 2012; 24(3):176-188.
- Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association* 2014; 311(8):806-814.
- ACHI: Arkansas Center for Health Improvement. Assessment of childhood and adolescent obesity in Arkansas: year eleven. Little Rock, AR: ACHI; October 2014.

## Acknowledgements

Dr. J.D. Patterson Summer Research Grant



# Amazefest Summer 2015: Nutrition Education and Body Mass Index (BMI) Assessment

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## Abstract

Within the last three decades, the prevalence of obesity in childhood has more than doubled in the United States. Approximately 12.7 million (17%) of children aged 2-19 years are affected by obesity in childhood. This research study was launched in an effort to lessen this country's overwhelming obesity problem by educating children and teens in Arkadelphia, Arkansas about the importance of eating healthy food and living an active lifestyle. The researchers visited five local summer programs during a seven-week period to determine the weight status of typical Arkadelphia children with ages ranging from three to twelve years old. Three programs served as the treatment group and received weekly education sessions covering topics in nutrition and physical activity. Two groups served as the control group and did not participate in the weekly lessons. At the beginning and end of the seven weeks, the children in both the treatment and control groups were weighed and measured and the pre- and post data was compared. Pre- and post assessment body mass index (BMI) were calculated and results collected in a database under the categories of underweight, healthy weight, overweight, and obese. Data was collected from 141 children. Newsletters containing a summary of the day's lesson and practical ways to improve lifestyle were sent home with the children in hopes that caregivers would continue the child's nutrition and physical activity education at home. Prevention is the main goal of this research, as studies have shown that educating students on the importance of nutrition and physical activity prevents weight gain and thus weight gain related health problems. This particular study was conducted to estimate the effectiveness and value of seven weeks of practical nutrition and physical activity-specific education and its role in the prevention of childhood obesity.

## Introduction

Over the past 30 years, obesity in children has more than doubled in the United States. Problems arise when the caregiver is not aware of the weight status of their child: the child may be at a healthy weight but seen as underweight, or overweight but seen at a healthy weight which leads to the caregiver overfeeding the child.<sup>1</sup> This emphasizes the importance of a positive environment and child-caregiver relationship during childhood. Instilling healthy eating habits allows for optimal growth and development, preventing overweight/obesity and illnesses in the future.<sup>1</sup> Though teaching children practical nutrition information is important, educating the caregiver has shown to be vital to the prevention of childhood obesity.<sup>2</sup> One study reports that after an 8-week nutrition education program, significant improvement of 1-2 points on a 5-point scale occurred in areas such as television watching, eating with the family, and fruit and vegetable consumption for both the child and the caregiver. More than 50% of the participants reported that fast food consumption decreased by the end of the study.<sup>2</sup> Educating both the caregiver and child has proven to be the best way to ensure proper growth and development in childhood.

## Acknowledgements

Dr. J.D. Patterson Summer Research Grant

## Methods

Amazefest Summer was conducted in cooperation with Peake Rosenwald, Fun Time, Perritt Primary, Boys & Girls Club, and Arkadelphia Kids Club summer programs. One hundred and forty-one children were enrolled in the program. The treatment group had 86 children and the control group had 55 children. The program impacted as many as 58 children per day. Children between the ages of 3-12 years participated in the study. The control group consisted only of pre- and post-assessment of body mass index (BMI)-for age percentile calculations. The treatment group had BMI-for-age percentile assessments made prior to the first lesson. The treatment group was taught a lesson focused on various aspects of nutrition and physical activity each week resulting in seven lessons total. Each of the seven sessions consisted of teaching nutrition and exercise-themed lessons while incorporating arts and crafts, demonstrations, group discussions, educational games, physical activity, reviewing concepts from previous lessons, and sharpening critical thinking and problem solving skills. The lessons consisted of the following topics:

- Lesson 1: Incorporating all five food groups within each meal
- Lesson 2: Limiting sugar and soft drinks; discussed diabetes and obesity
- Lesson 3: Learning to read and compare nutrition facts labels to help make healthy food choices
- Lesson 4: Staying hydrated by drinking water throughout the day; water content in foods
- Lesson 5: Making sports and physical activity a daily priority; the necessity of getting adequate sleep; decreasing the amount of time spent in sedentary activities
- Lesson 6: Practical ways to make healthy lifestyle changes; healthier fast food options; choosing foods low in fat and sugar
- Lesson 7: Eating breakfast every day; using food models to simulate the creation of healthy meals

After the last lesson, post-assessment BMI-for-age percentile calculations were made. All data was entered into Excel and SPSS to be analyzed. Comparisons were made between the pre- and post-assessments for the control group and the treatment group as well as comparisons between groups.

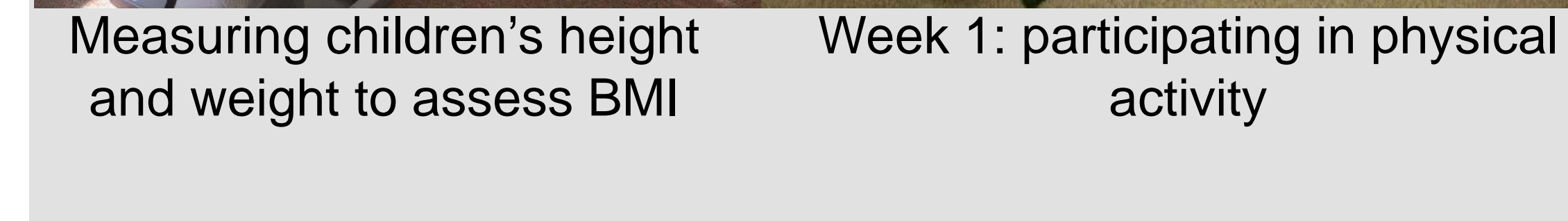


Lesson 7: using food models to include all five food groups in healthy meal simulations

During lesson 5, we learned about the importance of physical activity and created our very own Olympic medals!



Measuring children's height and weight to assess BMI



Week 1: participating in physical activity



Learning how to make healthy choices at fast food restaurants and how to choose foods low in fat and sugar

## Results

In the control group there were 25 children (10 male and 15 females). Eight were Caucasian, sixteen were African American and one was Indian. Seventeen were present for pre-assessments and post-assessments.

Analysis of the control data (n=17) revealed a mean pre-assessment BMI of 16.4± 1.5 and a post-assessment BMI of 16.5±1.4. A paired sample t-test showed there was no statistical significance between the pre-BMI and the post-BMI with a p=0.12.

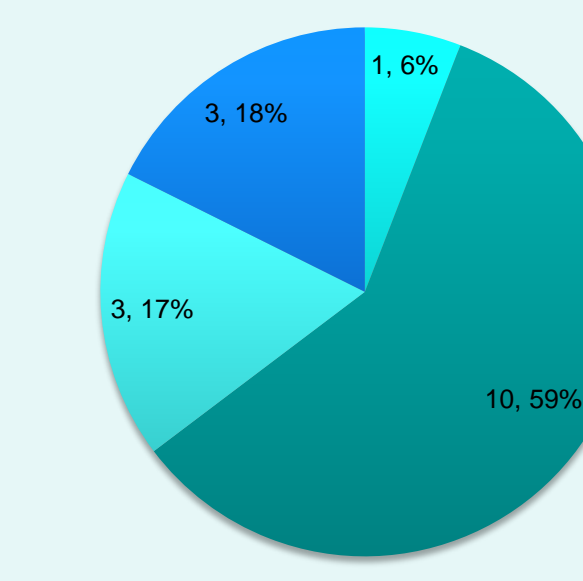
BMI-for-age-percentiles weight status categories for the pre-assessment (n=17) were: underweight- 5%, healthy weight- 59%, overweight- 18%, and obese- 18%. Post-assessment of the BMI-for-age-percentiles weight status categories for the control group saw slight changes: underweight- 5%, healthy weight- 47%, overweight- 30%, and obese- 18%. Two children moved from having a healthy weight at the beginning of the summer research program to being in the overweight category at the end of the program.

There were 61 children (39 males and 22 females) in the treatment group. Thirty were Caucasian and 31 were African American.

## Results

BMI-for-age-percentiles weight status categories for the treatment group's pre-assessment (n=29) were: underweight- 0%, healthy weight- 48%, overweight- 21%, and obese- 31%. Post-assessment of the BMI-for-age percentiles weight status categories for the treatment group saw slight changes: underweight- 0%, healthy weight- 45%, overweight- 24%, and obese- 31%. One child moved from the healthy weight to overweight, one child moved from obese to overweight and one child moved from overweight to obese. The remainder of the children remained in the same weight status category.

Control: Pre-Assessment Weight Status Categories



Control: Post-Assessment Weight Status Categories

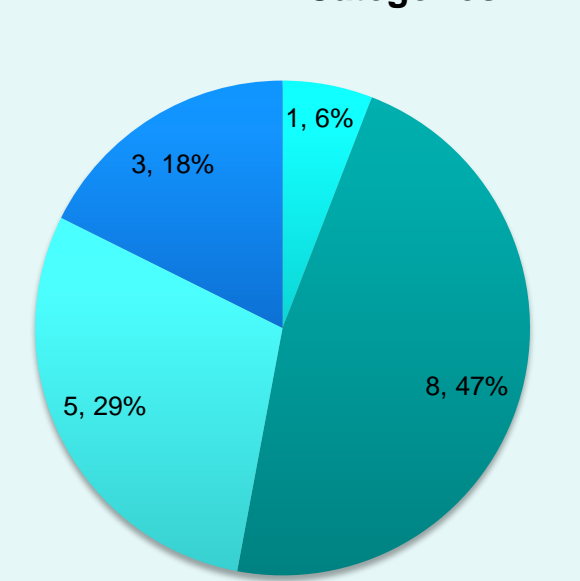
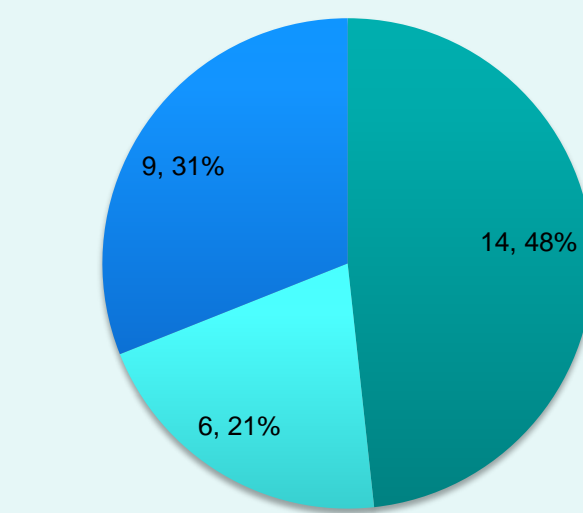


Figure 1: Comparison of pre-and post weight status categories within the control group

Treatment: Pre-Assessment Weight Status Categories



Treatment: Post-Assessment Weight Status Categories

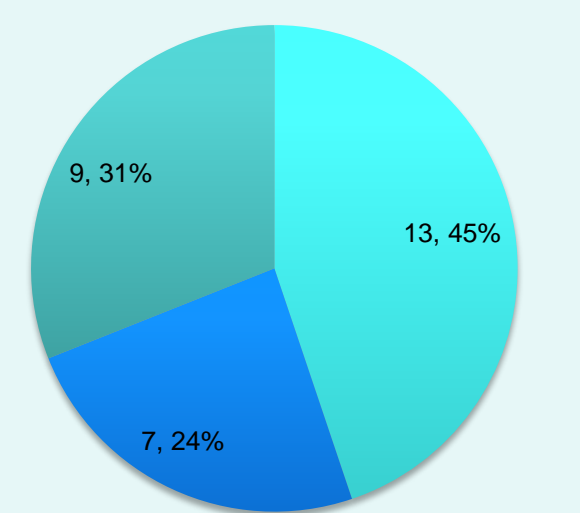


Figure 2: Comparison of pre-and post weight status categories within the treatment group

## Conclusion

The goal of the summer was to teach children in Arkadelphia, Arkansas about nutrition and physical activity to reduce the risk of obesity in childhood. The children were able to recall the information weeks after the lessons were taught and reported practical changes they made according to what they learned.

The majority of children in the control and treatment group remained in the same weight status category. Only two children in the control group and three children in the treatment group changed weight status category. There's a possibility that error could occur in measuring height and therefore, BMI calculations.

The summer nutrition research program succeeded in educating children on the importance of nutrition and exercise which has been shown to reduce the risk of obesity during childhood.

## References

- Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*. 2014; 806-814.
- Dickin K, Hill T, Dollahite J. Practice-based evidence of effectiveness in an integrated nutrition and parenting education intervention for low-income parents. *J Acad Nutr Diet*. 2014; 945-950.