The Impact of Food, Nutrition, and Health on Youth in Michigan: An Examination of Traverse City Area Public Schools

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Motivation

- **Obesity**
  - **Epidemic in US**
    - Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years
    - In 2012, 34% of adults and 17% of adolescents were obese in America
  - **Negative Health Effects**
  - **Costs**
  - **Interventions**
    - School-based nutrition education programs
    - From 2004 to 2010, the USDA spent between $225 and $379 million each year on the Supplemental Nutrition Assistance Program-Education (SNAP-Ed)

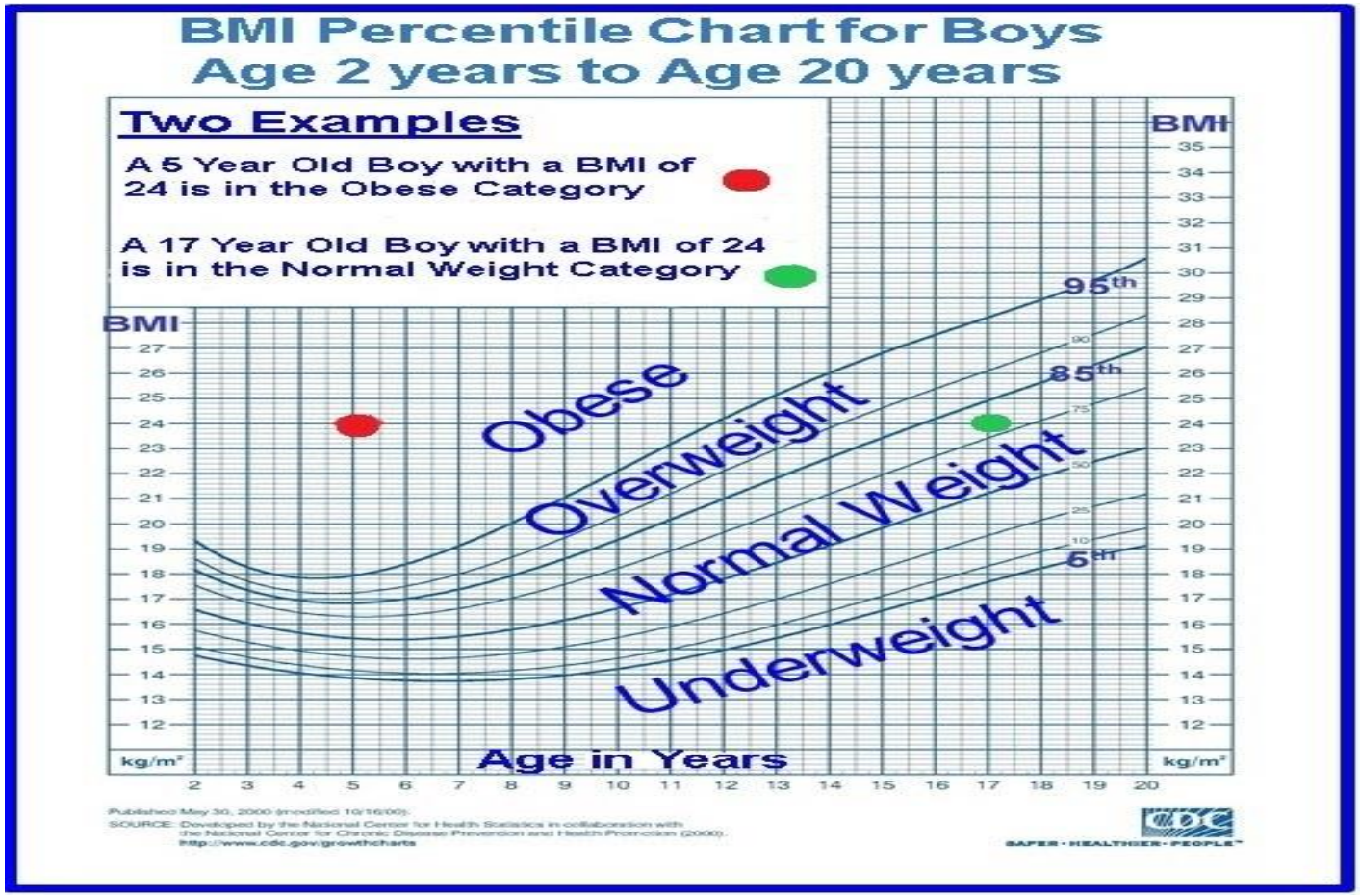
Study Design

- **Research Objective:** Determine the impact of a Nutrition Education Program on students' health related outcome (BMI percentile)
- Quasi-Experimental design
- Michigan Fitness Foundation (MFF)
  - Physical Education-Nutrition (PE-Nut) program
- Traverse City Area Public Schools (TCAPS)
  - PE-Nut first implemented in TCAPS in 2008
  - 8 total schools in the study (4 control and 4 treatment schools)
  - TCAPS collects anthropometric data (height and weight) of its students
- Uniqueness of Study: This study is the first thorough research based analysis of the PE-Nut program that considers a biometric outcome.

Data

- Yearly student level data was collected from TCAPS
- Unbalanced panel dataset that range from 2008 to 2012
- Students height and weight, demographic, and educational outcomes (i.e. test scores and attendance records) information is included in the dataset
- Students who were in kindergarten, 2nd, and 4th grade between 2008 and 2012 were included in this dataset

Data: BMI-percentile



Data

Table 4 : Descriptive Statistics by BMI-based weight categories

VARIABLE	Count Mean					
	Normal Weight			Overweight/Obese		
Dichotomous	Treatment Schools	Control Schools	Mean difference (S.D.)	Treatment Schools	Control Schools	Mean difference (S.D.)
Female	789	775	-0.01	308	229	0.034
	.467	.477	(.017)	.52	.486	(.031)
White	1,513	1,498	-0.027***	497	413	-0.037*
	.895	.922	(.010)	.839	.877	(.022)
Running Record	1,003	1,024	-0.021	350	283	-0.011
Score	.741	.763	(.016)	.714	.725	(.031)
Continuous				**Mean (S.D.)**		
#BMI Percentile$_{08}$	52.84	50.88	1.95	94.92	91.07	3.84***
	(.943)	(.934)	(1.34)	(.233)	(.900)	(.865)
#BMI Percentile$_{09}$	53.93	50.88	3.05**	93.91	91.07	2.83***
	(.816)	(.934)	(1.23)	(.433)	(.900)	(.902)
#BMI Percentile$_{10}$	53.88	50.88	2.99**	93.08	91.07	2.01**
	(.854)	(.934)	(1.26)	(.464)	(.900)	(.930)
#BMI Percentile$_{11}$	53.49	50.88	2.61**	92.20	91.07	1.13
	(.925)	(.934)	(1.31)	(.697)	(.900)	(1.12)
#BMI Percentile$_{12}$	55.30	50.88	4.41***	92.02	91.07	.954
	(.915)	(.934)	(1.31)	(.733)	(.900)	(1.15)

* Implies significance at the 0.10, ** at the 0.05 level and *** at the 0.01 level

#All BMI Percentile of the Treatment group are compared to the 2012 control group BMI percentile values

Empirical Framework

- Unobserved effects model (UEM)
- Pooled OLS (POLS) and Student Fixed Effects (FE) will be used to estimate the UEM
- Overweight and Obese BMI-based weight categories were combined

$$BMIP_{it} = \alpha + \delta_1 PeNut_{it} + Z_{it}\Pi + T_t\Lambda + c_i + \varepsilon_{it},$$

$$t = 1, \ldots, 5$$

Where,

Z_{it} = Other explanatory variables

T_t = time dummy variables

c_i = unobserved effect

ε_{it} = error term

Results

Table 5: Pooled OLS Regressions of PE-Nut effect on students BMI Percentile by weight categories

	Estimated β (S.E.)	
	Normal Weight N = 7188	**Overweight & Obese N = 2231**
PE-Nut	1.49**	0.760**
	(.723)	(.406)
Age	0.002	-0.04
	(.248)	(.122)
Female	-2.93***	-1.76***
	(.937)	(.529)
White	-3.69**	-2.47***
	(1.69)	(.573)
Running Record	-0.20	-0.61
Score	(.943)	(.521)
F	3.71	6.91
Prob > F	0.0001	0.0000
R^2	0.0064	.0342

* Implies significance at the 0.10, ** at the 0.05 level and *** at the 0.01 level
Robust standard errors reported above
Year Dummies included in regressions

Results

Table 6: Fixed Effects Results of PE-Nut effect on students BMI Percentile by weight categories

	Estimated β (S.E.)	
	Normal Weight N = 7188	**Overweight & Obese N = 1494**
PE-Nut	-0.204	0.970**
	(.490)	(.425)
Age	0.749***	-1.53***
	(.251)	(.303)
Running Record Score	0.727	.770**
	(.746)	(.385)
F	4.31	8.14
Prob > F	0.0002	.0000

* Implies significance at the 0.10, ** at the 0.05 level and *** at the 0.01 level
Robust standard errors reported above
Year Dummies included in regressions

Conclusion

- PE-Nut had no effect on the normal weight students' BMI percentile

- Overweight/obese weight group students' experienced a small increase in their BMI percentile compared to students who did not participate in PE-Nut.

- These result are similar to studies that did not find any changes to the treatment groups BMI percentile (Donnelly et al. (2009), Martínez Vizcaíno et al. (2007) and Gentile et al. (2009))

Implications

- What does this mean for government funded school-based nutrition education programs?

- What are the implications for firms trying to impact the health outcomes of adolescents?

Questions

Thank you for attending my presentation!

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