Changes in BMI Scores for Healthy, At-Risk, and Overweight Children
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ABSTRACT
The prevalence of overweight and obesity in children has risen significantly in the last twenty years. Because of the risk factors associated with overweight and obesity, it has become a major concern for public health. A health and nutrition program was implemented in three at-risk elementary schools to improve health outcomes for first through fourth grade students. BMI data were collected from 531 students attending these three elementary schools in Northeast Oklahoma. In order to assess the percent of change in BMI scores, chi-square analyses were computed by gender and grade. Results were statistically significant for all grades. Findings indicate that some at-risk and overweight BMI scores improved while other BMI scores changed negatively from fall 2007 to fall 2008.

METHOD
TCCHD collected BMI scores from 531 students during fall 2007 and fall 2008. Participating students were enrolled in grades first through fourth. Each time BMI scores were collected, a TCCHD official recorded participants’ code, age, grade level, height, and weight. TCCHD officials then calculated and recorded BMI scores.

Because children’s height and weight change as they mature, childhood BMI scores were plotted onto the Center for Disease Control and Prevention’s (CDC) gender specific BMI-for-age Growth Charts to determine a percentile ranking. The percentile ranking represents the child’s BMI score among other children of the same age and gender. The BMI categories and the corresponding percentile are presented in Table 1 (Center for Disease Control and Prevention, 2007):

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Percentile Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Weight</td>
<td>5th percentile to less than the 85th percentile</td>
</tr>
<tr>
<td>At risk of Overweight</td>
<td>85th percentile to less than the 95th percentile</td>
</tr>
<tr>
<td>Overweight</td>
<td>Equal to or greater than the 95th percentile</td>
</tr>
</tbody>
</table>

The protocol for this study was approved by the university’s human subject review board.

RESULTS AND CONCLUSION
In order to assess the percent of change in BMI scores, chi-square analyses were computed by gender and grade. Results were statistically significant for all grades. See Figures 1-8 for a graphic depiction of study findings.

Specifically, of the male students who had overweight BMI scores in fall 2007, 7.7% of first graders [$\chi^2$ (56) = 29.684; $p < .001$], 10.5% of third graders [$\chi^2$ (88) = 94.585; $p < .001$], and 16.7% of fourth graders [$\chi^2$ (82) = 84.688; $p < .001$] improved their BMI scores in fall 2008. Changes were also observed with male students with at-risk BMI scores in fall 2007, including 30.0% of first graders [$\chi^2$ (56) = 29.684; $p < .001$] who improved their BMI scores in fall 2008. Of the male students who had healthy BMI scores in fall 2007, 18.2% of first graders [$\chi^2$ (56) = 29.684; $p < .001$], 21.2% of second graders [$\chi^2$ (51) = 55.088; $p < .001$], 8.5% of third graders [$\chi^2$ (88) = 94.585; $p < .001$], and 10.2% of fourth graders [$\chi^2$ (82) = 84.688; $p < .001$] had at-risk or overweight BMI scores in fall 2008.

In addition, of the female students who had overweight BMI scores in fall 2007, 7.7% of first graders [$\chi^2$ (72) = 60.966; $p < .001$], and 7.7% of fourth graders [$\chi^2$ (62) = 78.955; $p < .001$] improved their BMI scores in fall 2008. Changes were also observed with female students with at-risk BMI scores in fall 2007, including 9.1% of first graders [$\chi^2$ (72) = 60.966; $p < .001$], and 7.7% of third graders [$\chi^2$ (58) = 76.982; $p < .001$] who improved their BMI scores in fall 2008. Of the female students who had healthy BMI scores in fall 2007, 20.8% of first graders [$\chi^2$ (72) = 60.966; $p < .001$], 19.6% of second graders [$\chi^2$ (62) = 55.786; $p < .001$], 5.9% of third graders [$\chi^2$ (58) = 76.982; $p < .001$], and 10.5% of fourth graders [$\chi^2$ (62) = 78.955; $p < .001$] had at-risk or overweight BMI scores in fall 2008.

The findings indicate that some at-risk and overweight BMI scores improved while other BMI scores changed negatively from fall 2007 to fall 2008. Further research is needed to understand the reasons for changes in student BMI scores.

REFERENCES