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Perceptions of Principals, Teachers, and School Food, Health, and Nutrition Professionals Regarding the Sustainability and Utilization of School Food Gardens

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Purpose/Objectives
The purpose of this study was to examine the perceptions of various school personnel who are key participants in child nutrition and wellness regarding the sustainability and use of school gardens.
Methods
A convenience sample of staff from schools with school gardens across the United States was established, consisting of: principals; teachers; and school food, health, and nutrition professionals. Two surveys from previous studies were combined to align with the research questions. The survey included 19 items addressing topics such as: the effectiveness of school gardens; sustainability of the school garden program; items produced in the gardens; how items were used from the gardens; and the potential impact school gardens may or may not have on produce offerings in school lunches. Questions addressing demographics, school garden usage, and sustainability of the garden were developed and included. The final instrument was reviewed for content and construct validity, and distributed electronically.
Results
Twenty-seven surveys were completed by representatives of the three various stakeholder groups. Of all the respondents, 55.6% (n=15) used garden produce in their cafeterias. Participants also reported that school gardens were used in core academic instruction for all grades, augmenting the pedagogy in math, science, nutrition, and environmental studies. The majority of schools had an interest in utilizing garden produce through a salad bar as a part of its meal program, although the findings revealed that most schools surveyed did not offer a salad bar. However, those who were more closely aligned with the daily operations of a school lunch program had a less enthusiastic response. Such individuals may have a more realistic perspective regarding the actual use and impact of school gardens in the meal program.
Applications to Child Nutrition Professionals
The results of this study are applicable to child nutrition professionals as a foundation to promote various uses of school gardens while recognizing the perceived barriers that must be overcome to ensure their success.

INTRODUCTION

School food gardens are one way that nutrition can be incorporated into the educational system. Sustainable food systems are not only a means to educate youth on the topic of nutrition; they are a unique way to involve students with the cultivation of a garden (Lekies & Sheavly, 2007). "Sustainability refers to the capability of being maintained over the long term, and meeting the needs of the present without compromising the ability of future generations to meet their needs" (Harmon & Gerald, 2007). Assadourian (2003) reported that for students at schools with a garden, the students' favorite part of school was related to participation in the school garden, and the garden provides a unique venue to gain knowledge in the areas of health and nutrition. School gardens have allowed teachers, in all areas of study, to be creative with their lesson plans and involve their students with hands-on activities and projects. Students involved with school gardens become aware of their environment while also gaining practical knowledge in gardening, food, and nutrition (Assadourian, 2003).

School gardens provide nutrition education in an integrative manner and also increase students' interest in nutrition and health. McAleese and Rankin (2007) stated that fruit and vegetable consumption in the early years of life is related to eating patterns in adulthood. In addition, James (2008) stated that encouraging the consumption of healthful and nutritious food has provided lasting healthful food practices for children. Thus, nutrition intervention in childhood is vital for healthful eating patterns. The tools learned, and resources gained, by children cultivating school gardens has allowed them the opportunity to incorporate and utilize fruits and vegetables into their everyday lives. Morris, Briggs, and Zidenberg-Cherr (2000) stated the following:

Gardening not only provides opportunities to improve student knowledge and skills related to healthy eating, but it also significantly enhances their awareness of the environment. Vegetable gardens provide continuous visual reinforcement of nutrition lessons, even on days when nutrition is not being taught. (p. 44)

The Child Nutrition and WIC Reauthorization Act of 2004 (2004) required all schools to create a wellness policy that included nutrition guidelines for all foods available during the school day as a means to promote better health among school age children. In addition, Nutrition Standards in the National School Breakfast and Lunch Programs (2012), new requirements for meal planning in school meals, were recently published to align with the *Dietary Guidelines for Americans, 2010* (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2011). These standards require schools to increase the availability of fruits and vegetables. Schools are continually being challenged to create a healthful environment, and school gardens may provide a conduit to better meet both nutritional objectives of a school's wellness policy, as well as the new National School Breakfast and Lunch Program nutrition standards.

While there has been a great deal of research focused on school gardens in relation to children's fruit and vegetable consumption and nutrition education, research regarding perceptions related to school gardens among those actively involved with them is needed. The purpose of this study was to examine the perceptions of key school staff, participating in school nutrition and wellness activities, regarding the value of school gardens. Topics included assessing the purpose of the school garden, how school gardens are used as an educational tool, and the sustainability of school gardens. The independent variable, school food gardens, was defined as raised beds, pots, containers, or greenhouses, in either classrooms or outdoors, that grow fruits and/or vegetables in which the students cultivate themselves (Graham & Zidenberg-Cherr, 2005). The dependent variables included the perceptions held by principals, teachers, and school food, health, and nutrition professionals regarding school gardens, incorporation of school garden produce into the school lunch program, use of school gardens to affect the cost of school lunches; creation of a sustainable food source through school gardens; and ways school gardens are utilized at schools.

The following research questions guided the study: is there a significant difference among principals, teachers, and school food, health, and nutrition professionals' perceptions of school gardens related to the feasibility of: (a) incorporating the fruits and vegetables into the school lunch program; (b) viewing the school garden as a potential sustainable food system that can affect the cost of school lunches; (c) creating a sustainable food system from the school garden; and (d) the ways in which the school gardens are utilized?

METHODOLOGY

A convenience sample of principals, teachers, and school food, health, and nutrition professionals from schools with school gardens across the United States was established in the summer and fall of 2010. In an effort to recruit participants, schools were contacted via Mealtalk, a listserv facilitated by the U.S. Department of Agriculture. A message was submitted to the listserv requesting schools with a school garden to provide the researchers with contact information. Additional schools with gardens were also identified through a school garden website and included in the study. E-mail correspondence was sent directly to the identified principals of schools with school gardens requesting participation in the study (N=51). The e-mail requested that the principals not only complete the study themselves, but forward the invitation to key stakeholders of the school gardens including, but not limited to, the school nutrition director, school nurse, and any others directly involved with school gardens. Based upon the distribution method, it was difficult to predict the sample size. The identified principals were contacted via two follow-up e-mail correspondences to increase participation among stakeholders.

Approval was obtained from the authors of two research studies, Graham and Zidenberg-Cherr (2005) and Graham, Beall, Lussier, McLaughlin, and Zidenberg-Cherr (2005), to edit their survey instruments originally designed to assess various elements related to school gardens. One survey was originally designed by Graham and Zidenberg-Cherr to address teachers' perceptions of school gardens as effective tools to promote nutrition and eating habits. The second survey, originally designed by Graham et al. (2005), focused on principals' perceptions of school gardens used for academic instruction. For the purpose of this study, the two surveys were combined to align with the research questions.

Numerous questions in the two surveys were either similar or duplicated. Questions that did not address the research questions of this study were eliminated. After combining and editing the previously validated survey tools, two school nutrition directors from school districts in central Illinois evaluated the new instrument for content validity. The survey included 19 items addressing topics such as: the effectiveness of school gardens, sustainability of the school garden program, items produced in the gardens, how items were used from the gardens, and the potential impact school gardens may/may not have on produce offerings and cost of school lunches. Questions that addressed demographics, sustainability, school garden usage and the school lunch program were developed and included. The final instrument was reviewed for content and construct validity.

The survey was distributed through email and administered using *SelectSurvey* online surveying software. Informed consent was included, clearly identifying the purpose and intent of the survey. Participants acknowledged consent electronically before advancing to the survey items. As an incentive, participants were able to elect to have their name included in a drawing for the opportunity to receive one of two $50 gift cards to a major retailer at the close of the survey. The contact information for the drawing was gathered and maintained within a separate file to preserve confidentiality of survey responses.

Predictive Analytics Software for Windows (PASW) version 18.0 was used to analyze all data. The intent of this study was to determine the statistical significance among participant groups. However, due to the small sample size, there was limited ability to utilize inferential statistics. Therefore, data were limited to descriptive statistics to illustrate trends among key stakeholders' perceptions of school gardens. PASW was used to determine frequencies of responses by principals, teachers, and school food, health, and nutrition professionals. Frequencies of the responses were used to compare positions (principals, teachers and school food, health, and nutrition professionals) and schools (kindergarten through eighth grade and high school).

RESULTS AND DISCUSSION

Twenty-seven surveys were completed, and the participants were categorized by both school and position (Table 1) to provide a more generalized grouping among the small set of respondents. Principals, assistant principals, and a guidance counselor were grouped as "principals." School

teachers, garden volunteers, and a greenhouse specialist were included in the "teacher" group. The school food, health, and nutrition professionals group was comprised of school nutrition directors and a school nurse. Schools from 13 states were represented in the study, including Alabama, Alaska, California, Colorado, Florida, Illinois, Indiana, Iowa, Michigan, Minnesota, New Hampshire, Oregon, and Pennsylvania.

Table 1. *Demographic Characteristics of Respondents*

	N = 27
Schools	
Preschool – Eighth Grade	20
Ninth – Twelfth Grade	7
Positions	
Principals	11
Teachers	8
School Food, Health, and Nutrition Professionals	8

Regarding the feasibility of incorporating fruits and vegetables into the school lunch program, seven participants (35.0%) from preschool through eighth grade schools reported that their schools offered a salad bar as part of its meal program. However, 13 (65.0%) of the preschool through eighth grade respondents reported that their school did not offer a salad bar as part of its meal program. Four participants (57.1%) from ninth through twelfth grade schools identified that their school offered a salad bar as part of its meal program. Of the 27 total respondents (PK–12), only 40.7% (n = 11) reported their school offered a salad bar.

In total, 15 (75.0%) preschool through eighth grade participants indicated that they had an interest in offering a salad bar at their school, while the remaining five schools indicated no interest. Six (85.7%) ninth through twelfth grade participants had an interest in offering a salad bar. Overall, 77.8% (n = 21) indicated their interest in offering a salad bar.

Results revealed that 11 (55.0%) of the participants from preschool through eighth grade used items produced in the gardens in their school cafeteria. Four (57.1%) participants from ninth through twelfth grade used garden produce in the cafeteria. Of all the schools surveyed, 55.6% (n = 15) used garden produce in their cafeterias. Participants who did not use produce from their garden in the school cafeteria were asked why they did not use the items. Table 2 provides a summary of their responses.

Table 2. *Participants' Reasons Items Produced in School Gardens Were Not Used in School Cafeterias*

Reasons	n = 13	%
Not enough food from school garden is produced	6	46.2
No available way to incorporate food grown into school lunch program	2	15.4

Reasons	n = 13	%
There are too many insurance and liability risks	4	30.8
I have never thought about this concept	1	7.7

Note. More than one reason could be cited.

School gardens, which may affect the cost of school lunches and create a sustainable food system, were also addressed. The survey items addressing this research question were based on a 5-point Likert scale, ranging from 5 (*strongly agree*), to 1 (*strongly disagree*). Of the 27 participants, 48.1% (n = 13) agreed *(strongly agree or somewhat agree*) that fruits could be produced to make an impact on the price of school lunches. In addition, 66.7% (n = 18) agreed that vegetables could be produced to make an impact on the price of school lunches. Table 3 provides a summary of participants' responses that agreed with statements regarding school lunches, the cost of the school lunch program, farmers markets, and sustainable food sources.

Table 3. *Positive Responses Regarding School Lunches, Reducing Costs, Farmers Markets, and Sustainable Food Sources*

Statements	Principals		Teachers		School Food, Health, and Nutrition Professionals	
	n = 11	%	n = 8	%	n = 8	%
Sustainable Food System[a]	8	72.7	7	87.5	4	50.0
Cost of Lunches[b]	7	63.6	7	87.5	3	37.5
School Lunch Program[c]	9	81.8	8	100.0	8	100.0
Produce Sold[d]	5	45.5	6	75.0	4	50.0
Farmers Markets[e]	4	36.4	7	87.5	2	25.0
Sustainable Food Source[f]	6	54.5	7	87.5	4	50.0

Note. Values are the total strongly agreed and somewhat agreed responses.

[a]It is possible to create a sustainable food system out of school gardens.[b]Using items from school gardens in school lunches could reduce the cost of lunches for the school. [c]Items from school gardens should be used in the school lunch program.[d]Produce from school gardens could be sold and money generated could be used to affect the cost of the school lunch program.[e]Fruits and vegetables produced by the school gardens should be sold at farm stands or farmers markets. [f]School gardens could be used as a sustainable food source for the school lunch program.

Results indicated that 75.0% of teachers (n = 8) and 63.6% of principals (n = 11) *strongly agreed* that administrator support would assist in sustaining school gardens. Principals also *strongly agreed* that parent volunteers (63.6%), garden coordinators (63.6%), and community volunteers (54.5%) would assist in sustaining school gardens. Similarly, 75.0% of school food, health, and nutrition professionals *strongly agreed*that both parent volunteers and staff support would assist in sustaining school gardens. A larger number of teachers (87.5%) and school food, health, and nutrition professionals (n = 8, 87.5%) *strongly agreed* that use of garden produce in school meals and snacks would assist in sustaining school gardens. Teachers (75.0%) and school food, health, and

nutrition professionals (87.5%) *strongly agreed* that funding for the garden would support its sustainment. Conclusively, 87.5% of teachers *strongly agreed* that time available within the school day would aid in sustaining school gardens.

Finally, participants were asked to identify ways school gardens were utilized. The participants were asked to indicate all that applied as reasons why their school maintained a school garden. Of the total participants (N = 27), 88.9% reported they maintained school gardens for consuming garden produce and 85.2% reported they maintained school gardens for use in core academic instruction. Participants indicated they did not maintain school gardens for fundraising projects (40.7%) or for meditation or relaxation purposes (37.0%).

Participants were asked to identify what subjects were taught with the school garden as a means of providing supporting pedagogy. Participants representing preschool through eighth grade (n = 20) reported that their school garden was used to teach nutrition (85.0%), science (80.0%), environmental studies (65.0%), and math (55.0%). The majority of participants from ninth through twelfth grade schools (n = 7) reported that their school garden was used to teach nutrition (85.7%), science (57.1%), and environmental studies (57.1%). Participant responses when asked if school gardens were effective at enhancing numerous aspects of their school are in summarized in Table 4.

Table 4. *Positive Responses Regarding the Effectiveness of School Gardens*

	All Schools		Preschool-Eighth		Ninth-Twelfth	
	N = 27	%	n = 20	%	n = 7	%
Physical Education	17	63.1	13	65.0	4	57.1
Academic Performance	24	89.1	19	95.0	5	71.4
School Meal Programs	23	85.2	16	80.0	7	100.0
Healthy Eating Habits	27	100.0	20	100.0	7	100.0
Social Skills	25	92.6	18	90.0	7	100.0
Mathematics	20	74.1	16	80.0	4	57.1
Language Arts	19	70.4	14	70.0	5	71.4
Science	27	100.0	20	100.0	7	100.0
Physical Activity	22	81.5	16	80.0	6	85.7
Implementation of School Wellness Policy	23	85.2	18	90.0	5	71.4

Note. Values are the total *strongly agreed* and *somewhat agreed* responses.

The original intent of this study was to determine if there was a statistically significant difference among stakeholder groups and various practices and perceptions related to school gardens. However, based on the limited sample size, inferential statistics were not feasible. Instead, descriptive statistics were used to provide a perspective of current trends in the use of school gardens, as well as perceptions of principals, teachers, and school food, health, and nutrition professionals regarding their use.

Data from a previous study identified that after produce cultivated from school gardens was implemented in salad bars in the school cafeteria, there was a 46% increase in paying customers and 80% of students eating in the school cafeteria chose the salad bar with garden produce over the hot meal (Feenstra, 2000). The results of the current study revealed that most schools (60%) surveyed did not offer a salad bar, although the majority of schools had an interest in offering a salad bar as a part of the meal program.

Overall, the majority of principals (63.6%) and teachers (87.5%) agreed that produce from school gardens used in school lunches could reduce the cost of lunches for the school. However, with an understanding of operational issues, only 37.5% of school food, health, and nutrition professionals agreed that such an outcome could be achieved. Teachers (75.0%) agreed that produce from school gardens could be sold and money generated could be used to affect the cost of the school lunch program. Fewer principals (45.5%) and school food, health, and nutrition professionals (50.0%) agreed that income from school gardens could offset related school lunch program expenses. A majority of principals (72.7%) and teachers (87.5%) agreed that it was possible to create a sustainable food system from school gardens, while school food, health, and nutrition professionals (50.0%) were split on this concept. Finally, 54.5% of principals, 87.5% of teachers, and 50.0% of school food, health, and nutrition professionals agreed that school gardens could be used as a sustainable food source for the school lunch program. These results demonstrate that, while principals and teachers reported that school gardens could be used to affect the cost of school lunches and used as a sustainable food system, less school food, health, and nutrition professionals agreed. These findings may indicate that those who are more closely aligned with the daily operations of a school nutrition program have a more practical perspective regarding the actual use and impact school gardens may have as a resource, other than as a learning opportunity.

Study participants were in agreement that school gardens may be used for consuming garden produce (88.9%) and in core academic instruction (85.2%). It was found that school gardens were used to assist with teaching math, science, nutrition, and environmental studies. These data coincide with the research done by Graham et al. (2005) that suggested school gardens were used for teaching science, environmental studies, and nutrition. Data from this study also suggest that principals, teachers, and school food, health, and nutrition professionals all agreed that not having enough time was a barrier that prevented gardening. Principals and school food, health, and nutrition professionals consistently agreed that a lack of teachers' interest in gardening was a barrier which also prevented gardening. Additionally, principals and teachers agreed that a lack of teachers' training in utilizing a school garden project was a barrier to its growth and success.

CONCLUSIONS AND APPLICATION

With the inception of the school wellness policy requirement and new meal planning requirements for school nutrition programs, a greater emphasis has been placed on incorporating fruits and vegetables in the school environment. Although the 2012 nutrition standards (Nutrition Standards for the National School Breakfast and Lunch Programs, 2012) were not published until after this study was concluded, their impact is significant as it relates to the promotion of school gardens. These new requirements provide yet another challenge to schools as they strive to increase the number and variety of fruits and vegetables served. School gardens may provide an opportunity for a unique solution to address this challenge.

The results obtained from this study identified school staff perceptions regarding the utilization and sustainability of school food gardens. These results may also be useful for registered dietitians who provide nutrition information to school-age children and/or school staff. A better understanding of the purpose and utilization of school gardens may help to inform their content. In a study by Morris and Zidenberg-Cherr (2002), nutrition education utilizing school gardens was found to be a successful way to increase the preference of vegetables and nutrition knowledge of fourth-grade students. This study found that when school gardens are used in academic instruction, especially for teaching nutrition, it can not only benefit the nutrition knowledge that students may hold, but it also has the capacity to increase taste preferences for vegetables (Morris & Zidenberg-Cherr, 2002). Parmer, Salisbury-Glennon, Shannon, and Struempler (2009) reported that increasing the amount of

fruits and vegetables children consume is vital to forming healthy eating habits. Their study also found that when nutrition education was combined with gardening, children were more willing to try fruits and vegetables. Based upon the results of these studies, finding ways to overcome the barriers identified by the various stakeholder groups is vital.

This study highlights information regarding the use and sustainability of school gardens which has not been widely researched. Participants from the current study identified that their schools may not utilize garden produce in school cafeterias due to not enough food being produced, no available way to incorporate food grown into school lunch programs, and a perception of too many insurance and liability risks. The findings suggest that while schools have an interest in incorporating garden produce into the school lunch program, there may be numerous barriers in doing so.

About half of the participants in this study reported that garden produce was used in the school cafeteria. Participants who reported produce from school gardens was not used in the school cafeteria shared a variety of reasons including: 1) not enough food being produced from the gardens, 2) no available way to incorporate food grown into the school lunch program, 3) too many insurance and liability issues, and 4) not a concept previously considered. Schools need to be aware of the necessary cautions relating to food safety when incorporating garden produce into the school cafeteria. Also, there are more human pathogens in the environment and more children affected by allergies and asthma. In addition, schools need to be mindful of the legal liabilities of school gardens (Hollyer et al., 2011).

Additional research is needed in the areas of safe incorporation of garden produce into school lunch programs and the creation of sustainable food systems from school gardens. Fruit and vegetable consumption in children early in life has been related to positive dietary habits later in life (McAleese & Rankin, 2007). School gardens provide opportunities for students to gain knowledge in nutrition, and familiarity with nutritious foods (Morris, Briggs, & Zidenberg-Cherr, 2000). Healthful foods provided in childhood have been directly related to long-term healthful food practices (James, 2008). School nutrition professionals may consider having gardens represented in their wellness policies as a vehicle to set standards which safely and economically increase the availability of fruits and vegetables. Future research should emphasize how, and with what degree of success, garden produce may be safely implemented into school breakfast and lunch programs, thus creating and promoting sustainable food systems in schools. Future studies will provide useful data by exploring methods to increase sample size and provide statistical validation of the findings.

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