Research Article

Comparison of School Food Policies and Food Preparation Practices before and after the Local Wellness Policy among Indiana High Schools

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ABSTRACT

Background: *Federal legislation requires local education agencies or school districts to develop a local wellness policy. No data-based research using a prospective cohort of a representative sample of secondary schools has been conducted to investigate the impact of the local wellness policy.* ***Purpose:*** *To investigate changes in school food policies and food preparation practices before and after the local wellness policy was implemented in Indiana high schools.* ***Methods:*** *The principal or food service director of 226 food-serving Indiana high schools participated in a survey in February-March 2006. Of the 226 schools, 150 participated in the follow-up survey in April-May 2007 (response rate: 66%).* ***Results:*** *The proportion of schools was significantly reduced that offered chocolate candy (63% to 39%), non-low-fat cookies or crackers (79% to 53%), soda pop (83% to 63%), and non-low-fat salty snacks (72% to 43%). The proportion of schools that prohibited junk foods from being offered significantly increased (29% to 68%). However, no significant increase was observed in the proportion of schools that offered fruit (75% to 76%), vegetable salads (71% to 75%), or 100% fruit juice (83% to 84%). Also, little significant improvement was observed in food preparation practices.* ***Discussion:*** *Additional improvement should be made in food preparation practices and providing more healthy foods.* ***Translation to Health Education Practice:*** *More schools should offer students fruits, vegetables, and 100% fruit juice and make an effort to improve food preparation practices as little improvement was observed in these areas after the local wellness policy was developed. Positive effects of local wellness policies are limited. School health educators and professionals need to advocate the adoption of a minimum federal standard for the school wellness policy rather than allowing each LEA or school district to develop its own wellness policy.*

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BACKGROUND

Adolescents in the United States are increasingly becoming more overweight. The prevalence of overweight, defined as a Body Mass Index (BMI) at or above the 95th percentile on age- and gender-specific growth charts developed by the Centers for Disease Control and Prevention (CDC), has tripled among adolescents aged 12-19 years in the last two decades[1-4] and there is no evidence that this trend has come to an end.[2] The recent National Health and Nutrition Examination Surveys show that the prevalence of overweight among adolescents continued to increase significantly between 1999-2000 and 2003-2004.[1] This causes a serious concern because overweight adolescents are at an increased risk of various physical, mental, and emotional health problems, including impaired glucose tolerance,[5,6] insulin resistance,[7] atherosclerosis,[8] coronary heart disease in adulthood,[9-11] development of eating disorders,[12,13] and low self-esteem.[14]

Schools are a rational setting where interventions can be implemented to help deter this epidemic of adolescent obesity as students spend substantial time in schools.

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Availability and accessibility of a range of healthful or unhealthful food options can be affected by school policy. The fact that the consumption of sweetened beverages and high-fat foods is a contributor to adolescent obesity[3] and that there has been an increase in the consumption of foods that are high in fat and sugars[15-17] illustrates an important role of schools in preventing and controlling this obesity epidemic. Schools can facilitate students' adoption of healthy eating habits not only by providing useful nutrition education, programs, and support services,[18] but also by changing school food environments which has been shown to affect students' key nutritional risk factors, especially in high schools where foods of low nutritional value are pervasive.[19,20] The school food environments include both food policy and food preparation practices that reduce the amount of saturated fat, sodium, and sugar from school meals.[21,22]

In recognition of this important role of schools, and in an effort to prevent and control obesity among children and adolescents, Congress passed Section 204 of Public Law 108-265, the Child Nutrition and WIC Reauthorization Act of 2004. This legislation required each local education agency (LEA) or school district participating in the National School Lunch Program or School Breakfast Program to develop a local wellness policy by July 1, 2006. A unique feature of this legislation was to put the responsibility of developing a wellness policy at the local level in order to adequately address individual needs of each LEA or school district. LEAs and school districts were mandated to set goals for nutrition education, physical activity, campus food provision, and other school-based activities designed to promote student wellness.[23-26] Additionally, they were required to involve a broad group of stakeholders in policy development and to have a plan for measuring policy implementation. To assist LEAs and school districts in developing their own local wellness policies, three federal agencies, such as the United States Department of Agriculture, Division of Adolescent and School Health of the Centers for Disease Control and Prevention, and the Office of Safe and Drug Free Schools of the United States Department of Education, have worked together to provide web pages where sample policies and reference materials are provided.

Few studies are available about the impact of the law. The Action for Healthy Kids reported that only about 50% of local school wellness policies met all of the minimum federal guidelines for nutrition and physical education after the organization reviewed food policies from 112 school districts in 42 states.[23] However, in an online survey conducted by the School Nutrition Association (SNA) and the School Nutrition Foundation in May-June 2007, 83% of the respondents reported their schools offered more healthy food options after July 1, 2006 although the survey was completed by self-selected SNA director-level members with a response rate of only 28%.[24]

PURPOSE

No data-based research using a prospective cohort of a representative sample of secondary schools has been conducted so far to investigate the impact of the law on actual school food policies and food preparation practices. This study was conducted to investigate the impact of the law in terms of school food policies and food preparation practices using a prospective design. According to CDC 2006 School Health Policies and Programs Study (SHPPS 2006), 85.8% and 50.1% of U.S. high schools, respectively, had one or more vending machines and a school store, canteen, or snack bar in 2006 where students could purchase foods or beverages.[25] Also, students in 48.0% of U.S. high schools were allowed to purchase foods or beverages high in fat, sodium, or added sugars from a vending machine or in a school store, canteen, or snack bar during school lunch periods.[25] Indiana was one of 35 states that did not require high schools to prohibit junk foods from being offered in school vending machines, school store, canteen, or snack bar in SHPPS 2006.[26]

It was hypothesized prior to this study that after the local wellness policy was developed the number of high schools decreased significantly that offered chocolate candy, non-low-fat cookies or crackers, soda pop, or non-low-fat salty snacks. It was also hypothesized that the number of schools increased significantly (a) that prohibited junk foods from being offered at schools; (b) that offered fruit, vegetable salads, or 100% fruit juice; and (c) that improved food preparation practices.

METHODS

Sampling and Procedures

In 2006, e-mail addresses of 414 high schools (359 public and 55 non-public) in Indiana were obtained from the Indiana Department of Education. Among them, 39 schools (29 public and 10 non-public) had e-mail addresses that were not working due to an undeliverable error message. Additionally, two non-public schools did not serve food so they were excluded. The principal or food service director of each of the schools was asked to participate in the survey through e-mails in February and March 2006. In total, 373 food-serving schools were invited to participate in an e-mail survey (330 public and 43 non-public high schools) and 198 out of the 330 public high schools (60% response rate) and 28 out of the 43 non-public high schools (65% response rate) participated in the survey, resulting in an overall response rate of 61% in 2006. In April and May 2007, recruiting e-mails were sent out only to the high schools that responded to the baseline survey for a follow-up survey that had the same question items as the baseline survey. A total of 135 out of the 198 public high schools (68%) and 15 out of the 28 non-public high schools (54%) completed the follow-up survey, resulting in an overall response rate of 66% in 2007. At each survey, three weekly reminder e-mails were sent for non-participating schools.

The survey asked principals or food service directors to identify their school food policy and practices. The survey included questions about a variety of food choices available to students, school junk food policy, food preparation practices, type of institution (public or non-public), and percentage of racial/ethnic minorities. The vast majority

of question items were adopted from CDC SHPPS 2000 Questionnaire. All the surveys except four schools in the baseline survey and three schools in the follow-up survey were completed by food service directors or managers. Given that many schools are bombarded by a request of cooperation in data collection or other administrative burdens and that an adequate response rate is crucial in this type of study, an attempt was made to make the questionnaire as short and easy to respond as possible. No imputation was made for missing values. Hence, items with missing values were dropped pairwise from analysis. To check the validity of the responses, 20 randomly selected schools were asked to send their wellness policy documents and 15 returned the documents. These documents were reviewed against the self-reported responses to school food policy questions. The most evident validation check item was whether or not the participating school had adopted a policy prohibiting junk foods from being offered. Fourteen out of 15 schools were true in their responses. Indiana University's Institutional Review Board approved the study protocol. Confidentiality of the survey was ensured to each participating school, i.e., no school-specific information is revealed in any way.

Measures

The primary outcome variables of interest were what types of food high school students had access to and how their schools prepared food for serving. In regards to food policy, respondents were asked about the choices their students were offered during a typical week. Specifically, they were asked if their school offered chocolate candy, other kinds of candy, low-fat cookies, crackers, cakes, pastries, or other low-fat baked goods, baked goods not low in fat, beverages not 100% juice, low-fat salty snacks, salty snacks not low in fat, fruit, lettuce, vegetable or bean salads, 100% fruit juice or 100% vegetable juice, pizza, hamburgers or sandwiches, and 1% or skim milk. In addition, the school was asked if students could purchase food products before classes began in the morning, during school hours when meals were not being served, and during school lunch periods. One question asked if the school had adopted a policy prohibiting junk foods from being offered during these time periods. Junk foods were defined as "foods that provide calories primarily through fats or added sugars and have minimal amounts of vitamins and minerals." All of the response options were yes/no dichotomies.

In regards to food preparation, respondents were asked how often healthier practices were used during the past 30 days when preparing food for their school. The variables of interest included using vegetable oil instead of shortening, butter or margarine, using part-skim or low-fat cheese instead of regular cheese, using ground turkey or lean ground beef instead of regular ground beef, trimming fat from meat or using lean meat, removing the skin from poultry or using skinless poultry, skimming fat off of warm broth, soup, stew, or gravy, and roasting meat or poultry on a rack so the fat would drain. The response options were "never," "rarely," "sometimes," and "almost always." To meet the adequate cell size assumption of nonparametric frequency tests, the first three options were collapsed into "never, rarely, or sometimes."

Data Analysis

After the 2006 and 2007 datasets were combined by school, McNemar nonparametric tests were conducted for the two related dichotomous variables to examine proportion changes between 2006 and 2007.[27 (pp. 374-380)] Also, chi-square tests of independence were conducted between each dichotomous variable and types of schools and percentage of racial/minority students for each year to examine changes in the pairwise associations between the two years.

RESULTS

Characteristics of sampled schools are shown in Table 1. Ninety percent of the schools were public, 70% had enrollment size less than 1000, and 55% had less than 10% of racial/ethnic minority students. Results of this study indicated that many favorable changes occurred between 2006 and 2007 in terms of food policy and practice among Indiana high schools. In regards to school food policy (Table 2), the percentage of high schools that offered chocolate candy decreased from 63% in 2006 to 39% in 2007 ($P < 0.001$); other kinds of candy from 59% to 39% ($P< 0.001$); cookies, crackers, cakes, pastries, or other baked goods not low in fat from 79% to 53% ($P < 0.001$); soda pop, sports drinks, or fruit drinks that are not 100% juice from 83% to 63% ($P = 0.001$); salty snacks not low in fat from 72% to 43% ($P < 0.001$). The percentage of high schools that allowed students to purchase unhealthy foods, such as non-low-fat baked goods or salty snacks or chocolate candy, during any school hours when meals were not being served also decreased from 47% to 30% ($P = 0.002$). In addition, the number of schools that prohibited junk foods from being offered at schools increased from 29% to 68% ($P < 0.001$). However, no significant increase was observed in the number of schools that offered fruit (from 75% to 76%), lettuce, vegetable or bean salads (from 71% to 75%), 100% fruit juice or 100% vegetable juice (from 83% to 84%), and 1% or skim milk (from 80% to 79%).

Little significant improvement was observed in food preparation practices as shown in Table 3. The only significant favorable change was found from the number of high schools that used part-skim or low-fat cheese instead of regular cheese, that is, from 51% to 63% in 2007 ($P = 0.012$). Marginally, significant changes were observed in the number of schools that used vegetable oil instead of shortening, butter, or margarine ($P = 0.061$) and those that used ground turkey or lean ground beef instead of regular ground beef ($P = 0.054$).

When the changes in food policy and preparation practices between 2006 and 2007 were examined by type of schools, enrollment size, percentage of students on free or reduced price lunch, and percentage of racial/ethnic minority students, it was found that favorable changes were more pronounced in public schools than in non-public schools. As Table 4 shows, no significant differences between the percentage of public schools and non-public schools in

Table 1. Characteristics of Sampled High Schools (N = 150) in 2007

Characteristics	n (%)
Type of school	
Public	135 (90)
Non-public	15 (10)
Enrollment size	
Less than 500	48 (32)
500 to 999	57 (38)
1000 to 1999	28 (19)
2000 or greater	13 (9)
Percentage of students on free or reduced price lunch	
Less than 10%	15 (10)
10% to 19%	31 (21)
20% to 29%	46 (31)
30% or greater	53 (35)
Percentage of racial/ethnic minority students	
Less than 10%	82 (55)
10% to 24%	49 (32)
25% to 49%	15 (10)
50% or greater	4 (3)

Note. The total may not add to 150 due to missing values.

2006 that offered non-low-fat baked goods and salty snacks and prohibited junk foods from being offered became significant or marginally significant in 2007 when the local wellness policy had been in place. The same pattern of relationship was noted in two food preparation practices, i.e., using vegetable oil instead of shortening, butter, or margarine and roasting meat or poultry on a rack so the fat would drain. The percentage of students on free or reduced price lunch (referred to as "% FRPL" hereafter) was associated with a significant change in one food policy, i.e., "Students can purchase baked goods not low in fat, salty snacks not low in fat, chocolate candy, other kinds of candy, or soda pop during any school hours when meals are not being served." In 2006, there was no significant association between maintaining such a policy and % FRPL ($\chi^2 = 0.50$, $df = 3$, $P = 0.920$). However, in 2007, a significant association was found ($\chi^2 = 8.07$, $df = 3$, $P = 0.045$) with the biggest change found in schools with a 30% FRPL or greater. Whereas 47% of the schools with a 30% FRPL or higher maintained such a policy in 2006, only 19% did so in 2007. School enrollment size and percentage of racial/ethnic minority students were not associated with any of the food policy and preparation practices either in 2006 or in 2007. Results of analyses with and without the surveys completed by those other than school food service directors or managers were not different. Also, type of schools, enrollment size, % FRPL, and percentage of racial/ethnic minority students were not significantly different between schools with complete responses and those with missing values.

A review of the collected wellness policy documents revealed substantial discrepancy among different LEAs and school districts in the local wellness policies. Some policies were just one-and-a-half pages long with soft language such as "schools will encourage" or "schools will strive." Other policies were nine pages long with binding statements. Among the examples of these favorable statements are "The schools shall provide at least 30 minutes daily for student lunch periods," "All students who bring lunches from home will not be allowed to bring carbonated beverages for their drink," and "School carbonated soft drink vending machines are turned off during lunch breaks from 11:00 am to 1:00 pm." About half the collected wellness policies included a provision to ensure minimal duration for students' eating such as "Students will be provided with at least 10 minutes to eat after sitting down for breakfast and 20 minutes after sitting down for lunch" and a provision on the proportion of healthy products offered in the vending machine such as "All vending machines must have a minimum of 50% nutritious products available to students." The vast majority of the reviewed policies included a provision to provide a training opportunity for food service staff although wordings varied. Some policies state, "Staff members who provide nutrition education shall have the appropriate training" while others are more concrete, stating, "Food service staff will be given the opportunity to attend at least one workshop, meeting or training type experience per year."

DISCUSSION

This is the first data-based research that used a prospective cohort of a representative sample of statewide secondary schools to investigate the impact of Section 204 of Public Law 108-265, the Child Nutrition and WIC Reauthorization Act of 2004, on actual school food policies and food preparation practices. The findings of this study indicate that many positive improvements were made in food policy and practices among Indiana high schools after the local wellness policy was developed. However, the improvements were limited to a decrease in the number of schools that offered some unhealthy food choices, such as chocolate candy, non-low-fat cookies, crackers or salty snacks, and soda pop. No improvements were made in the number of schools that offered fruit, lettuce, vegetable or bean salads, 100% fruit juice or 100% vegetable juice, or 1%

Table 2. Changes in School Food Policy in Indiana High Schools (N = 150)

School Food Policy	Yes, n (%)		Δ in %[1]	*P*-value
	2006	2007		
Allows students to purchase foods and beverages from vending machines or at the school store, canteen, or snack bar	137 (91)	127(85)	-6	0.227
Offers chocolate candy	94 (63)	58 (39)	-24	<0.001
Offers other kinds of candy	88 (59)	58 (39)	-20	<0.001
Offers low-fat cookies, crackers, cakes, pastries, or other low-fat baked Goods	117 (78)	120 (80)	2	0.152
Offers cookies, crackers, cakes, pastries, or other baked goods that are not low in fat	119 (79)	80 (53)	-26	<0.001
Offers soda pop, sports drinks, or fruit drinks that are not 100% juice	125 (83)	95 (63)	-20	0.001
Offers salty snacks that are low in fat, such as pretzels, baked chips, or other low-fat chips	129 (86)	130 (87)	1	0.227
Offers salty snacks that are not low in fat, such as regular potato chips or cheese puffs	108 (72)	64 (43)	-29	<0.001
Offers fruit	113 (75)	114 (76)	1	0.377
Offers lettuce, vegetable, or bean salads	106 (71)	112 (75)	4	0.212
Offers 100% fruit juice or 100% vegetable juice	124 (83)	126 (84)	1	0.093
Offers pizza, hamburgers or sandwiches	110 (73)	113 (75)	2	0.200
Offers 1% or skim milk	120 (80)	119 (79)	-1	0.361
Can purchase baked goods not low in fat, salty snacks not low in fat, chocolate candy, other kinds of candy, or soda pop				
▪ before classes begin in the morning	95 (63)	78 (52)	-11	0.055
▪ during any school hours when meals are not being served	70 (47)	45 (30)	-17	0.002
▪ during school lunch period	93 (62)	57 (38)	-24	<0.001
Prohibits junk foods from being offered before classes begin in the morning or during any school hours or lunch periods	43 (29)	102 (68)	39	<0.001

Note. [1]The difference in percentage of schools that reported "yes" is shown (% in 2007 - % in 2006).

or skim milk. This reflects that the majority of schools' attitudes and approaches might be reactive rather than proactive, focusing on compliance with the law rather than on improving students' diets and health. This is further affirmed by the finding that little significant improvement was observed in food preparation practices except the schools that used part-skim or low-fat cheese instead of regular cheese.

These findings echo the position of the Institute of Medicine (IOM) that reported inconsistency in local education agencies (LEAs) or school districts' responses in meeting the local wellness policy requirements.[28] In this regard, the new school food standards, "Nutrition Standards for Foods in Schools: Leading the Way toward Healthier Youth," proposed by IOM in April 2007 appear to be very appropriate. The new standards recommend schools to offer more fruits, vegetables, whole grains, and nonfat or low-fat milk and dairy products.[28] In addition to adopting new school food standards, another way of achieving a healthful school eating environment would be to increase the professional qualifications of the individuals who manage school nutrition services programs. Although they have to juggle with many responsibilities which

Table 3. Changes in School Food Preparation Practice in Indiana High Schools (N = 150)

Food Preparation Practice	Almost always, n (%)		Δ in %[1]	*P*-value
	2006	2007		
Vegetable oil used instead of shortening, butter, or margarine	57 (38)	69 (46)	8	0.061
Part-skim or low-fat cheese used instead of regular cheese	77 (51)	94 (63)	12	0.012
Ground turkey or lean ground beef used instead of regular ground beef	52 (35)	66 (44)	9	0.054
Fat-trimmed from meat or lean meat used	78 (52)	89 (59)	7	0.074
Skin removed from poultry or skinless poultry used	97 (65)	99 (66)	1	1.00
Fat trimmed off warm broth, soup, stew, or gravy	93 (62)	100 (66)	4	0.532
Meat or poultry roasted on a rack so fat would drain	62 (41)	72 (48)	7	0.134

Note. [1]The difference in percentage of schools that reported "almost always" is shown (% in 2007 - % in 2006).

Table 4. Significant Changes in the Association between Type of School and Selected Food Policy and Preparation Practice in Indiana High Schools (N = 150)

	2006			2007		
	Public	Non-public		Public	Non-public	
Schools that reported "yes" to the following food policy questions	n (%)	n (%)	χ^2 (P-value)	n (%)	n (%)	χ^2 (P-value)
Offers cookies, crackers, cakes, pastries, or other baked goods that are not low in fat	107 (86)	12 (86)	.00 (0.953)	68 (60)	12 (86)	3.6 (0.057)
Offers salty snacks that are not low in fat, such as regular potato chips or cheese puffs	96 (74)	12 (86)	.87 (0.350)	54 (46)	10 (77)	4.6 (0.033)
Prohibits junk foods from being offered before classes begin in the morning or during any school hours or lunch periods	41 (31)	2 (13)	2.0 (0.153)	96 (77)	6 (43)	7.4 (0.006)
Schools that reported "almost always" to the following food preparation practice questions	n (%)	n (%)	χ^2 (P-value)	n (%)	n (%)	χ^2 (P-value)
Vegetable oil used instead of shortening, butter, or margarine	54 (42)	3 (21)	2.2 (0.138)	68 (55)	1 (8)	10.5 (0.001)
Meat or poultry roasted on a rack so fat would drain	55 (52)	7 (50)	.02 (0.894)	68 (64)	4 (33)	4.3 (0.038)

Note. The number of public and non-public schools may not add to 135 and 15, respectively, even after adding the number of other schools that reported "no" or "never, rarely or sometimes" because of missing values.

Table 5. Survey Instrument

1. Are students allowed to purchase foods and beverages from vending machines or at the school store, canteen, or snack bar? Yes ( ) No ( )

2. If yes to Question 1, during a typical week, are students at your school offered the following selections?

a. Chocolate candy Yes ( ) No ( )
b. Other kinds of candy Yes ( ) No ( )
c. Low-fat cookies, crackers, cakes, pastries, or other low-fat baked goods Yes ( ) No ( )
d. Cookies, crackers, cakes, pastries, or other baked goods that are not low in fat Yes ( ) No ( )
e. Soda pop, sports drinks, or fruit drinks that are not 100% juice Yes ( ) No ( )
f. Salty snacks that are low in fat, such as pretzels, baked chips, or other low-fat chips Yes ( ) No ( )
g. Salty snacks that are not low in fat, such as regular potato chips or cheese puffs Yes ( ) No ( )
h. Fruit Yes ( ) No ( )
i. Lettuce, vegetable, or bean salads Yes ( ) No ( )
j. 100% fruit juice or 100% vegetable juice Yes ( ) No ( )
k. Pizza, hamburgers, or sandwiches Yes ( ) No ( )
l. 1% or skim milk Yes ( ) No ( )

3. Can students purchase baked goods not low in fat, salty snacks not low in fat, chocolate candy, other kinds of candy, or soda pop…

a. Before classes begin in the morning? Yes ( ) No ( )
b. During any school hours when meals are not being served? Yes ( ) No ( )
c. During school lunch periods? Yes ( ) No ( )

4. Junk foods are foods which provide calories primarily through fats or added sugars and have minimal amounts of vitamins and minerals. Has your school adopted a policy prohibiting junk foods from being offered at these times? Yes ( ) No ( )

5. Please tell us how often the following practices are used when preparing food for your school. During the past 30 days, how often …

a. Vegetable oil used instead of shortening, butter, or margarine?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )
b. Part-skim or low-fat cheese used instead of regular cheese?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )
c. Ground turkey or lean ground beef used instead of regular ground beef?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )
d. Fat trimmed from meat or lean meat used?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )
e. Skin removed from poultry or skinless poultry used?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )
f. Fat skimmed off warm broth, soup, stew, or gravy?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )
g. Meat or poultry roasted on a rack so fat would drain?
Never ( ) Rarely ( ) Sometimes ( ) Almost Always or Always ( )

6. Can you tell us brief information about your school?

Type of school Public ( ) Private ( )
Percentage of racial/ethnic minority students in your school
Less than 10% ( ) 10% to 24% ( ) 25% to 49% ( ) 50% or greater ( )

often conflict with each other and deal with various tasks including menu planning, food purchasing, and meal preparation practices, many LEAs and school districts just require only a high school diploma or GED as the minimum educational requirement for a new hire.[22]

It is noted that favorable changes after the local wellness policy requirements were enforced in school food policy and preparation practices were more pronounced in public schools than in non-public schools, although the wellness policy requirements applied to non-public schools as well, including religious private schools and charter schools.[29] This could be due to the fact that non-public schools were allowed to develop their own wellness policy[26] or might be more oriented toward generating program revenue than public schools. Related to this, it should be noted that all the schools with a 30% FRPL or higher that made a favorable policy change in terms of availability of unhealthy foods or drinks at schools are public schools. These findings indicate the need for more efforts and effective policy approaches that can lead to healthier food environment at non-public schools.

The finding that schools with a high % FRPL made a favorable policy change in terms of availability of unhealthy foods or drinks at schools might indicate two possible interpretations. One is the regression effect (i.e., an initially low score would improve after a pretest because of statistical regression toward the mean). However, this interpretation is unlikely the case because there was no significant difference between schools with a high % FRPL and with a low % FRPL in maintaining such a policy in 2006. Another interpretation would be that schools with a higher % FRPL might be more conforming to laws and regulations than schools with a lower % FRPL. This is a plausible explanation as schools with a higher % FRPL receive higher amounts of reimbursement from the Department of Agriculture than those with a lower % FRPL. Schools that receive large subsidies from the federal government might be more responsive to federal laws and regulations.

Further research is warranted to track long-term changes in school food policy and food preparation practices and to elucidate factors that lead to different levels of healthful school eating environment. The findings of this study suggest that although significant improvement was made in reducing unhealthy foods available at schools, more improvement should be made in food preparation practices and providing more healthy foods.

Limitations

These findings are subject to limitations. One limitation is the findings might have been biased by self-reports. However, wellness policy documents of randomly chosen participating schools were reviewed against the self-reported responses to school food policy questions and a high consistency was noted between them. Second, caution is needed in inferring causal relationships from the study findings as no active experimental control was placed to guard against confounding due to extraneous variables. However, the prospective cohort design with measurements taken before and after the local wellness policy requirements were enforced does lend to the evidence of an improvement in reducing unhealthy food choices offered at schools due to the wellness policy requirements. Third, the findings should be only generalized to public and non-public high schools in Indiana. Despite these limitations, this study contributes to the literature by providing an insight into the effects of the local wellness policy requirements.

TRANSLATION TO HEALTH EDUCATION PRACTICE

The findings from this study indicate that only limited improvement was made in food choices offered at secondary schools after the local wellness policy was developed. Although significant improvement was made in reducing unhealthy foods available at schools, such as chocolate candy, non-low-fat cookies or crackers, soda pop, and non-low-fat salty snacks, no significant increase was observed in the number of schools that offered fruit, vegetable salads, 100% fruit or vegetable juice, and 1% or skim milk. These findings, along with the Institute of Medicine Report,[28] strongly suggest the need for proactive implementation of school food policies rather than reactive compliance of the related law in order to improve students' diets and health, which should include offering more fruits, vegetables, 100% fruit or vegetable juice, and nonfat or low-fat milk and dairy products. It was alarming and disappointing to find such a large discrepancy among different LEAs and school districts in the local wellness policies. Some LEAs and school districts have almost empty wellness policies whereas others have stepped up to the level beyond what was required by the law. There is a strong need to ensure a minimum level of standard for the school wellness policy across all different types of schools. Perhaps school health educators and professionals need to advocate the adoption of a minimum federal standard for the school wellness policy rather than allowing each LEA or school district to develop its own wellness policy. In the meantime, school health educators need to benchmark exemplary local wellness policies and disseminate them to help many LEAs and school districts. In improving local wellness policies, one of the critical tasks of school health educators and administrators would be to develop policies that can be measured. Examples of such policies include "All students will receive physical activity for 150 minutes for elementary and 225 minutes for middle school per week," "Vending machines filled only with water will be available to students throughout the buildings at any time," and "Food service staff will be given the opportunity to attend at least one workshop, meeting, or training type experience per year." An example of a bad policy that cannot be measured is "Staff members who provide nutrition education shall have the appropriate training."

Also, the findings from this study indicate that school food service directors and school administrators should make an effort to improve food preparation practices as little improvement was observed even after the local wellness policy was developed.

It may include using vegetable oil instead of shortening, butter or margarine, using ground turkey or lean ground beef instead of regular ground beef, trimming fat from meat or using lean meat, removing the skin from poultry or using skinless poultry, skimming fat off of warm broth, soup, stew, or gravy, and roasting meat or poultry on a rack so the fat would drain. Based on the findings from this study, school policies may need to be developed to encourage more non-public schools to offer their students healthy food choices and implement healthful food preparation practices.

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