

# Implementation of Texas Senate Bill 19 to Increase Physical Activity in Elementary Schools

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## ABSTRACT

In 2001, the 77th Texas legislature passed Senate Bill 19 requiring students in publicly funded elementary schools to participate in physical activity and schools to implement a coordinated school health program by September 1, 2007. We report on awareness of and adherence to Senate Bill 19 in a statewide sample of elementary schools and a subsample in two public health regions located along the Texas–Mexico border. Statewide, structured interviews with principals indicated high awareness of Senate Bill 19’s requirements, but lower awareness of the need for parental involvement. Only 43% of Texas schools had adopted their coordinated program 1 year or less before the implementation deadline. Principals reported an average of 179 min of physical education per week, higher than the 135-min mandate. Among the subsample border schools, principals’ physical activity reports were consistent with teacher records and student reports. Further, direct observation of physical education indicated that 50% of class time was spent in moderate and vigorous physical activity, meeting the level of physical activity intensity recommended by Healthy People 2010. The differences observed by public health regions included: more physical activity minutes in Region 10 (231 min compared to 217 min in Region 11); higher adoption of coordinated school health programs (92% compared to 75%); more district-level school health advisory committees (58% compared to 38%) and school-level school health advisory committees (83%

compared to 25%); and a lower prevalence of obesity in 4th grade students (21% compared to 32%). Differences by region suggest that Senate Bill 19 is not being adhered to equally across the state, and some regions may require further support to increase implementation. Results underscore the importance of continued monitoring of enacted legislation, and that legislation for child health that focuses on school programs and policies requires funding and refinement to produce the intended effect.

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#### INTRODUCTION

The prevalence of overweight among children in Texas is higher, especially among economically disadvantaged populations, than national estimates for the United States (1–3). National prevalence estimates indicate that 16% of Mexican-American adolescents are obese and 34% are overweight, based on the Centers for Disease Control and Prevention body mass index (BMI)-for-age growth charts (4). Among 4th grade students in Texas, Hispanic children (31.1% of boys and 26.4% of girls) and African-American children (21.6% of boys and 30.8% of girls) have a higher prevalence of obesity compared to their White counterparts (17.7% and 13.7%) (1). Because Texas has a growing and young age distribution of at-risk minority populations (5) and obesity has been found to persist from childhood into adulthood (6), the prevalence of obesity among Texas children is worrisome.

In response to health consequences and projected health care costs (3) of childhood obesity, the 77th Texas legislature passed Senate Bill 19 in 2001, which requires elementary school children to participate in 30 min of daily physical activity or a total of 135 min per week. Senate Bill 19 also required the Texas Education Agency to recommend coordinated school health programs and that schools adopt and receive implementation training in “approved” programs by 2007. A coordinated school health program must address eight components, including classroom curriculum, physical activity, child nutrition services, and parental involvement (7). Additional details on Senate Bill 19 are provided elsewhere (8).

In January 2003, the 78th legislature made amendments to Texas Education Agency statutes (28.004 and 38.013) by enacting Senate Bill 1357, which strengthened the scope and authority of school health advisory councils to include strategies for: integrating school health services; counseling and guidance services; a safe and healthy school environment; and school employee wellness. This legislation also: broadened the availability of coordinated school health programs for elementary schools; required an assessment of compliance with vending machine and food service guidelines; and held schools accountable for public inspection of school health programs.

Although Senate Bill 19 was enacted to improve the health of Texas children, it also sought to help ameliorate unintended negative consequences of Texas academic testing standards. Enacted in 1999, the Texas Assessment of Knowledge and Skills (9) was mandated for administration during the 2002–2003 school year. When performance standards were being introduced, many school districts cut back or eliminated “enrichment” elements in their curriculum (those not considered “foundation” elements). This often meant fewer physical and health education contact hours and reduced recess time (recess is an unstructured time during school hours when students are allowed to play outside). Pate *et al.* (10) mention similar consequences of the No Child Left Behind Act across the United States (the No Child Left Behind Act of 2001 (Public Law 107-110) is a US federal law aimed at improving academic performance via accountability standards).

The passage of Senate Bill 19 in Texas was significant because it was one of the first statewide efforts to target child health through mandated physical activity time and health education. When Senate Bill 19 was enacted, there was no additional funding for implementation or evaluation (nor is there any such funding today). In addition, accountability standards were not enacted for this legislation, thus requiring non-state funding to determine effects on children’s health.

The purpose of this study was to assess the extent of implementation of Senate Bill 19 in Texas elementary schools. We evaluated the implementation of Senate Bill 19 related to physical activity and coordinated school health programs for the state as a whole and compared the implementation of components of Senate

Bill 19 in two economically disadvantaged border regions in Texas over time. The specific aims of the study were to:

- assess awareness of and adherence to Senate Bill 19 in a representative sample of Texas elementary schools; and
- monitor implementation and impact of Senate Bill 19 in Texas–Mexico border schools on:
  - school and district physical activity policy,
  - weekly minutes of scheduled physical activity,
  - quality of child physical activity during physical education class as defined by minutes engaged in moderate-to-vigorous physical activity,
  - selected self-reported dietary and physical activity measures, and
  - child obesity.

## METHODS

### *Sample and Procedures*

We employed a mixed methods approach by making use of existing and newly collected data. Unfortunately, funding for this project began after the implementation of Senate Bill 19, not allowing for collection of baseline data before 2001. We made use of data collected under the present funding, as well as data from a statewide representative survey (School Physical Activity and Nutrition), funded by the Texas Department of State Health Services and administered during the 2004–2005 school year (1).

Aim 1 of the study concerned an assessment of knowledge and adherence to Senate Bill 19. We contacted the 171 schools measured during the 2004–2005 School Physical Activity and Nutrition survey and conducted a telephone interview. The original sampling design of the survey used a probability-based sample of elementary schools representative of Texas and individual public health regions (1). Using a cross-sectional study design, 169 of the 171 schools (98% response rate) were interviewed during the 2005–2006 school year.

Aim 2 of the study concerned monitoring implementation and impact of Senate Bill 19 in schools on the Texas–Mexico border. We selected schools from Texas Public Health Regions 10 and 11 that had participated in the 2004–2005 School Physical Activity and Nutrition survey. These regions represent the Texas–Mexico border

cities of El Paso, Laredo, and Brownsville and were chosen because they represent communities with high rates of obesity, diabetes, and poverty. Children in these regions are economically disadvantaged (>75%) and largely Hispanic (>90%). In Region 10, 12 schools were invited and agreed to participate (100% response rate). In Region 11, 20 schools were invited and eight agreed to participate (40% response rate). Reasons for non-participation were involvement with other health research projects and poor student performance in terms of state academic standards.

Methods for monitoring the implementation and impact of Senate Bill 19 in our sample of Texas–Mexico border schools included: (a) structured interviews with principal or designated key informant at the school level; (b) direct observation of 3rd–5th grade physical education classes; (c) a time-use log (i.e., record) to assess how 4th grade students spent their physical activity time; (d) School Physical Activity and Nutrition assessment of physical activity and nutrition behaviors in 4th grade students; and (e) objectively measured height and weight of 4th grade students. In assessing changes in BMI, self-reported physical activity, and dietary behaviors, we used a serial cross-sectional design in which 4th grade students in selected schools were assessed in 2004 and another sample of 4th graders were assessed in the same selected schools in 2006–2007. All study objectives and methods were approved by the University of Texas Committee for the Protection of Human Subjects.

### *Measures*

#### *Telephone key informant interviews of school policy environment*

The study team developed a structured telephone interview to assess awareness and adherence to Senate Bill 19 among school principals or school principal designees. The interview schedule included items created to assess mandate-specific aspects of Senate Bill 19 policy, as well as items modeled from previous research for CATCH (Coordinated Approach to Child Health) (11). The questionnaire consisted of 28 items that assessed: awareness of the various requirements of Senate Bill 19 and Senate Bill 1357; information channels for learning about Senate Bill 19; weekly minutes of school-scheduled physical activity by grade level; school adoption of a Texas Education Agency-approved coordinated school health program;

and implementation status of a coordinated school health program (see Table 1). The interview was reviewed by physical activity and nutrition experts and was found to have good face validity. Pretesting with four school administrators resulted in minor modifications.

### *Additional Measures in Regions 10 and 11*

#### *Log of students' structured physical activity*

As an additional measure of adherence to Senate Bill 19's weekly physical activity minutes mandate, we collected teacher-reported minutes of physical activity time in schools. Fourth grade classroom teachers in Regions 10 and 11 were asked to complete a 5-day log on structured physical activity programmed for their students during the 2006–2007 school year. The log tracked the location of physical activity (classroom, recess, and physical education class) and the amount of time spent in each location. The log was adapted from previous CATCH physical education surveys; pretesting with elementary school teachers to assess comprehension resulted in minor revisions.

#### *Direct observation of physical activity in physical education class*

This was conducted by trained observers at schools in Regions 10 (in spring 2008) and 11 (in spring 2007), using the System for Observing Fitness Instruction Time (SOFIT). The SOFIT uses direct observation to obtain a simultaneous measure of students' physical activity levels and lesson contexts in physical education classes. Three assessments per school were carried out, one at each grade level (3rd, 4th, and 5th). Observers randomly selected four children during the course of a physical education class and observed and recorded their activity levels based on a momentary time sampling method. Development and validation of the SOFIT has been extensively described elsewhere (12–14). The SOFIT has been found to have strong interrater reliability (13) as well as validity when compared with accelerometers (12) and heart rate monitors (14).

#### *School physical activity and nutrition*

The School Physical Activity and Nutrition self-administered questionnaire was designed to assess nutrition behaviors, attitudes

Table 1: Texas Senate Bill 19 core constructs and corresponding data collection methods by Texas study

<i>Constructs</i>	<i>Statewide school sample</i>		<i>Regions 10 and 11 school sample</i>		
	<i>Key informant Telephone survey*</i>	<i>Key informant Telephone survey*</i>	<i>Direct observation SOFIT†</i>	<i>Teacher Log‡</i>	<i>Student report SPAN§</i>
Awareness of 30 min/day or 135 min/week physical health mandate	X	X			
Awareness of coordinated school health mandate	X	X			
Awareness of district school health advisory committee	X	X			
Presence and composition of local school health advisory committee	X	X			
Information channels for learning about Senate Bill 19	X	X			

Table 1 (continued)

<i>Constructs</i>	<i>Statewide school sample</i>		<i>Regions 10 and 11 school sample</i>			
	<i>Key informant Telephone survey*</i>	<i>Key informant Telephone survey*</i>	<i>Direct observation SOFIT†</i>	<i>Teacher Log‡</i>	<i>Student report SPAN§</i>	
Adherence to physical activity minutes mandate (weekly/daily activity minutes)	X	X				
Quality of physical activity in physical education class			X	X	X	
Adoption of coordinated school health program	X	X	X			
Intention to adopt coordinated school health program	X	X				
Training status on coordinated school health program	X	X				

Table 1 (continued)

<i>Constructs</i>	<i>Statewide school sample</i>		<i>Regions 10 and 11 school sample</i>		
	<i>Key informant Telephone survey*</i>	<i>Key informant Telephone survey*</i>	<i>Direct observation SOFIT†</i>	<i>Teacher Log‡</i>	<i>Student report SPAN§</i>
Implementation of coordinated school health program	X	X			
Body mass index/weight classification					X
Dietary characteristics					X

\* Key informants were primarily principals or principal designees from a representative sample of Texas public elementary schools.  
 † Survey of Fitness Intensity Time.

‡ Teachers filled out a 5-day log on structured physical activity programmed for their students.

§ Survey of Physical Activity and Nutrition.

and knowledge, and physical activity behaviors among 4th, 8th, and 11th grade students (only 4th grade was used in the present study). For this study, the School Physical Activity and Nutrition survey provided additional measures of the impact of Senate Bill 19 on self-reported physical activity and nutrition behaviors. The School Physical Activity and Nutrition measures and protocols were developed, pilot tested, and assessed for reproducibility (15,16) and validity (17) with students in 4th and 8th grade. School Physical Activity and Nutrition survey items for the 4th grade questionnaire were found to have a moderate to high level of reproducibility ( $\kappa > 0.40$  for 90% of items). Previous-day-recall dietary questions were found to have a moderate to high percentage of agreement (26%–90%) with 24-h dietary recall.

#### *Height and weight*

These were objectively assessed using digital platform scales (for measuring weight) and portable stadiometers (for measuring height). For this study, BMI  $\geq$  95th percentile was considered obese (18) using Centers for Disease Control and Prevention BMI-for-age and -sex growth charts (4). The School Physical Activity and Nutrition survey and height and weight measures were administered by trained data collectors at schools in Regions 10 and 11 during the spring semester in 2007 according to standardized protocols (1).

#### *Statistical Analysis*

Awareness of and adherence to Senate Bill 19 were assessed using data from the key informant survey, 5-day logs of physical activity, and the SOFIT assessments. Data were summarized as proportions within Regions 10 and 11 (and 10/11 combined). *P*-values from *z*-score (standard score) tests were calculated for comparison between Regions 10 and 11 as well as Regions 10/11 combined compared to Texas statewide. Student-level data from the School Physical Activity and Nutrition survey were used to compute region-specific prevalence of standard BMI categories and mean and standard deviation of selected physical activity and dietary behaviors. Estimates were obtained from random-effects regression models adjusted for age, gender, ethnicity, and parent language as

fixed effects, and school as a random effect. Separate estimates were obtained for 2004 and 2007, and the differences between these 2 years within each region were evaluated using *t*-statistics for differences in means and *z*-scores for difference in proportions. All computations were performed using Stata v9.0 software (19).

## RESULTS

### *Statewide Findings*

Table 2 presents findings from the key informant interviews based on a random sample of Texas elementary schools and schools specific to Regions 10 and 11. Of the 169 informants who participated in the interview, 77% were principals, 12% were assistant principals, 5% were nurses, 3% were physical education instructors, and the remaining 3% were faculty and counselors. We found a high level of overall awareness of the coordinated school health program requirement (96%  $\pm$  2%) and required physical activity per day or per week (97%  $\pm$  3% acknowledged awareness). However, 12% of the sample was not aware of the need to implement health education, physical activity, or the child nutrition services component as part of a coordinated school health program, and over 40% were not aware of the need to include a parental involvement component for the coordinated school health program. Most key informants had learned about Senate Bill 19 requirements from their school district (70%) or a district physical activity policy statement regarding the statute (69%) (Table 2).

The average minutes of structured student physical activity per week at the state level was 179, exceeding the 135 minimum minutes required by the statute. Roughly half of schools reported that their school district had not formed a school health advisory committee as mandated in Senate Bill 19, and only 33% of schools had formed a school-level health advisory committee. Furthermore, 43% reported having adopted a Texas Education Agency-approved coordinated school health program. At the time of the survey, conducted 1 year before the Texas Education Agency implementation deadline and 3 years after the Texas Education Agency requirements letter, only 40% and 27% of schools, respectively, had included the physical activity minutes and coordinated school health program requirements in their campus improvement plans (Table 2).

Table 2: 2005–2006 telephone survey of Texas elementary schools

	Texas (n=169) % (95%CI)	Regions 10/11 (n=20)* % (95%CI)	Region 10 (n=12) %	Region 11 (n=8) <sup>†</sup> %
<i>Are you aware that Senate Bill 19 requires:</i>				
K-5 physical education and CSHP <sup>‡</sup> ?	96 (94–99)	95 (85–105)	91.7	100
30 min of structured physical activity per day or 15 min/week?	97 (94–100)	100 (100–100)	100	100
Implementation of TEA <sup>§</sup> approved CSHP?	88 (83–93)	95 (85–105)	91.7	100
Four interrelated components				
Health education	88 (83–93)	95 (85–105)	91.7	100
Physical education	88 (83–93)	95 (85–105)	91.7	100
Food service	84 (78–90)	95 (85–105)	91.7	100
Parental involvement	59 (52–67)	80 (61–99)**	75	87.5
Establishment of a District School Health Advisory Council?	70 (63–77)	90 (76–104)**	83.3	100
<i>How did you become aware of Senate Bill 19?</i>				
School district	68 (61–75)	65 (42–88)	75	50
Professional education	5 (2–9)	5 (–5–15)	0	12.5
<i>Physical education planning</i>				
Did your district issue a physical education policy statement regarding the physical education requirements?	69 (62–76)	60 (36–84)	58.3	62.5
Are physical education requirements in campus improvement plan?	40 (33–48)	40 (16–64)	41.7	37.5

Table 2 (continued)

	Texas (n=169) % (95%CI)	Regions 10/11 (n=20)* % (95%CI)	Region 10 (n=12) %	Region 11 (n=8) <sup>†</sup> %
Are the CSHP requirements in the campus improvement plan?	27 (20-33)	35 (12-58)	41.7	25
<i>Physical education implementation</i>				
Minutes physical education per week (average K-5)	179 (173-186)	225 (213-238)***	231	217
<i>School Health Advisory Council/Committee</i>				
Are you aware of federal law on school meals and wellness policy?	49 (41-56)	75 (54-96)***	75	75
Has your district formed a school health advisory council?	50 (43-58)	50 (26-74)	58.3	37.5
Has your school formed a school health advisory committee?	33 (25-40)	60 (36-84)***	83.3	25***
What is the composition of your school health advisory committee:				
Physical education teacher	27 (20-34)	45 (21-69)**	66.7	12.5***
Teacher other than physical education teacher	20 (14-26)	40 (16-64)***	58.3	12.5***
Food service staff worker	18 (12-24)	45 (21-69)***	66.7	12.5***

Table 2 (continued)

	Texas (n=169) % (95%CI)	Regions 10/11 (n=20)* % (95%CI)	Region 10 (n=12) %	Region 11 (n=8) <sup>†</sup> %
Coach	5 (2-9)	25 (4-46)***	33.3	12.5
Student	1 (-1-2)	5 (-5-15)*	0	12.5
Parent	13 (8-18)	25 (4-46)*	33.3	12.5
Administration staff member	19 (13-25)	15 (-2-32)	25	0*
Other person	25 (18-31)	55 (31-79)***	75	25***
<i>Program adoption, training, and implementation</i>				
Has your school adopted a TEA-approved CSPH program?	43 (35-50)	85 (68-102)***	92	75
If yes, did your school attend training?	96 (91-101)	94 (82-107)	91	100
If yes, has your school implemented the program?	89 (81-96)	88 (71-105)	82	100

\* Tested for significance of difference between Texas and Regions 10/11 combined.

<sup>†</sup> Tested for significance of difference between Regions 10 and 11.<sup>‡</sup> CSHP: Coordinated School Health Program.<sup>§</sup> TEA: Texas Education Agency.

\*\*\*P &lt; 0.05; \*\*P &lt; 0.10; \*P &lt; 0.15.

CI, confidence interval.

*Regions 10 and 11 Findings*

Response rates for Regions 10/11 were determined using the 2005–2006 Texas Education Agency 4th grade enrollment data for counties in public health regions 10 and 11. Out of 1,423 4th students enrolled in Region 10, a total of 589 students participated in the 2007 survey (41% participation rate). In Region 11, out of 869 enrolled, 637 students participated in the study (73% participation rate).

Regions 10 and 11 combined differed from Texas as a whole. Of greatest importance, Regions 10/11 compared to the state of Texas averaged 46 more minutes per week of physical education ( $P=0.001$ ), nearly double the rate of adoption of coordinated school health programs ( $P=0.0004$ ), and a trend for greater awareness of the parental involvement component ( $P=0.07$ ) (Table 1). Although we found few differences between Regions regarding awareness of Senate Bill 19, notable differences were found in implementation. Region 10 reported a higher number of physical activity minutes, 231 min compared to 217 in Region 11 ( $P=0.26$ ), a greater proportion of *district-level* school health advisory committees (58% in Region 10 compared to 38% in Region 11,  $P=0.39$ ), and higher *school-level* school health advisory committees (83% compared to 25%,  $P=0.01$ ). Region 10 had a higher adoption rate of coordinated school health programs (92% compared to 75%), and had physical activity requirements (42% compared to 38%) and coordinated school health program requirements (42% compared to 25%) in their annual campus improvement plans (Table 1).

Table 3 presents 4th grade student BMI, prevalence of physical activity, and dietary behaviors for Regions 10 and 11 in 2004 and 2007. In schools from Region 10, we found that prevalence of obesity increased from 16.1% to 21.3% between 2004 and 2007 ( $P=0.04$ ). Although no significant changes in BMI were observed for Region 11, it is important to note that the high prevalence of obesity ( $\sim 30\%$ ) was maintained.

Although the mean number of days in physical education class was greater in Region 10 in 2004 and 2007 compared to Region 11 (mean = 4.21 and 4.34 days, respectively), a significant increase was observed in Region 11 (from 3.12 to 3.54 days,  $P<0.001$ ). In both

Table 3: Body mass index and self-reported physical activity and dietary behaviors of 4th grade children

	Region 10			Region 11		
	2004 (n=348)	2007 (n=609)	P-value	2004 (n=1,184)	2007 (n=620)	P-value
<i>Body mass index and BMI-for-age percentile*,†</i>						
Body mass index	19.18 (6.5)	19.79 (5.5)	0.02	21.3 (9.4)	21.32 (7.3)	0.96
≥95% (Obese)	16.1	21.3	0.04	30.5	31.4	0.76
≥85th to <95th (Overweight)	16.4	17.6	0.63	18	20.1	0.43
<i>Physical activity and sedentary behaviors (mean, SD)‡</i>						
Weekly PE CLASSES	4.21 (2.8)	4.34 (2.6)	0.17	3.12 (2.7)	3.54 (2.1)	<.001
TV/Video viewing	3.11 (6.9)	2.61 (6.5)	0.01	3.43 (5.1)	2.94 (4.0)	0.02
<i>Dietary behaviors (mean, SD)‡</i>						
<i>Number of times ate or drank</i>						
Milk	1.52 (2.1)	1.55 (1.9)	0.61	1.22 (1.5)	1.17 (1.2)	0.34
Healthy vegetable‡	1.03 (2.1)	0.87(2.0)	0.01	0.85(1.5)	0.82 (1.1)	0.53
Fruits	1.28 (2.0)	1.38 (1.8)	0.12	1.17 (1.7)	1.29 (1.3)	0.09
Fruit Juice	0.94 (1.6)	0.93 (1.4)	0.92	0.92 (1.4)	0.89 (1.1)	0.58
Soda	0.62 (1.2)	0.59 (1.0)	0.62	0.73 (1.4)	0.72 (1.1)	0.86
Sweet rolls	0.57 (1.5)	0.43 (1.4)	0.00	0.44 (1.3)	0.46 (1.0)	0.68
Candy	0.39 (1.1)	0.4 (0.9)	0.67	0.43 (1.3)	0.51 (1.0)	0.19

\* Based on Centers for Disease Control and Prevention weight categorization: overweight: ≥85th to <95th%; obese: ≥95th%

† Mean values adjusted for age, gender, ethnicity, parent language use, and school. Significant differences based on linear regression.

‡ Composite variable of mean times ate orange vegetables (carrots), and other vegetables (tomatoes, cabbage, etc.). Scale 1–9 times.

regions, we found a significant decrease in the mean hours of television watching ( $P < 0.05$ ). Although few significant differences were found in dietary behaviors in the two regions between 2004 and 2007, we did observe a significant decrease in previous-day-recall of consumption of sweet rolls, cakes, and other baked goods among 4th grade students from Region 10 ( $P < 0.001$ ). And, although both

regions reported an increase in the mean number of times students consumed fruit between 2004 and 2007, these differences were not significant. Interestingly, we found a slight decrease in the mean consumption of vegetables for 4th grade students between 2004 and 2007 in Region 10 (from 1.03 to 0.87,  $P=0.01$ ) (Table 3).

Figure 1 highlights the time that schools in Regions 10 and 11 provided opportunities for physical activity by summarizing data from three sources: (1) the key informant telephone interviews, (2) the 5-day logs of required physical activity, and (3) the School Physical Activity and Nutrition survey. Both regions exceeded the minimum required physical activity minutes per week (135), with schools in Region 11 offering between 14 (telephone survey,  $P=0.26$ ) and 22 (5-day teacher log,  $P=0.05$ ) fewer minutes per week. Further, the days that physical education was offered to students was near or above four times per week, with schools in Region 11 offering 0.42 ( $P=0.079$ ) to 0.8 ( $P=0.001$ ) fewer days per week compared to schools in Region 10.

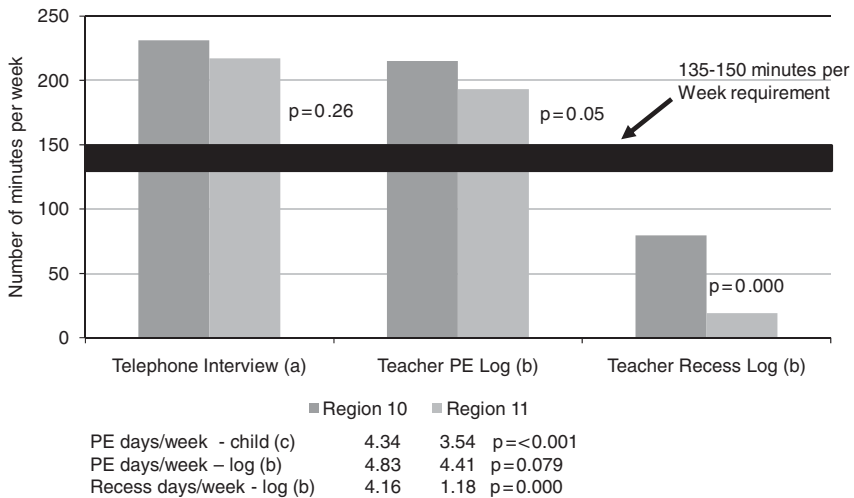


Figure 1

Reported physical education and recess minutes per week. Data for this figure were derived from three different data sources: (a) Telephone interview with school administrator/lead health teacher ( $n = 18$  schools); (b) 5-day classroom teacher log of PE and recess ( $n = 18$  schools; 63 teachers); and (c) Student survey ( $n = 2,797$  students)

Findings from both the School Physical Activity and Nutrition survey and the SOFIT provide additional overlapping data on the trends observed in student physical activity minutes from the key informant interview and teacher logs. Based on the School Physical Activity and Nutrition questionnaire, 4th grade students in Regions 10 and 11 reported an average of 4.34 and 3.54 days of physical education per week, respectively (Figure 1). Assuming an average class time of 45 min per physical education class, students engaged in 195 min and 159 min per week, respectively, for Regions 10 and 11. When we add the estimated minutes spent in recess from the teachers' logs (Figure 1), the estimates approximate those provided by key informants and teachers. For SOFIT results, we recorded an average of 44.1 min of scheduled physical education class time per session and observed an average of 34.1 min of physical education per session across regions (data not shown in tables). Given a 5-day physical education week (or 4-day physical education week with the remainder representing recess), these findings provide further support for the 204–225 weekly minutes or 40.8–44.8 daily minutes of physical activity reported per region.

Figure 1 also provides data on the number of days and amount of time spent in recess. The 5-day log indicated a dramatic difference in recess, with 18.9 min per week in Region 11 and 79.4 min in Region 10 ( $P=0.0001$ ). The combined time spent in physical education and recess was 74.5–82.5 min less for students in Region 11 than for students in Region 10.

Figure 2 presents data on the quality of physical activity participation at the school level, based on SOFIT direct observations of physical activity in physical education classes and the percentage of class time spent in moderate-to-vigorous physical activity. At every grade level, students in Region 10 met the Healthy People 2010 (20) benchmark of 50% of available physical education class time devoted to moderate-to-vigorous physical activity. Students in Region 11 scored considerably lower in moderate and vigorous physical activity among 3rd grade students ( $P=0.033$ ) and overall ( $P=0.029$ ), 19.75% and 9.4%, respectively.

Figure 3 illustrates data from Table 3 by gender. In both 2004 and 2007, the percentage of obese children was 10% to nearly 15%

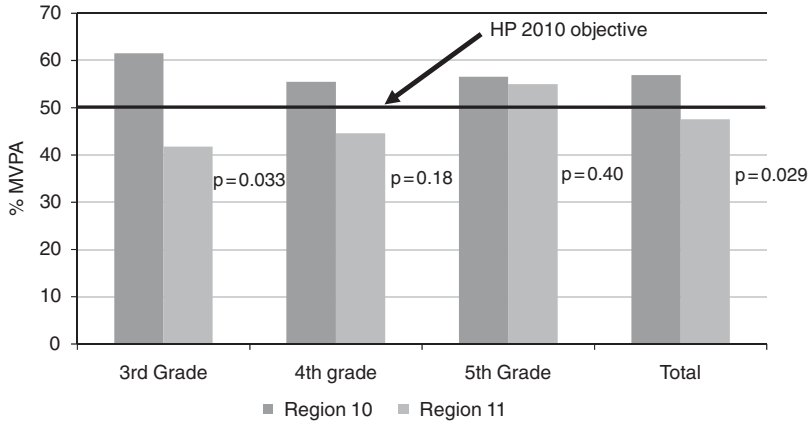


Figure 2  
Direct observation of PE class (SOFIT; *n* = 19 schools). MVPA = % of PE class time where students are engaged in movement to vigorous physical activity

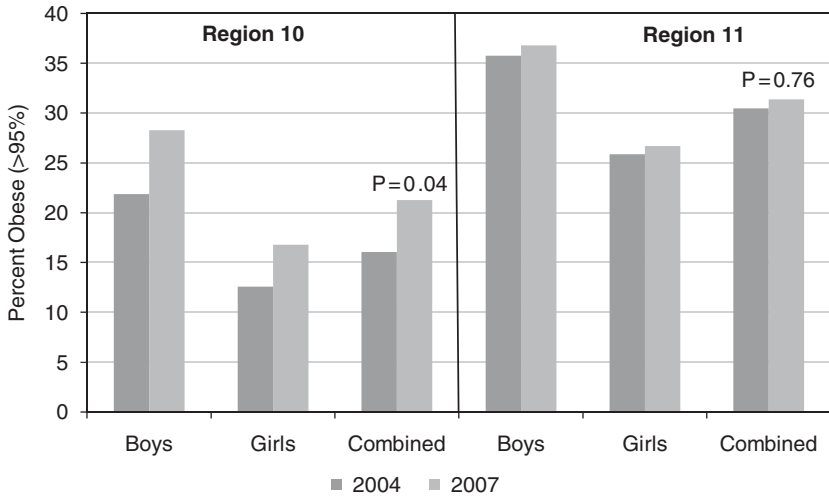


Figure 3  
Percent obese\* (>95%) by region, 2004 and 2007. \*Adjusted for mean age, gender, ethnicity, language use, and school

higher in Region 11 compared to Region 10 (2004 and 2007, both  $P < 0.05$ ), and the obesity rate was 7% to 10% higher among boys in both regions. From 2004 to 2007, a 5% significant increase was

observed in Region 10, and the rate of change was higher in boys and approached (but did not reach) significance ( $P = 0.10$ ).

#### DISCUSSION

Statewide across Texas, our results indicated a high level of awareness, action, and compliance with the physical activity-related requirements of Senate Bill 19. Based on self-reported data from school administrators and staff, on average elementary schools in Texas offered 179 ( $\pm 6$ ) minutes of physical education per week, which is substantially higher than the minimum standard of 135 min. This finding was confirmed in Regions 10 and 11 by a 5-day log (204 min per week), the School Physical Activity and Nutrition survey with a mean of 3.94 days of physical education per week, and direct observation as part of the SOFIT of 170.5 min of physical education per week.

In addition, our findings also suggest that students in Regions 10 and 11 engaged in a sufficient level of physical activity during physical education classes. Although previous research on 3rd grade students in 10 sites around the United States found students spent an average of 37% time in moderate-to-vigorous physical activity during physical education class (21), we found physical activity levels in 3rd, 4th, and 5th grade students near or above the Healthy People 2010 (20) recommendation of 50% of available class time.

A different pattern was observed regarding the mandate for coordinated school health programming. Most schools were aware of the need to implement a coordinated school health program, yet 41% were unaware of the need for parental involvement. Recognizing that our study was conducted 1 year before the coordinated school health program deadline, a 43% coordinated school health program adoption rate suggests an important need being addressed by Senate Bill 19. On a positive note, among schools adopting coordinated school health programs, 96% sent representatives to training sessions and 89% reported implementation. We previously noted that school health programs with multiple components are challenging to implement without new school resources and support, including a program champion (11,22,23). The current academic structure of Texas schools is directed to increasing academic test scores, and health is not an accountable outcome. However, recent

Texas legislation (Senate Bill 530, in 2007) (24) has mandated fitness testing and public reporting for all students in grades 3–12. Time will tell if compliance to coordinated school health program requirements improves.

Our second study aim assessed the impact of Senate Bill 19 in two economically disadvantaged areas along the Texas–Mexico border. Despite the lack of a baseline assessment, existing data provided a reference point to observe changes in health-related outcomes over time. Our first important finding was that the prevalence of obesity among students who attended border schools was high: 21.3% and 31.4% in Regions 10 and 11, respectively. This underscores the need for enhanced intervention efforts to reduce and prevent childhood obesity in these areas – efforts that should complement the current Senate Bill 19 legislation. Secondly, although obesity rates were high in both regions, schools in Region 10 reported lower obesity rates than did Region 11. We noted greater adoption and implementation of a Texas Education Agency-approved coordinated school health program (the CATCH program) in Region 10, greater school health advisory council and school-level health committees, more moderate-to-vigorous physical activity during physical education, and more recess time.

Although we cautiously interpret the regional differences, the reduced obesity rate in Region 10 suggests both the potential value of Senate Bill 19 to support school-based efforts as well as greater investments in community-based physical activity and nutrition programs. From the late 1990s through 2005, the Paso del Norte Health Foundation supported implementation of several initiatives, including CATCH El Paso school health program (25), Qué Sabrosa Vida nutrition program (26), and the Walk El Paso project (27). Region 11, in contrast, implemented the CATCH program, but did not implement a supporting large-scale community health program. Interestingly, we found increased obesity prevalence in Region 10 in 2007, 2 years after cessation of funding for CATCH El Paso. We speculate that, to curb the obesity epidemic, multi-component, sustained, and funded school and community interventions are needed in addition to legislation.

### *Study Limitations*

As with all studies, ours has limitations. First, both the key informant survey and the School Physical Activity and Nutrition questionnaire

were self-reported, which may result in recall and social desirability bias. Although we cannot rule out the possibility that key informants over-reported adherence to Senate Bill 19, we attempted to reduce self-report bias through the use of a limited number of trained interviewers who followed a standardized protocol and through examination of information from multiple data sources (key informant data, teacher logs, observed physical education time, and student self-reported physical education days). We found similar estimates and similar trends in each data source. Student estimates of participation in physical education days provided the lowest estimates of physical education minutes (ranging from 159 to 195 min based on 3.54 to 4.34 days of physical education per week and a session length of 45 min), but these estimates were still well above the 135 min of structured physical activity required by Senate Bill 19, providing further confidence in the validity of the data. A second limitation was relying on a state representative sample at a single point in time to determine awareness and implementation of the requirements of Senate Bill 19. Obviously multiple assessments would strengthen our confidence in the findings, yet our data did provide an in-depth view of the execution of this unfunded mandate. Finally, although we did attempt to assess change over time in the subsample of border schools, we did not have access to a non-intervention comparison state. As such, our single-group, pretest/posttest study design leaves unanswered several potential threats to internal validity, including history, maturation, and statistical regression (28).

### *Implications for School Health Programs*

Data from the 2006 School Health Policies and Programs Study indicated that a comprehensive physical education program can provide opportunities for students to learn lifelong physical activity habits (29). However, to promote healthful behaviors and ultimately prevent chronic disease, a coordinated school health program should be adopted, implemented, and sustained. Since the 1980s, research has shown that the broad framework of coordinated school health programs facilitates both delivery of consistent health messages and development of collective efforts and resources to achieve school wellness goals (30). Numerous professional organizations

recommend daily physical education from kindergarten through 12th grade (31) to combat childhood obesity. This recommendation could have greater impact on the health, welfare, and education of children as part of a coordinated school health program.

#### CONCLUSIONS

Only recently have child nutrition and physical activity experts focused their efforts on policy as a tool to prevent childhood obesity. Data from this study suggest the importance of monitoring implementation progress of the requirements of state statutes and making adjustments to ensure that schools are in compliance, either by adding new provisions to statutes or by increasing accountability. Findings of this study suggest that health-related policies such as Senate Bill 19 can be communicated effectively to schools in a relatively short time period. Yet our mixed findings with regard to implementation of the statute underscore the importance of not abandoning the legislation once it is passed. Lessons learned from this project indicate that legislation for child health that focuses on school programs and policies needs support from local community organizations, as well as continued follow-up, evaluation, and refinement to produce the intended effects.

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