

Correlates of State Legislative Action to Prevent Childhood Obesity

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Objective: To determine the factors associated with state legislative action to address childhood obesity.

Methods and Procedures: This paper has an ecologic study design, with data on each US state from 2003 to 2006. Data on whether a bill was introduced in the state legislature and whether a law was enacted to address childhood obesity were linked to a rich set of independent variables concerning state political and socioeconomic characteristics that were drawn from a variety of sources. The association between state legislative action and state political and socioeconomic characteristics was measured using probit regression.

Results: From 2003 to 2005 there was an increasing trend toward the introduction of bills and enactment of laws to address childhood obesity. State legislative action on childhood obesity was more likely in states with a greater gap between adults' actual and desired weight, a higher percentage of college-educated adults, a higher percentage of African-American residents, a Democratic governor, or a legislature not controlled by Republicans.

Discussion: The socioeconomic conditions of the state and its political climate strongly predict legislative action to address childhood obesity. The finding that Democratic governors and state legislatures not controlled by Republicans are associated with greater policy action against obesity suggests that the 2006 election may result in additional action against obesity in certain states. This study can also be used to guide the efforts of public health advocates, who can achieve greater success by targeting their efforts toward states with conducive political environments.

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INTRODUCTION

Over the past three decades the prevalence of overweight among American youth has risen dramatically (1–3). The Centers for Disease Control and Prevention define childhood overweight as a BMI above the 95th percentile for children of the same age and gender benchmarked against the historic BMI distribution (1). Since 1970, the fraction who are overweight has almost quadrupled among children aged 6–11 years and more than doubled among adolescents aged 12–19 years (2). As of 2003–2004, 17.1% of children aged 2–19 are clinically overweight, a figure more than three times greater than the *Healthy People 2010* goal of 5% (3–4).

This rise in youth obesity is troubling because of its impact on physical health, mental health, and medical care costs (5–7). In addition, obese youths are likely to become obese adults, creating additional medical and financial consequences (8).

Public health and medical organizations have responded by encouraging the passage of a wide variety of policies aimed at preventing or reducing obesity among youths; notable examples include the Institute of Medicine's 2005 report, *Preventing*

Childhood Obesity: Health in the Balance (9) and its 2007 follow-up, *Progress in Preventing Childhood Obesity: How do We Measure Up?* (10).

In response to the rise in youth obesity and the urging of public health officials, state legislatures have introduced bills and enacted laws regarding a variety of anti-obesity policies, such as revising physical education requirements and improving school nutrition standards (11,10). Such legislative action by states is considered critical to the prevention and reduction of childhood obesity (9–12). Both the 2005 and 2007 Institute of Medicine (IOM) reports urge additional state legislative action to prevent childhood obesity (9–10). Another indication of the importance assigned to the states' role in preventing childhood obesity is that one research group grades each state annually on the basis of its legislative action in addressing childhood obesity (13,10). In the group's 2007 report (which was based on state legislative action during 2006), 6 states received As, 21 received Bs, 14 got Cs, 6 received Ds and 3 states got failing grades for taking no action at all (13).

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Despite the important role of states in preventing childhood obesity, there is no evidence about why certain states take aggressive action (and earn As) or take no action at all (and earn Fs). This paper seeks to fill that gap in the research literature by documenting the correlates of state legislative action on childhood obesity. The results of this study will indicate the factors that lead states to pursue the *Healthy People 2010* goals and comply with the recommendations of the 2005 IOM report. It will also shed light on whether the results of the 2006 election, which resulted in the Democrats gaining six governorships and the Republicans losing control of five state legislatures (14), are likely to result in additional legislative action on childhood obesity. More generally, it will help predict future policy action on obesity after the party control of state legislatures and governorships changes in each election cycle. Finally, the results of this study can be used to guide the efforts of public health advocates, who could achieve greater success by targeting their efforts to take advantage of state political environments that are conducive to policy action on obesity.

METHODS AND PROCEDURES

Study Overview

This paper has an ecologic study design. Using data on each US state from 2003 to 2006 we estimate the probability that a state legislature introduced a bill to address childhood obesity as a function of the state health, socioeconomic and political characteristics, and also estimate the probability that a state enacted a law to address childhood obesity as a function of the same health, socioeconomic and political characteristics. The data we analyze are detailed below, followed by a description of our statistical methods.

Dependent variables: state legislative action on childhood obesity

Annual data on the introduction of bills and enactment of laws to address childhood obesity are taken from Thomson West's Health Policy Tracking Service (11). We use year-end summaries of state legislative activity for 2003, 2004, and 2005 and for 2006 we use the April report (the most recent available).

We analyze data on whether states either introduced a bill or enacted a law that addressed the following topics: Physical Education (available 2003–2006), School Nutrition (available 2004–2006), BMI Reporting by Schools (available 2005–2006) and Health Education (available 2005–2006). In 2006, Thomson combined its reporting on state legislative activity on physical education and health education, so the two cannot be identified separately in that year. These categories of legislative activity are so broad that states can and do introduce bills and enact laws in these areas in multiple years; as a result, we consider each state to always be at risk of introducing a bill and enacting a law in each area.

Independent variables: state health, socioeconomic and political characteristics

The independent variables in the model are characteristics of the state that are likely to affect voter or legislator support for anti-obesity policies. These state characteristics can be classified as relating to health, socioeconomics, or politics. We control for two measures of state health: prevalence of adult obesity in the state and the disparity between ideal and actual weight of residents in the state. Obesity rate among adults in the state in 2003 is calculated from the Behavioral Risk Factor Surveillance System data (15). Ideally we would also control for the obesity rate among the state's children and youth prior to the passage of any anti-obesity laws, but the Youth Risk Behavior Surveillance System cannot be used to produce state-level rates of childhood obesity for all 50 states. We control separately for average percent desired weight

loss among adults in each state in 2003. This is based on the difference between self-reported weight and self-reported ideal weight (in pounds) divided by self-reported weight, all in the Behavioral Risk Factor Surveillance System.

The second category of independent variables concerns the political characteristics of the state. For example, states might be less likely to have taken policy action to address childhood obesity between 2003 and 2006 if they had already passed similar policies before 2003. While comprehensive data on the existing policies in each state are not easily available, we control for such differences by including a count of how many types of physical education laws a state had on its books in the year 2000. These data are taken from the 2000 School Health Policies and Programs Study (SHPPS), a census of state laws regarding school health (16).

State legislative action may also be related to the party control of the legislature and governorship. We include indicator variables for whether the legislature is controlled by Democrats, and another for whether the legislature is controlled by Republicans (the reference category is a divided legislature); the source for this annual data is the National Conference of State Legislatures (14). We also include an indicator variable for whether the governor is a Democrat (the reference category is a Republican governor); the source for this annual data is the National Association of Governors (17).

The third category of independent variables concerns the socioeconomic characteristics of the state. Wealthier and better educated states may be more aggressive in their policies to limit or reduce childhood obesity. For that reason, we control for the log of the state per capita income in 2003, taken from the Bureau of Economic Analysis, Department of Commerce (18). Per capita income reflects the average income, but income disparities may also influence the policy process. For this reason we also control for two measures of poverty in the state: first, the percentage of the state population enrolled in Medicaid, which is taken from the 2003 Current Population Survey (19), and second, the percentage of the state population under the poverty line in 2003, which is taken from the US Census Bureau (20). We also control for the percentage of the adult population with a bachelor's degree or higher, taken from the 2000 census (20).

States that are rural or predominantly agricultural may have residents who get more physical activity in the course of their day and have less need for anti-obesity policies. For this reason, we control for the percentage of the state employed in agriculture, and the percentage of state residents living in rural areas; both variables are from the Current Population Survey for 2003 (19).

State legislative action may also be correlated with the racial composition of the state. For this reason, we control for the percent of the state population in 2003, i.e., African American, Hispanic, or other, where the reference category is white; these data are from the 2000 census (20).

Statistical analyses

The association between state legislative action and state health, socioeconomic and political characteristics are measured using probit regression models that are estimated using STATA 9.2. Specifically, probit models are estimated for the following binary dependent variables: (i) an indicator variable that equals one if the state legislature introduced any anti-obesity bill during that year (either Physical Education, School Nutrition, BMI Reporting by Schools, or Health Education); (ii) an indicator variable that equals one if the state legislature introduced a Physical Education anti-obesity bill during that year, (iii) an indicator variable that equals one if the state legislature introduced a school Nutrition anti-obesity bill during that year. Likewise, we estimate probit models for these additional binary dependent variables that concern the enactment of laws (as opposed to simply introduction of bills): (i) an indicator variable that equals one if the state enacted any anti-obesity law during that year (either Physical Education, School Nutrition, BMI Reporting by Schools, or Health Education); (ii) an indicator variable that equals one if the state enacted a law concerning Physical Education during that year, (iii) an indicator variable that equals one if the state enacted a law concerning School Nutrition

during that year. It is not informative to estimate models of the introduction of bills or enactment of laws regarding BMI Reporting or Health Education separately because data on these outcomes were available for only 1 or 2 years.

In each model we control for the full set of independent variables described above, as well as including indicator variables for year, with 2003 as the reference year. Probit coefficients are converted to marginal effects using the STATA `mfx` compute command. To allow error terms for the same state to be correlated over time *s.e.* are clustered by state using the `robust, cluster` command in STATA. All *P* values are two-sided, with *P* < 0.05 considered statistically significant.

RESULTS

Descriptive statistics of the variables are provided in **Table 1**. In ~61% of all legislative sessions from 2003 to 2006, state legislatures introduced at least one anti-obesity bill. During that same period (2003–2006) and across all states, at least one anti-obesity law was enacted in ~20% of legislative sessions.

Introduction of bills to combat obesity

Table 2 lists the results of probit regressions concerning the introduction of anti-obesity bills into state legislatures, 2003–2006. Each cell contains the marginal effect (the percentage point change in the probability that the dependent variable equals one associated with a one-unit change in the independent variable) and the *s.e.* Asterisks indicate statistical significance.

Column 1 reports results from models for the introduction of any type of anti-obesity bill (physical education, school nutrition, BMI reporting, or health education). Column 2 reports results from a model of the introduction of a physical education bill, and column 3 reports results from a model of the introduction of a school nutrition bill.

Table 2 confirms an increasing trend over time in the introduction of bills to address childhood obesity (column 1). The probability of such legislative activity is consistently higher in 2004, 2005, and 2006 than in 2003 (the reference year). While the point estimate of the conditional probability of introduction in 2006 may seem lower than that for 2004 and 2005 this may be due to the fact that our 2006 data are for the first quarter of the year only.

Across all of the models in **Table 2**, we consistently find that the gap between actual and reported weight among adults in the state is associated with a higher probability that a bill aimed at curbing childhood obesity is introduced in the legislature. If, on average, self-reported weight is an extra 1% point higher than desired weight, the probability that any anti-obesity bill is introduced is 17.7% points higher (column 1). That same 1% point difference between reported and desired weight is associated with a 20.6% point greater probability that a Physical Education bill in particular is introduced, and a 16% point greater probability that a School Nutrition bill is introduced.

Another consistent result is that better-educated states are more likely to introduce bills to address childhood obesity. In columns 1 and 3, a 1% point increase in the percentage of the adult population with a bachelor's degree is associated with an ~2% point increase in the possibility that an anti-obesity bill is introduced.

A higher percentage of residents engaged in agriculture is associated with a lower probability that an anti-obesity bill is

Table 1 Descriptive statistics

Variable	Mean	s.d.	Minimum	Maximum
State introduced anti-obesity bill (annual for 2003–2006)	0.613	0.488	0	1
State enacted anti-obesity law (annual for 2003–2006)	0.198	0.399	0	1
Democrats control legislature (annual for 2003–2006)	0.355	0.480	0	1
Republicans control legislature (annual for 2003–2006)	0.410	0.493	0	1
Democratic Governor (annual for 2003–2006)	0.435	0.497	0	1
Average % deviation from desired weight, 2003	5.792	0.728	3.704	7.692
Adult prevalence of obesity, 2003	23.215	2.920	16.041	28.960
Log per capita income, 2003	10.313	0.136	10.055	10.662
Percent adult population with bachelor degree or higher, 2000	26.312	4.895	15.300	37.600
Percent of population on Medicaid, 2003	10.547	3.140	5.964	18.311
Percent of population in poverty, 2003	12.356	3.215	7.700	20.300
% Population black, 2003	10.262	9.515	0.547	36.785
% Population Hispanic, 2003	8.515	9.353	0.705	42.972
% Population other race, 2003	6.160	8.755	1.380	60.400
% Population rural, 2003	30.313	21.037	0	74.572
% Workforce in agriculture, 2003	1.047	1.000	0.035	4.336
Number of PE policies in 2000	3.840	1.931	0	7

introduced in the legislature (columns 1 and 3). This may be because children in such states are more active at home because they are working on family farms. Less consistent results are that a higher log per capita income and a higher percentage of residents living in poverty, is positively correlated with bill introduction (column 1).

Enactment of laws to combat obesity

Table 3 lists the results of probit regressions concerning the enactment of anti-obesity laws, 2003–2006. In general, enactment of such laws is more likely in 2004 or 2005 than in 2003 (column 1).

The most consistent results are that laws are less likely to be enacted in states with high adult obesity rates (columns 1 and 3)

Table 2 Predicting the introduction of bills that address childhood obesity

Variable	Any type ^a	Physical education	Nutrition
Average deviation from desired weight	0.177* (2.51)	0.206* (2.06)	0.160** (1.68)
Adult prevalence of obesity	-0.034 (-1.48)	-0.021 (-0.60)	-0.058* (-1.98)
Democrats control legislature	-0.102 (-0.92)	-0.022 (-0.18)	-0.169 (-1.10)
Republicans control legislature	-0.069 (-0.95)	-0.094 (-0.92)	-0.191 (-1.61)
Democratic Governor	-0.061 (-1.41)	0.029 (0.38)	0.033 (0.49)
Log per capita income	1.226*** (2.80)	0.906 (1.33)	-0.449 (-0.69)
% Population with bachelor degree or higher	0.020* (2.42)	0.018 (1.49)	0.020** (1.85)
% Population black	0.000 (0.0091)	-0.000 (-0.025)	0.002 (0.33)
% Population Hispanic	-0.003 (-0.96)	-0.001 (-0.12)	0.005 (0.96)
% Population other race	0.002 (0.90)	0.005 (1.11)	-0.005* (-2.04)
% Population on Medicaid	0.011 (0.85)	0.002 (0.093)	-0.015 (-0.97)
% Population in poverty	0.069*** (3.09)	0.040 (1.43)	0.046 (1.48)
% Population rural	0.002 (1.03)	0.001 (0.45)	-0.001 (-0.22)
% Workforce in agriculture	-0.086*** (-2.79)	-0.087 (-1.62)	-0.124*** (-3.53)
State legislature did not meet in 2004 or 2006	0.060 (0.53)	0.140 (1.02)	
Number of PE policies in 2000	0.026** (1.80)	0.026 (1.18)	-0.040** (-1.89)
Year 2004	0.257*** (4.94)	0.246*** (3.19)	
Year 2005	0.356*** (6.81)	0.435*** (5.49)	0.013 (0.13)
Year 2006	0.230*** (3.68)	0.289*** (3.22)	-0.200** (-1.83)
Observations	188	188	132

Table lists probit marginal effects and robust z statistics in parentheses. Statistical significance indicated using asterisks: **P* < 0.05, ***P* < 0.1, ****P* < 0.01.
^aAny type^a includes Physical Education, Nutrition, BMI Reporting by Schools and Health Education.

and in states with higher per capita incomes (columns 3 and 4). Anti-obesity policies are also more likely to be enacted in states with larger African-American populations (columns 1 and 3).

Enactment of laws to address childhood obesity is more likely in states with a Democratic governor (columns 1 and 3).

Table 3 Predicting the enactment of state laws to address childhood obesity

Variable	Any type ^a	Physical education	Nutrition
Average deviation from desired weight	0.114* (1.87)	0.033 (0.69)	0.095 (1.48)
Adult prevalence of obesity	-0.050* (-1.87)	0.000 (0.021)	-0.064** (-2.10)
Democrats control legislature	0.120 (1.05)	0.048 (0.69)	0.021 (0.20)
Republicans control legislature	-0.067 (-0.75)	-0.050 (-0.84)	-0.194** (-2.11)
Democratic Governor	0.205*** (2.93)	0.071 (1.24)	0.115* (1.72)
Log per capita income	-0.507 (-1.11)	-0.805** (-2.04)	-1.457*** (-2.91)
% Population with bachelor degree or higher	0.016 (1.52)	0.027*** (3.14)	0.000 (0.034)
% Population black	0.006* (1.82)	0.002 (0.72)	0.007* (1.94)
% Population Hispanic	0.000 (0.035)	0.004 (1.54)	0.005 (1.36)
% Population other race	-0.002 (-0.76)	-0.004 (-1.26)	-0.003 (-1.28)
% Population on Medicaid	-0.010 (-0.88)	-0.007 (-0.80)	-0.020 (-1.56)
% Population in poverty	0.024 (1.25)	0.005 (0.31)	-0.017 (-0.86)
% Population rural	0.002 (1.15)	0.004* (1.94)	0.000 (0.17)
% Workforce in agriculture	-0.043 (-0.98)	-0.036 (-1.06)	-0.064 (-1.35)
State legislature did not meet in 2004 or 2006	0.339 (1.64)	0.358** (2.20)	-0.111 (-0.88)
Number of PE policies in 2000	0.030* (1.65)	0.025* (1.82)	0.009 (0.56)
Year 2004	0.380*** (2.84)	0.225** (2.16)	
Year 2005	0.590*** (5.24)	0.373*** (3.28)	0.162* (1.74)
Year 2006	0.214* (1.71)	0.030 (0.31)	-0.210** (-2.07)
Observations	188	188	138

Table lists probit marginal effects and robust z statistics in parentheses. Statistical significance indicated using asterisks: **P* < 0.1, ***P* < 0.05, ****P* < 0.01.

^aAny type^a includes Physical Education, Nutrition, BMI Reporting by Schools and Health Education.

Specifically, states with Democratic governors are 20% points more likely to enact some type of anti-obesity law, and 11.5% points more likely to enact a school nutrition law in particular (column 3). A Republican-controlled state legislature is associated with a 19.4% point lower probability that a school nutrition bill is enacted.

The probability that any anti-obesity law is enacted is positively correlated with the gap between current and ideal weight among adults in the state. A 1% point increase in that gap is

associated with an 11.4% point increase in the probability that a law is enacted in any of the categories we examine (column 1).

DISCUSSION

This paper finds that the enactment of an anti-obesity law is 20% points more likely in states headed by Democratic governors, and that enactment of a school nutrition law is 19.4% points less likely in states with Republican-controlled legislatures. These findings suggest that the 2006 election, which resulted in the Democrats gaining six governorships and the Republicans losing control of five state legislatures (14), may result in additional action against obesity in those states. More generally, these results can help predict future policy action on obesity after the party control of state legislatures and governorships changes after each election cycle.

These findings complement a large and growing literature on voters' support for specific anti-obesity policies (21–28). Whereas that literature focuses on the individual characteristics that determine people's support for anti-obesity policies, this article documents the state-level characteristics that determine the action of state legislatures in addressing childhood obesity. In particular, our findings with respect to political affiliation relate to previous research that finds that voters' party affiliation is also linked to their support for anti-obesity policies. Compared to Republicans, Democrats are more supportive of some anti-obesity policies (29) and are willing to pay more in taxes for programs to reduce childhood obesity (21).

This paper documents an increasing trend toward the introduction of bills and the enactment of laws to combat childhood obesity. The introduction of at least one bill to reduce childhood obesity was 25.7% points more likely in 2004 and 35.6% points more likely in 2005, relative to 2003. The enactment of at least one law to reduce childhood obesity was 38.0% points more likely in 2004 and 59.0% points more likely in 2005, relative to 2003. This increased action at the state level is welcome news for public health advocates because state legislative action is considered by many to be critical to the prevention and reduction of childhood obesity (9–12). The trend we document is consistent with research that documents a recent increase in the American public's support for policies to address obesity (23). It is unclear what specific factors led to this rise in support and increase in policy activity; one possibility is that it is due in part to the IOM report *Preventing Childhood Obesity: Health in the Balance* (9), which was released in preliminary form in 2004.

We find that a greater average deviation from desired weight (defined as the percent gap between self-reported weight and desired weight) among adult residents of the state is consistently associated with a higher probability of bills being introduced in the state legislature to address childhood obesity. Our statistical model controls for the prevalence of adult obesity in a state, so greater deviation from desired weight, holding constant the obesity rate, may reflect greater dissatisfaction with being overweight, which may translate into support for policies to prevent obesity in children. This is consistent with previous research that finds that adults who report that they

believe youth obesity in the United States is a major problem, or who report that they think youth obesity is among the most important problems facing American youth, are willing to pay significantly more in higher taxes to support policies to reduce or prevent childhood obesity (21). Other research has also confirmed that adults who perceive obesity to be a very important national problem are more likely to support specific anti-obesity policies (29).

One of the strengths of this approach is that it controls for a host of health, socioeconomic, and political factors that may affect the likelihood of state policy action being implemented. In addition, every state is examined for each year from 2003 to 2006. On the other hand, a limitation of this approach is that it does not control for every factor that may have led to policy action or inaction; for this reason, the present study should be complemented by a qualitative, in-depth, study of the factors that lead to state action against childhood obesity. Another limitation is that there is variation within the categories for the policies we examine (Physical Education, Nutrition, BMI Reporting, and Health Education); future research could examine the language of the bills or statutes to draw finer distinctions. The study can also be strengthened by the addition of data from future years as they become available.

This study can also be used to guide the efforts of public health advocates, who can achieve greater success by targeting their efforts toward states with political environments that are conducive for taking policy action to reduce obesity. Many papers have offered lessons for anti-obesity advocates based on the success of the public health campaign against smoking (30–33). However, we are aware of no previous research that uses quantitative methods to derive lessons from recent policy successes from the public health campaign against obesity. This paper provides the first such evidence, and finds several demographic, socioeconomic, and political characteristics of states that help predict legislative action on obesity. As a result, it provides anti-obesity advocates with evidence about which states might be the most receptive to new policies in addressing the epidemic of childhood obesity.

DISCLOSURE

The authors declared no conflict of interest.

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