Title: Early Impact of the Federally Mandated Local Wellness Policy on School Nutrition Environments Appears Modest in Colorado’s Rural, Low-Income Elementary Schools

Abstract: To increase opportunities for healthy eating and physical activity, United States school districts participating in the National School Lunch Program were required to create a Local Wellness Policy (LWP) by June 2006. The What’s Working project described the initial impact of this mandate on nutrition environments and policies. In 2005 and 2007 (before and after the mandate went into effect), a survey about school features related to nutrition and physical activity was sent to a random sample of 45 low-income, rural elementary food service managers (FSMs) and principals. Schools averaged 204 students and 27% Hispanic. Districts’ LWPs were coded for strength and comprehensiveness. In addition, key informant interviews were conducted with FSMs almost two years after the LWP went into effect. Three improvements were observed: increases in the percent of schools with policies stipulating predominantly healthy items be offered in classroom parties (21.4% in 2005 vs. 48.7% in 2007), daily fresh fruit offerings in the lunchroom (0.80 in 2005 vs. 1.15 in 2007), and the % of schools using skinless poultry (27% in 2005 vs. 59% in 2007). LWPs were weakly worded and rarely addressed calorie content. Nutrition guideline elements most commonly addressed included vending machines, school stores, and a la carte food offerings. 73% of FSMs were familiar with their district’s LWP but did not perceive it changed lunchroom practices. While LWPs offer a framework to support opportunities for healthy eating, few evidence-based practices were implemented as a direct result of the mandate. Schools need more information about evidence-based practices, as well as technical and financial assistance for implementation.
February 16, 2010

RE: Ref.: Ms. No. ADAJ-D-09-00417

Dear Editor:

We greatly appreciate the reviewer comments we received September 25, 2009 on our manuscript entitled “Early Impact of the Federally Mandated Local Wellness Policy on School Nutrition Environments Appears Modest in Colorado’s Rural, Low-Income Elementary Schools” (originally submitted to JADA July 26, 2009). Attached, please find a revised manuscript (now in Research Brief format per reviewers’ comments), tables 1 and 2, and a point by point response to reviewer comments.

As a reminder, we have a “sister” paper related to the initial impact of the local wellness policies on physical activity published in a special issue of the Journal of Public Health Policy (February 2009). Please do not hesitate to let me know if you would like an electronic version of that paper to aid in the review process. The full citation is: Belansky ES, Cutforth N, Delong E, Ross C, Scarbro S, Gilbert L, Beatty B, Marshall JA. Early Impact of the Federally Mandated Local Wellness Policy on Physical Activity in Rural, Low Income Elementary Schools. J Public Health Policy. 2009;30: S141-S160.

If you have any questions or require further information, please contact me at Elaine.belansky@ucdenver.edu or at 720-530-3642. Thank you for considering this manuscript.

Sincerely,

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University of Colorado Denver, Colorado School of Public Health
Early Impact of the Federally Mandated Local Wellness Policy  
on School Nutrition Environments Appears Modest in Colorado’s Rural, Low-Income Elementary Schools

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**Key Words**: local wellness policy, childhood obesity, elementary schools, nutrition, rural, low income

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Response to Reviewers’ comments

Reviewer #1:

Table 2: Could be deleted and described in the text or condensed to just report the significant changes.

Table 2 shows trends in school-level nutrition features both inside and outside the lunchroom. We condensed the table significantly (it used to have 24 indicators; it now has 13).

We kept some non significant trends in Table 2 in order to make the point that many evidence-based practices associated with increasing fruit and vegetable consumption did NOT get implemented as a result of the Local Wellness Policy.

Table 3: The analysis used is unclear from the information given.

This table was removed from the manuscript in order to comply with Research and Professional Brief parameters (maximum of 2 tables). We retained the narrative but added more information about the analyses in the analysis subsection of the methods section.

Page 11 lines 76-83: Did the authors define the size of the districts or were the school districts already defined in this way?

We did not define the size of the school district. We randomly selected school districts that had at least 40% of the student population qualifying for free/reduced lunch AND were designated by the Colorado Department of Education as either rural or outlying towns. Due to space limitations, we did not add further explanation to the narrative but can do so if the reviewer thinks this information would be useful.

Page 14 lines 143-146: What is the rationale for identifying the researchers?

We removed the researchers’ names. See 126.

Page 18 line 253: There is a ? after CDE.

We removed the “?”.

Page 22 Conclusions: The recommendations are vague and don’t seem consistent with the discussion of results. The manuscript describes the limited impact of evidence-based practices yet recommends this approach at the end. Do the data suggest a different approach might be effective?

We fine tuned the wording of the conclusions to make our points more concise and pertinent to the results section. In cases where we make recommendations that aren’t supported by data presented in the results, we cite other studies/papers. See 221-240.

One point of clarification: The manuscript does not describe the limited impact of evidence-based practices. Rather, the manuscript describes the limited impact
of the LWP in getting schools to implement evidence-based practices. This is why we are recommending schools get additional assistance to implement important but difficult to make changes. In other words, an unfunded mandate with minimal implementation resources is not enough for schools to make important changes. Federal mandates such as the LWP should be accompanied with resources to assist schools in making difficult but important changes.

The statistics software used is not identified.
We added this information. See 90.

Recommend the manuscript be changed to research & professional brief. The sample size is too limited to make broad inferences from the results. The narratives from participants are interesting, but don’t necessarily add to the overall outcome of the research. The description of statistical analysis needs more explanation.
We converted the manuscript to a research and professional brief. This format allows only a maximum of two tables. Therefore, we removed table 1 re: participation rates (and referred the reader to another paper that includes this information) and removed table 3 as described above.

To reduce the number of words from 3500 to 2000, we shortened the first paragraph of the paper, shortened the section about the foodservice managers’ knowledge and attitudes regarding the local wellness policy and removed most of the quotes, removed the section on food insecurity, and cut down on words everywhere possible. The manuscript currently has approximately 2337 words (excluding abstract).

Both reviewers commented on the small sample size and the importance of not making broad inferences from the results. We randomly selected 45 out of 72 eligible low income, rural elementary schools in Colorado. Thus, the random sample represents 63% of eligible rural, low income elementary schools in Colorado. However, since not all 45 schools responded to the survey each year (response rate ranged from 71\% [n=32] to 91\% [n=41]), we need to be careful about making broad inferences and added this caution at the end of the results/discussion section. See 219.

We added more description about the statistical models we tested in the “Analysis” subsection of the methods. See 90-100.

Reviewer #2:

Title:
Title conveys the primary focus of the research.
No response required.
Abstract:
Design: Indicate who completed the surveys. Include time frame.
Setting: Include student enrollment of schools (range) and race/ethnicity information
Results: Include what percentage of foodservice managers were familiar with their district LWP. Include years associated with data (i.e. 21.4% in 2005 versus 48.7% in 2007).
Due to converting this paper to a research brief, we modified the abstract to be “unstructured”. We incorporated every suggestion made here. See 1-24.

Introduction:
Line 2: Include the target audience (promoting health behaviors of children and adolescents).
Done. See 27.

Line 4: Cite reference
Removed text to shorten article.

Line 6: Cite reference
Removed text to shorten article.

Lines 6-11: Cite literature to support statements.
Removed text to shorten article.

Line 17: Change reference listing to 4-8.
Done. See 29.

Line 21: Suggest moving reference for SNDA study to after the word "assessment"
Removed some of the text to shorten article.

Line 29: Provide explanation for why schools are not required to follow best practices.
Removed text to shorten article.

Line 43: Suggest changing assure to ensure
Done. See 104.

Lines 47-48: Include who was responsible for providing oversight for compliance/evaluation of the mandated LWP.
We removed this section to shorten article.

Line 68: How does the current study build upon the results of previous research in this area?
Our study is the first we know of to examine school building environment and policy changes before/after the wellness policy went into effect. Other published
studies on the LWP focus on the contents of the district policy and strength of wording. These studies are described in our paper. However, immediately after we submitted the manuscript for review in July, a report from “Bridging the Gap” was published. We added that study to this section (see 44). We also added this sentence: “The present study builds on previous research by investigating changes in low-income, rural Colorado elementary school lunchrooms, classrooms, and other areas of the school building in addition to school-wide policies related to nutrition.” See 55.

Methods:
Why were rural elementary schools selected as the sample? What about elementary schools in urban settings? Has this issue been examined previously?

Rural schools were selected in order to serve as a control group for an intervention being conducted in a rural, low-income part of the state. We were able to add 45 randomly selected schools from a large urban school district AFTER the LWP went into effect. To date, we do not know of any research group who has looked at before/after LWP school building changes in urban settings. Due to word limitations with the research brief, we do not describe all of this information in the manuscript. However, if the reviewer feels it is important to do so, we will.

Line 76: Indicate what percentage of randomly selected schools that fit the inclusion criteria participated in this study. Why were other schools excluded?

Define grade levels (i.e. K-5).
We added the following language: “A random sample of 45 (out of 72 eligible) rural Colorado elementary schools in which at least 40% of students received free or reduced-cost lunch was established in fall 2005 to serve as a control group for an intervention.” See 65.

We added grade levels but then due to the word limits for a research brief ended up removing that. We hope that “elementary school” will be sufficient.

Line 87: Cite reference number only
Done.

Line 89: What are the three modules? List out.
We condensed the narrative here and removed reference to 3 modules. See 72.

Lines 91-93: Describe how the other items on the survey instrument were developed and tested.
Due to space restrictions, we did not do this. However, the reader can go to the CATCH article for this information. See 74.

Line 102: State which school personnel completed the SEPS
Done. See 84.
Lines 108-119: Include this information under a separate heading labeled "Analysis". Also include the statistical analysis program used and define the level of statistical significance.
Done. See 90.

Lines 112-113: Clearly describe each model used in the analysis.
We added an example to the Analysis subsection but are not sure if the reviewer would like even more information provided. See 100. Below, we show the SAS code to help the reviewer decide if more detail is warranted in the manuscript:

For binomial variables:

```
proc genmod descending;
   class schoolid year ;
   model fruitline=year /dist=binomial link=logit;
   repeated subject=schoolid /type=cs;
run;
```

For continuous variables:

```
proc mixed method = ml data= tpnulnfv;
   class year ;
   model nulnfv = year /solution;
   random int/ subject=schoolid;
   format year yr.;
run;
```

Lines 122-123: List out the seven subsections for the reader.
We listed these out but because we were over the word limit, we ended up having to remove them.

Line 126: Include the range of scores.
Due to space limitations, we refer the reader to Table 3 in reference 20 for more information.

Lines 134-137: Suggest moving statements to results section.
Done. See 163.

Lines 137-139: Was training provided to the reviewers? Who served as reviewers?
We added some language about the reviewers and a training session they received. See 110.

Lines 146-148: Were the questions utilized in the key informant interviews pretested prior to use in this study? Please describe.
They were not pilot-tested; however, we asked similar questions of the principals, classroom teachers, and superintendents the year prior so knew that at least some of the questions worked. Unfortunately, due to space limitations, it is not possible to go into this detail in the manuscript.

Results:
Line 189: Cite reference number.
Done.

Line 202: Cite reference number.
Done.

Line 226: Write out abbreviation "CASB".
Done. See 174.

Lines 258-263: Put statement in quotes.
Due to space limitations, we removed this quote.

Line 253: Does this training program include content pertaining to the LWP?
Trainings about the LWP were offered through the Colorado Department of Education nutrition unit. We added some language about this. See 197-200.

Line 274: Include % of schools
We added the number of schools. See 202.

Discussion:
Begin the discussion section by restating the primary aims of the study and the key findings.
Due to this manuscript being converted to a research brief, the results and discussion section have been combined.

Could the differences in demographic characteristics of the schools and participants reported in lines 157-160 affected the overall results? The authors should address this in the discussion.
This is a good question and would require additional analyses to see if relationships exist among school size, % free and reduced lunch and variables such as LWP strength, comprehensiveness, and environment/policy changes. Other researchers (e.g., in Connecticut and Utah) have looked at these types of relationships. However, due to the space limitation of turning our manuscript into a research brief, we aren’t able address this question here.

Line 347: Other limitations of the study include: limited generalizability, and social desirability bias.
We added these limitations to the weaknesses. See 213-216.
Lines 350-351: Inform the reader of new resources that are available. Describe areas for future research. 
*We added an Action for Healthy Kids resource and the need for longer term follow up studies. See 217 and 232.*

Conclusions:
Lines 360-361: From the authors' perspective, how can the attitudes and behaviors of school administrators be changed around the issue of school wellness?  
*We added language about showing school leaders evidence regarding the link between academic achievement and healthy behaviors. See 228-233.*

References and Tables:
Line 388: Fulderson should be changed to Fulkerson.  
*Done.*

Line 392, 404, and 454: Check citation format.  
*Done.*

Lines 435-438: Include date information was accessed.  
*Done.*

For tables 1-3, suggest include "school year" across columns.  
*Done.*

Did the authors examine a test for trend across years 2005-2007?  
*No we did not. We have a companion paper on the early impact of the LWP on physical activity and did examine the trend across years for that paper. But the reviewers were concerned that the test was not a fair one due to the timing of the LWP. While the district policy needed to be in place before the start of the 2006 year, it was unclear whether schools had sufficient time to implement aspects of the plan by the start of the 2006 school year (when the SEPS is completed). Thus we all agreed that a more fair test was to compare 2005 to 2007.*

For tables 2 & 3, indicate the level of statistical significance for p-values in footer.  
*Done.*

For table 3, include an * to indicate statistical significance for "% of schools serving skinless poultry".  
*We removed this table.*

For table 3 it is confusing to list both "n's" together.  
*We removed this table.*
ABSTRACT

To increase opportunities for healthy eating and physical activity, United States school districts participating in the National School Lunch Program were required to create a Local Wellness Policy (LWP) by June 2006. The What's Working project described the initial impact of this mandate on nutrition environments and policies. In 2005 and 2007 (before and after the mandate went into effect), a survey about school features related to nutrition and physical activity was sent to a random sample of 45 low-income, rural elementary food service managers (FSMs) and principals. Schools averaged 204 students and 27% Hispanic. Districts' LWPs were coded for strength and comprehensiveness. In addition, key informant interviews were conducted with FSMs almost two years after the LWP went into effect. Three improvements were observed: increases in the percent of schools with policies stipulating predominantly healthy items be offered in classroom parties (21.4% in 2005 vs. 48.7% in 2007), daily fresh fruit offerings in the lunchroom (0.80 in 2005 vs. 1.15 in 2007), and the % of schools using skinless poultry (27% in 2005 vs. 59% in 2007). LWPs were weakly worded and rarely addressed calorie content. Nutrition guideline elements most commonly addressed included vending machines, school stores, and a la carte food offerings. 73% of FSMs were familiar with their district's LWP but did not perceive it changed lunchroom practices. While LWPs offer a framework to support opportunities for healthy eating, few evidence-based practices were implemented as a direct result of the mandate. Schools need more information about
evidence-based practices, as well as technical and financial assistance for implementation.

INTRODUCTION

Public schools are an important setting for promoting health behaviors of children and adolescents (1,2). Several school environment and policy features relate to increased healthy food consumption: high availability of fruits and vegetables and low accessibility of high fat/sugar items (3-7); recess before lunch (8-9); verbal encouragement to choose fruits and vegetables (6); taste tests (10); farm-to-school programs (11); offer [vs. serve] for the school meal program (12); removing sweetened beverages and school stores, and not offering French fries (13); government fruit and vegetable programs, removing a la carte, vending, snack bar, school store and dessert items (14).

Local Wellness Policies

In response to the childhood obesity epidemic, the US government issued a mandate under the Child Nutrition and Women Infants and Children Reauthorization Act of 2004 requiring school districts participating in the National School Lunch Program to create a Local Wellness Policy (LWP) by June 2006 (15). The intent of the LWP was to increase opportunities for healthy eating and physical activity.

The mandate was written in a way that allowed districts to set minimal standards in order to reach compliance, thus potentially compromising the goal of increasing opportunities for physical activity and healthy eating (16, 17). Districts were able to set general rather than specific goals (18) and use weak wording
such as “encourage” rather than “require” (19). In addition, there was no funding
to support initiatives mentioned in LWPs, nor penalties for inaction.

Colorado researchers were one of the first groups to describe changes in
school environment and policy features that occurred after the LWP was
implemented (20). Among rural, low income Colorado elementary schools,
opportunities for physical activity did not change after the mandate went into
effect. LWPs had weak language in all dimensions and particularly in nutrition
guidelines and physical education, indicating that policies did not include strong
wording such as “require” or “mandate.”

The present study builds on previous research by investigating changes in
low-income, rural Colorado elementary school lunchrooms, classrooms, and
other areas of the school building in addition to school-wide policies related to
nutrition. Study goals were to describe the following: 1) changes in evidence-
based practices related to healthy food consumption before and after LWP
implementation; 2) contents of districts’ LWPs related to nutrition, including
comprehensiveness and strength of LWP wording; and 3) school foodservice
managers’ (FSMs) impressions about the impact of the LWP on school cafeteria
practices.

METHODS

Study Sample - A random sample of 45 (out of 72 eligible) rural Colorado
elementary schools in which at least 40% of students received free or reduced-
cost lunch was established in fall 2005 to serve as a control group for an
intervention study. The random sample comprised 40 school districts (one district had 4 schools; two districts each had 2 schools).

School Environment and Policy Survey (SEPS) - The Rocky Mountain Prevention Research Center created the SEPS to track environment and policy features related to healthy eating and physical activity (see 20 for more information.) Some foodservice items came from the Eat Smart Guidelines section of the CATCH foodservice survey (21).

Principals were asked to categorize the presence and enforcement of policies about nutrition content of items sold in schools using the following categories:

1. No policy exists, written or unwritten.
2. There is an *unwritten* policy that is *always or almost always* enforced.
3. Written policy exists but is never or almost never enforced.
4. Written policy exists and is sometimes enforced.
5. Written policy exists and is always or almost always enforced.

Response options 2–5 were collapsed into a “written or unwritten policy exists” category. Principals, FSMs, and physical education teachers completed the SEPS once in fall 2005, one year before the LWP went into effect, and twice after the LWP went into effect: fall 2006 and fall 2007. The baseline survey in fall 2005 was implemented eight months prior to the deadline for districts to have a LWP in place, and six months after the Colorado legislature passed a bill that encouraged school boards to adopt the LWP.
Analyses - Analyses were performed using SAS version 9.2 (22). A $P$ value of $<0.05$ was considered significant. To test for trends with a binary variable, the Generalized Estimating Equations with a binomial distribution, logit link and compound symmetry correlation structure was used. In the case of a continuous variable, the General Linear Mixed Model with the maximum likelihood estimation method for the covariance parameters and a variance components covariance structure was used. Both types of analyses used a random-effects model that allowed for an unbalanced design, i.e. schools with data for either or both years were included, to increase study power. The models for both binomial and continuous variables included a random school effect (e.g., Number of daily fresh fruit lunch choices = year05vs07 + random school effect). Because some LWP components may have been implemented the year after the mandate went into effect, the main test of LWP impact was 2005-06 vs. 2007-08. Additional analyses restricted to schools with data at both time points were conducted to ensure that estimates of trends over time were not biased by the unbalanced design. While statistical power was reduced, the estimated trends over time were similar and are not presented here.

Coding LWPs - A tool developed by grantees of the Robert Wood Johnson Foundation Healthy Eating Research Program was used to code LWPs (23). It contained 96 items, organized into 7 subsections including nutrition guidelines for competitive & other foods distributed at school. Two research assistants received training from coding tool creators, independently rated each policy statement (inter-rater agreement = 85%), then met to reach 100% agreement on ratings.
Contents of the LWP were coded both for comprehensiveness (how many different topic areas the policy covered) and strength (the degree to which the policy language was specific and required action). Each item in a subsection received a score. For example, the nutrition guidelines section contained 29 items, such as “regulates vending machines”. This was coded as follows: 0) Not mentioned; 1) Vague, suggested, overridden by principal’s discretion, or time specific (e.g., “vending machines shall include items which are healthful” or “vending machines shall be unplugged during lunch hour”; and 2) Indicates regulation of all vending machine items or umbrella statement regulating “all foods” or “competitive foods”. Comprehensiveness and strength scores for each of the 7 subsections can be found elsewhere (Table 3, p. S151 [ref 20]).

**FSM Key Informant Interviews** - Eighteen of the 45 schools were randomly selected to participate in key informant interviews. Thirteen schools agreed to participate and were each compensated $300. Two researchers conducted interviews with 11 of the 13 FSMs between January and May 2008 (in one case the FSM was absent and two assistants were interviewed). Interviews lasted 15 - 30 minutes and focused on FSM’s knowledge and familiarity with their district’s LWP and how they perceived the LWP had impacted their lunchroom and school environment. The Colorado Multiple Institutional Review Board approved the study protocol, and all FSMs provided written informed consent. Interviews were audio-taped and transcribed for analysis. Interviewers used the constant comparison method (24), once individually and once collectively, to discuss and record emerging patterns and themes.
RESULTS AND DISCUSSION

School Demographics – Demographics including participation rates are described elsewhere (Table 1, p. S147 [ref 20]).

School Environment and Policy Trends Related to Nutrition – The first set of analyses examined whether evidence-based practices associated with healthy eating changed once the LWP went into effect. These analyses considered policies and practices reported at the school level by principals and FSMs but did not take into account the specific content of the LWP.

Table 1 shows trends inside the lunchroom (reported by FSMs unless otherwise noted with an ^) and outside the lunchroom (reported by principals) before and after implementation of LWPs, as measured by the SEPS. Inside the lunchroom, there was an increase in the number of fresh fruits offered daily (.8 choices in 2005 vs. 1.15 choices in 2007; p<0.04). Outside the lunchroom, there was an increase in the percentage of schools stipulating predominantly healthy foods and beverages be offered in classroom parties (21.4% vs 48.7%; p<0.04). There were no changes in daily offerings of vegetables, % of schools getting produce from local farmers, % offering candy/high fat snacks in a la carte, % offering fruit/vegetables in a la carte, % with lunchroom monitors instructed to encourage students to eat their fruits and vegetables. A positive but non significant trend was observed for schools stipulating predominantly healthy foods and beverages in vending machines.

--INSERT TABLE 1 HERE--
The next set of analyses examined trends in lunchroom food preparation as reported by FSMs before and after LWP implementation, as measured by the SEPS. One change was found: more schools reported using skinless poultry (26.67% in 2005 vs. 58.82% in 2007; p<0.01).

*Contents of the LWP Nutrition Guideline Subsection*—LWPs were obtained from 32 of the 40 school districts. School demographics of the 32 districts did not differ significantly from the 8 districts that did not furnish LWPs. The most commonly addressed nutrition guidelines included regulations for vending machines, school stores, and food service a la carte (see Table 2). However, guidelines addressing calorie content for foods and/or beverages and limiting the use of unhealthy ingredients were rarely or never addressed. Nutrition guidelines had low “strength” scores, indicating policies did not include strong wording such as “require” or “mandate.” It was more common to see wording like, “It will be encouraged that all foods and beverages available on school grounds meet or exceed District’s nutrition standards”. Weak wording such as “encouraged” is not surprising considering the LWP template from the Colorado Association of School Boards contained strong wording for only 19 of 96 items (see Table 3, p. S151 [ref 20]).

---INSERT TABLE 2 HERE---

Similar to Utah (25), it was uncommon for districts to mandate a practice not already required by the state (e.g., in Colorado, only 3% of districts mandated vending guidelines). Even in the case of federally mandated wellness guidelines
about foods available on campus, only 51% of districts had language that
required schools to comply.

*LWP Content and Trends in Nutrition Environment* – 89% of districts
included a statement in their LWP that healthy foods be served at classroom
parties. Of those, 47% of schools reported a similar building policy but 53% of
schools did not. Thus, there was almost an equal probability of a school having
or not having a classroom party policy despite the district’s LWP. There was a
stronger correspondence between district policies and school practices for items
sold in vending machines. Of the 20 schools reporting vending machines, 15
were in districts that included LWP language about nutrition guidelines for items
sold.

*FSMs’ Knowledge, Attitudes, Perceived Impact of LWPs* -- 8 of the 11
FSMs were familiar with their district’s LWP. They read it and knew it was either
posted on their office wall or filed away. Two of the 11 helped write the policy.
None of the FSMs felt the LWP impacted their lunchroom practice in regard to
the nutritional content of meals, although several mentioned it influenced the food
served at classroom parties and the contents of school soda machines. Most
FSMs attached more importance to the Colorado Department of Education
(CDE) recommendations concerning menu planning, nutritional analysis,
reducing fat and salt content, and portion control which they learned through
trainings and workshops. FSMs rarely mentioned receiving CDE training on the
LWP though training was offered.
Five of 11 FSMs mentioned lack of financial resources preventing them from providing a broad selection of healthy foods. One FSM said, “We have fresh fruits and vegetables about twice a week; the state would want us to have them daily. They keep pushing us to do this but we only have a certain amount of money that only goes so far.” Another FSM remarked that if her budget allowed, she would buy more fruits and vegetables “like apples, oranges, cucumbers, broccoli, and peaches from across the mountain.” Most schools cannot buy fresh fruit and vegetables from local farmers due to health, safety, procurement and logistical requirements.

Strengths of the What’s Working study included a random sample of rural, low-income Colorado schools and a mixed methods approach using quantitative and qualitative strategies. Limitations included reliance on self-reported data from FSMs and principals; potential for social desirability bias; and study timing— which captured schools in the earliest phase of policy adoption and implementation. Because more resources are now available to help schools advocate for and implement change (e.g., Action for Healthy Kids Wellness Policy Tool), the examination of longer-term effects of the LWP are warranted. Finally, due to the small sample, it is important not to make broad inferences.

CONCLUSIONS

The LWP was intended to increase opportunities for healthy eating and physical activity at a time when 1 in 5 US children are obese (26). However, LWPs contained vague, weak language and only a few evidence-based practices have been implemented since it went into effect. Nutrition trainings hosted by CDE
appear to be a promising strategy for schools to implement evidence-based practices in the lunchroom. However, bigger foodservice budgets, more revenues, and increased ability to purchase local produce are needed to expand healthy offerings. For healthy eating opportunities to increase in other parts of the school building environment, such as foods in classrooms and/or vending machines, administrators need to elevate the importance of nutrition perhaps by being convinced of the link between nutrition and academic achievement. With the exception of school breakfast (27), these links have not yet been established and more research is needed. Finally, because of time constraints and competing pressures facing school administrators (20), there is an important role for university partners, the public health workforce, state departments of education, community partner agencies, and funders to play in assisting schools with implementing evidence-based changes aimed at increasing healthy eating opportunities. Ideally, federal mandates such as the LWP would include resources to provide schools with this type of external, expert technical assistance.
REFERENCES


<table>
<thead>
<tr>
<th>Inside the Lunchroom</th>
<th>School Year</th>
<th>P value for 2005 vs 2007*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of daily fresh fruit lunch choices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N, Mean (sd)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-2006</td>
<td>0.80 (0.71)</td>
<td></td>
</tr>
<tr>
<td>2006-2007</td>
<td>0.95 (0.76)</td>
<td></td>
</tr>
<tr>
<td>2007-2008</td>
<td>1.15 (0.89)</td>
<td></td>
</tr>
<tr>
<td>^Number of minutes for 5th grade lunch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N, Mean (sd)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-2006</td>
<td>Mean = 21.94 SD = 6.01</td>
<td>0.47</td>
</tr>
<tr>
<td>2006-2007</td>
<td>Mean = 23.15 SD = 6.66</td>
<td></td>
</tr>
<tr>
<td>2007-2008</td>
<td>Mean = 23.18 SD = 6.25</td>
<td></td>
</tr>
<tr>
<td>% of schools offering a salad bar some or every day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 30</td>
<td>6.67%</td>
<td></td>
</tr>
<tr>
<td>N = 39</td>
<td>12.82%</td>
<td></td>
</tr>
<tr>
<td>N = 33</td>
<td>15.15%</td>
<td></td>
</tr>
<tr>
<td>% of schools placing fruits at the front of the lunch line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 30</td>
<td>20.00%</td>
<td></td>
</tr>
<tr>
<td>N = 39</td>
<td>5.13%</td>
<td></td>
</tr>
<tr>
<td>N = 34</td>
<td>8.82%</td>
<td></td>
</tr>
<tr>
<td>% of schools placing vegetables at the front of the lunch line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 30</td>
<td>50.00%</td>
<td></td>
</tr>
<tr>
<td>N = 40</td>
<td>42.50%</td>
<td></td>
</tr>
<tr>
<td>N = 35</td>
<td>45.71%</td>
<td></td>
</tr>
<tr>
<td>% of schools offering a la carte food items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 27</td>
<td>59.26%</td>
<td></td>
</tr>
<tr>
<td>N = 35</td>
<td>51.43%</td>
<td></td>
</tr>
<tr>
<td>N = 35</td>
<td>57.14%</td>
<td></td>
</tr>
<tr>
<td>Outside the Lunchroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>^% with vending machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 31</td>
<td>45.2%</td>
<td></td>
</tr>
<tr>
<td>N = 40</td>
<td>52.5%</td>
<td></td>
</tr>
<tr>
<td>N = 38</td>
<td>52.6%</td>
<td></td>
</tr>
<tr>
<td>^Of those with vending machines, % that have soda/pop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 14</td>
<td>57.14%</td>
<td></td>
</tr>
<tr>
<td>N = 21</td>
<td>47.62%</td>
<td></td>
</tr>
<tr>
<td>N = 20</td>
<td>45.00%</td>
<td></td>
</tr>
<tr>
<td>^Of those with vending machines, % that have high fat/high calorie items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 14</td>
<td>50.00%</td>
<td></td>
</tr>
<tr>
<td>N = 21</td>
<td>24.00%</td>
<td></td>
</tr>
<tr>
<td>N = 20</td>
<td>40.00%</td>
<td></td>
</tr>
<tr>
<td>^% of schools with policies stipulating predominantly healthy foods and beverages be offered in classroom parties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 28</td>
<td>21.4%</td>
<td></td>
</tr>
<tr>
<td>N = 39</td>
<td>56.4%</td>
<td></td>
</tr>
<tr>
<td>N = 37</td>
<td>48.7%</td>
<td></td>
</tr>
<tr>
<td>^% of schools where lunch recess occurs before lunch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = 31</td>
<td>22.6%</td>
<td></td>
</tr>
<tr>
<td>N = 39</td>
<td>25.6%</td>
<td></td>
</tr>
<tr>
<td>N = 38</td>
<td>15.8%</td>
<td></td>
</tr>
</tbody>
</table>

^ Principal provided this information
* Model includes all observations (ex: 2005 n=30 and 2007 n= 34 for fresh fruit choices) but does not include year 2006 observations.

* $P<0.05$
Table 2. Nutrition Regulations and Guidelines for Competitive and Other Foods Distributed at School Included in School Districts’ Local Wellness Policies, % Districts Addressing Component, % Recommended, % Mandated (N=37)

<table>
<thead>
<tr>
<th>Policy Component</th>
<th>(% Addressing Component</th>
<th>% Recommend</th>
<th>% Mandate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Wellness Policy Requirement:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes nutrition guidelines selected by the local education agency for ALL foods available on each school campus during the school day with the objective of promoting student health and reducing childhood obesity</td>
<td>92%</td>
<td>41%</td>
<td>51%</td>
</tr>
<tr>
<td>Policy includes regulations about:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vending machines</td>
<td>95%</td>
<td>92%</td>
<td>3%</td>
</tr>
<tr>
<td>School stores</td>
<td>95%</td>
<td>92%</td>
<td>3%</td>
</tr>
<tr>
<td>Food service a la carte</td>
<td>95%</td>
<td>92%</td>
<td>3%</td>
</tr>
<tr>
<td>Food sold and served at class parties and other school celebrations</td>
<td>89%</td>
<td>89%</td>
<td>0%</td>
</tr>
<tr>
<td>Food from home for the whole class</td>
<td>84%</td>
<td>84%</td>
<td>0%</td>
</tr>
<tr>
<td>Food served before school</td>
<td>87%</td>
<td>84%</td>
<td>3%</td>
</tr>
<tr>
<td>Food served after school (beyond district-run after school programs)</td>
<td>87%</td>
<td>84%</td>
<td>3%</td>
</tr>
<tr>
<td>Food served at evening and community events on school grounds</td>
<td>86%</td>
<td>86%</td>
<td>0%</td>
</tr>
<tr>
<td>Food sold for fundraising</td>
<td>68%</td>
<td>65%</td>
<td>3%</td>
</tr>
<tr>
<td>Policy includes guidelines about:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limiting sugar content of foods</td>
<td>62%</td>
<td>59%</td>
<td>3%</td>
</tr>
<tr>
<td>Limiting fat content of foods</td>
<td>62%</td>
<td>59%</td>
<td>3%</td>
</tr>
<tr>
<td>Limiting sodium content of foods</td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Limiting calorie content per serving size of foods</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Limiting serving size of foods</td>
<td>68%</td>
<td>65%</td>
<td>3%</td>
</tr>
<tr>
<td>Increasing “whole foods”: whole grains, unprocessed foods, or fresh produce</td>
<td>43%</td>
<td>35%</td>
<td>8%</td>
</tr>
<tr>
<td>Limiting the use of ingredients with questionable health effects in food or beverages (e.g. artificial sweeteners, processed or artificial foods, trans fats, high fructose corn syrup [HFCS])</td>
<td>3%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Food not being used as a reward and/or withheld as a punishment</td>
<td>59%</td>
<td>54%</td>
<td>5%</td>
</tr>
<tr>
<td>Nutrition information available for foods other than school meals</td>
<td>22%</td>
<td>22%</td>
<td>0%</td>
</tr>
<tr>
<td>Limiting sugar content of beverages</td>
<td>11%</td>
<td>8%</td>
<td>3%</td>
</tr>
<tr>
<td>Limiting fat content of drinks (other than milk)</td>
<td>6%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Limiting calorie content per serving size of beverages</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Limiting regular (sugar-sweetened) soda</td>
<td>14%</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>Limiting beverages other than soda containing added caloric sweeteners such as sweetened teas, juice drinks, energy drinks and sports drinks</td>
<td>11%</td>
<td>8%</td>
<td>3%</td>
</tr>
<tr>
<td>Limiting sugar/calorie content of flavored milk</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Limiting fat content of milk</td>
<td>11%</td>
<td>8%</td>
<td>3%</td>
</tr>
<tr>
<td>Serving size limits for beverages</td>
<td>3%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Limiting caffeine content of beverages (with the exception of trace amounts of naturally occurring caffeine substances)</td>
<td>8%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Access to free drinking water</td>
<td>68%</td>
<td>3%</td>
<td>65%</td>
</tr>
</tbody>
</table>
Acknowledgements

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Conflict of Interest

None of the authors have any conflict of interest.
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