

Original**School Lunches Have the Potential to Improve Food Awareness not only for Children but also for Their Families**Yuko Naruse¹, Naoko Hirota²¹ Faculty of Human Health and Science, Matsumoto University, Nagano Prefecture, Japan² Graduate School of Health Science, Matsumoto University, Nagano Prefecture, Japan

ABSTRACT *Background and purpose.* With a view to reaching out to parents through school lunch, we conducted a survey to clarify whether first-graders experiencing school lunch for the first time and their families improve their awareness and attitudes toward eating and food through the provision of school lunches. *Methods.* The subjects of the survey were the parents of 822 children who entered 11 elementary schools in Matsumoto City, Nagano Prefecture in April 2021. The survey was conducted in April before the start of eating school lunches and in June, July, and October after the start of school lunches. Responses were collected on paper or online (Microsoft Forms). *Results.* Even in October, when the novelty had worn off after six months of eating school lunches, 69.1% of the children still talked about school lunches at home. In the October survey, 47.3% of children increased awareness in eating and food, and 52.8% of children increased talking about meals and food. In the October survey, 53.4% of families' awareness in eating and food increased since started eating school lunches. 56.5% of families' talking about eating and food increased. In families where children talk to their families about school lunches, there was a significant increase in family awareness in eating and food, and talking about meals and food compared to families where children did not (both $p < 0.001$). *Conclusion.* We were able to clarify that eating school lunches causes changes in children's attitudes toward food and behavioral changes such as talking about food, and that this also changes the attitudes of families. **Keywords:** school lunch, 1st grade elementary school student, effect on family, food awareness, Japan

INTRODUCTION

School lunch in Japan is not only to contribute to proper nutritional intake for children and students, but also to play an important role in helping children cultivate a correct understanding and the ability to make appropriate decisions regarding food, according to the School Lunch Law (1). In FY2021, the complete school lunch coverage rate in elementary schools was 98.7%, and 89.1% in junior high schools, with a very large number of children eating school lunch during their compulsory education period (2). In the third section on "Matters Concerning Comprehensive Promotion Including Activities to Promote *Shokuiku* [meaning food and nutrition education]" in the fourth basic plan for the promotion of *Shokuiku* (3), it is also mentioned that the government endeavor to educate guardians about the importance of *shokuiku* and knowledge of proper nutritional management, etc. in schools. There have been studies on nutritional aspects of school lunch (4,5) and nutrition education using school lunch for children (6). These studies include those that examined the educational effects of school lunch in relation to learning attitudes and motivation, and those that examined the role of school lunch in the formation of eating behavior during childhood. Murai

et al. (7) reported that in fifth- and sixth-grade students, those who were more interested in school lunch had higher attitudes and motivation toward learning. Asahina et al. (8) reported that school lunches play a role in changing eating behavior in 6th graders through eating the same meal with their peers. However, few studies have examined the effects of school lunch provision on the healthy dietary practices of children and families, and the educational value of school lunch from this perspective is not clear.

Globally, studies have been conducted on child-to-family or child-to-parent approaches in health-related education. Daudet IT et al. (9) conducted a systematic review and meta-analysis of child-to-parent communication of stroke information and reported that this approach was effective in educating families. Feng JH et al. (10) reported that an app-based educational program delivered through elementary schools using a child-to-parent approach was effective in lowering salt intake and systolic blood pressure in adults.

Therefore, in this study, we conducted a survey to verify whether the provision of school lunches improves children's own interest and awareness of food, and whether it improves the awareness and attitude of families towards healthy eating habits through children. In April (at the beginning of the school year), June (two months after the start of school

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lunch), July (three months after the start of school lunch), and October (six months after the start of school lunch), we conducted a questionnaire survey on the attitudes and awareness of first graders and their families toward eating. This paper focuses on the changes in the families in October, six months after the start of school lunches.

METHODS

1. Subjects and survey methods

The subjects were the parents of 822 children who enrolled in April 2021 in 11 elementary schools served by the Western School Meal Service Center in Matsumoto City, Nagano Prefecture.

Questionnaire surveys were conducted four times in April, June, July, and October of 2021. A description of the survey months is given in the introduction. The focus of this paper was to examine whether the provision of school lunches improves family's awareness and attitudes toward eating, using the results of the survey conducted primarily in April at the time of school entrance and in October six months later.

The questionnaires were distributed to each elementary school by the school lunch centers, and then distributed to the children by their classroom teachers. Responses were made either by survey sheet or online (Microsoft Forms). For survey sheet responses, the sheets were submitted by the children to their classroom teachers and collected by the food service center for each class.

2. Contents of the survey

Responses to the questionnaire were requested from those who were doing the most meal preparation at home. The April questionnaire asked about the respondents and their families, including their demographics, and their status related to eating together at breakfast and dinner. We also asked about the frequency of talking about eating and food in the family, with four options of Likert scale ranging from "very often" to "not at all". To determine whether the provision of school lunches was a new experience for the family, we also asked whether the subject children had older siblings. Additionally, to determine the impact of the preschool lunch experience prior to entering elementary school, we also asked whether the children had ever been offered lunches at a preschool or other school.

In the surveys conducted in June, July, and October, we asked respondents about changes in their children as seen by parents and in families' changes, since their children started eating school lunch. First, we asked how often children talk about school lunches at home. We asked if children talk about school lunch, with five points of Likert scale "fairly applicable", "slightly applicable", "neither", "slightly different", and "fairly different". Similarly, we asked about changes in

children as seen by parents about four items, i.e., "increased awareness in eating and food", "increased talking about meals and food themselves", "decreased in food likes and dislikes", and "changed to enjoy eating more" using a five points Likert scale. These questions are based on the Ministry of Education, Culture, Sports, Science and Technology's "Food Guidance Guide (Second Revised Edition)" (11), which indicates the goals, teaching methods, and evaluation of instruction from the perspective of promoting *Shokuiku* in schools. In this guide, examples of goals for teaching lower grade elementary school students (1st and 2nd graders) are "to be able to enjoy eating with interest and concern for food" and "to be able to think about the importance of eating without liking or disliking food". We also asked responders about changes in their families as a result of their children eating school lunch, i.e., "families' awareness in eating and food" and "families' talking about eating and food, with a five points Likert scale "increased considerably", "slightly increased", "neither", "slightly decreased", and "decreased considerably".

In addition, we asked whether parents had read the monthly school lunch menus and the school lunch newsletters which contain information on school lunches and nutrition. We asked these items with four options: "I read with a strong interest", "I read with a little interest", "I am not interested but I read", and "I rarely read". The school lunch newsletters distributed between April and October contained information on the ingredients used in school lunches, nutritional balance, and milk (Table 1).

3. Method and Analysis

Families included in the analysis were those with April and October survey forms and matched respondents. The 5-point Likert scale used for questions such as changes in children and families was graded in order from 5 points for a positive response to 1 point for a negative response. When asked whether they read the monthly school lunch menus and school lunch newsletters, the points were assigned in order from 4 points for "I read with a strong interest" to 1 point for "I rarely read". Mann-Whitney's U test was used with Likert scale scores for comparisons between the two groups, including the presence or absence of lunch services at preschool before entering elementary school and presence or absence of older siblings. To examine the relationship between changes in children and changes in families, we divided the children's changes into two groups: a positive response (fairly/slightly applicable) and no change group, and a negative response (neither and fairly/slightly different) group. Similarly, to examine the relationship between parental interest in monthly school lunch menus and newsletters and families' changes, respondents were divided into interested (strong/ a little interest) and no

interested groups. The Mann-Whitney U test was then performed using the Likert scale scores of the responses to the questions. The effect size r was obtained from the test statistic of the Mann-Whitney U test as $r = Z/\sqrt{N}$. The effect sizes were judged to be 0.10 (small), 0.30 (medium), and 0.50 (large) (12). IBM SPSS Statistics 27 was used for the analysis, and $p < 0.05$ was considered significant.

4. Ethical Considerations

Written explanation of free participation and anonymization process was provided in a letter accompanying the questionnaire, and consent was assumed to have been obtained upon submission of the questionnaire. This study was conducted with the approval of the Matsumoto University Ethics Committee (Approval No. 114).

Table 1 Contents of the school lunch newsletters

April	Ingredients for school lunch (rice, bread wheat, soup stock, milk) Preparation of clothing for serving school lunch How to wash hands Setting of tableware Recommended recipe (Japanese radish and small fish salad)
May	Sample of Nutritionally Balanced Meals "School Lunch" Three Color Food Groups Explanation about the work of the school lunch center Recommended recipe (Stamina-boosting, deep-fried bonito)
June	Encouraging Eating Together Notice Regarding Panel Exhibit on Nutrition Education
July	Information about milk Explanation about the work of the school lunch center Notice about the Miso Soup Contest with a variety of ingredients Recommended recipe (Wakame seaweed salad like a starry sky)
August	Chrono-nutrition Efforts of school lunch centers (visiting schools, guidance on breakfast) Recommended recipes (hijiki seaweed salad, broccoli salad)
September	The Shinshu ACE Project * Impressions after eating special school lunch Recommended recipe (natto salad)
October	Nutritionally balanced meal (staple, main and side dishes) Ingredients used in school lunch (story about local apple farmer's cooperation)

* The Shinsyu ACE Project is the Nagano Prefecture's Health Promotion Plan

RESULTS

1. Respondents' demographics and the status of the target families at the time of enrollment

A total of 401 matched respondents (valid response rate: 48.8%) to questionnaires submitted in April and October were included in the analysis.

Respondents included 8 fathers (2.0% of the valid responses, the same below), 389 mothers (97.0%), and 4 grandmothers (1.0%) of the children. There were 178 children (44.7%) with older siblings. In April, 88 families (22.3%) indicated that their child often eats breakfast by children only and 11 families (2.8%) indicated that their child often eats alone. However, 389 families (98.7%) reported that their child often

eats dinner by the whole family together or with adults. Regarding talking about eating and food, responses of 64 families (16.2%) were "very often" and those of 210 families (53.3%) were "occasionally". A total of 306 children (76.9%) had experienced lunch service prior to entering elementary school (Table 2).

2. Changes in children and families since their children started eating school lunch

We asked how often children talk about school lunches at home with five points of Likert scale. Parents who answered fairly/ slightly applicable were 266 out of 360 valid responses (73.9%) in June, 230 out of 329 (69.9%) in July, and 277 out of 401 (69.1%)

in October. Almost 70% of the children talked about school lunches with their families at home. No significant change was seen in the six months from the start of school lunches.

We asked about changes in children as seen by parents with a five points Likert scale. In October, children who increased interest in eating and food were 35 (8.8%) as "fairly applicable" and were 154 (38.5%) as "slightly applicable". Children who increased talking about meals and food themselves were 41 (10.3%) as "fairly applicable" and were 170 (42.5%) as "slightly applicable". Children who decreased food likes and dislikes were 32 (8.0%) as "fairly applicable" and were 114 (28.5%) as "slightly applicable". Children who changed to enjoy eating more were 43 (10.7%) as "fairly applicable" and were 136 (33.9%) as "slightly applicable" (Table 3). Although there were differences depending on the items, it was found that parents felt that their children had changed regarding awareness and attitude toward food after they started eating school lunches.

We also asked about changes in their families since their children started eating school lunch with a five points Likert scale. In October, 39 (9.8%) families increased their awareness in eating and food considerably and 174 (43.6%) families increased

slightly. As families' change in talking about eating and food in the family, 43 (10.8%) families responded, "increased considerably" and 182 (45.7%) families responded, "increased slightly" (table 3).

There was no significant association between the presence or absence of having received lunch service at a preschool before entering elementary school and the frequency of talking about school lunches at home as of October ($p=0.675$). There was also no significant association between the presence or absence of having received lunch service at a preschool and children's change due to eating school lunch (increased awareness in eating and food $p=0.243$, increased talking about meals and food themselves $p=0.551$, decreased food likes and dislikes $p=0.549$, changed to enjoy eating more $p=0.193$) (Table 4).

3. Families' changes in October, six months after the child started eating school lunch

There was no significant relationship between the presence or absence of older siblings among the surveyed children and the families' change in awareness in eating and food ($p=0.063$). However, families with older siblings were significantly increased talking about eating and food more than families without siblings ($p=0.016$) (Table 5).

Table 2. Respondent demographics and the status of the target families at the time of the child's enrollment

			The number of people	Percentage of total number of people*
Respondent's relationship to enrolled child		father	8	2.0
		mother	389	97.0
		grandmother	4	1.0
Siblings of enrolled children	older sibling	presence	178	44.7
		absence	220	55.3
	younger sibling	presence	180	45.2
		absence	218	54.8
Status related to eating together at breakfast		child often eats by the whole family together	80	20.3
		child often eats with adults, but not with the whole family	215	54.6
		child often eats by children only	88	22.3
		child often eats alone	11	2.8
		does not eat	0	0.0
Status related to eating together at dinner		child often eats by the whole family together	171	43.4
		child often eats with adults, but not with the whole family	218	55.3
		child often eats by children only	4	1.0
		child often eats alone	0	0.0
		does not eat	1	0.3
Do families talk about eating and food at home?		very often	64	16.2
		occasionally	210	53.3
		not very often	108	27.4
		not at all	12	3.0
Lunch for children before admission of elementary school		lunch service **	306	76.9
		others	92	23.1

n=401

* Percentage of valid responses for each question item

** Children were receiving food service at preschool.

Table 3 Changes in children and families since their children started eating school lunches in October

	the number of people (%)					
	fairly applicable	slightly applicable	neither	slightly different	fairly different	total
Talked about school lunches at home	83(20.7)	194(48.4)	83(20.7)	28(7.0)	13(3.2)	401(100.0)
Increased awareness in eating and food	35(8.8)	154(38.5)	204(51.0)	7(1.8)	0(0.0)	400(100.0)
Increased talking about meals and food themselves	41(10.3)	170(42.5)	177(44.3)	10(2.5)	2(0.5)	400(100.0)
Decreased food likes and dislikes	32(8.0)	114(28.5)	239(59.8)	13(3.3)	2(0.5)	400(100.0)
Changed to enjoy eating more	43(10.7)	136(33.9)	214(53.4)	8(2.0)	0(0.0)	401(100.0)
Changes in the families since their children started eating school lunches in October						
	increased considerably	slightly increased	neither	slightly decreased	decreased considerably	total
Families' awareness in eating and food	39(9.8)	174(43.6)	184(46.1)	2(0.5)	0(0.0)	399(100.0)
Talking about meals and food in family	43(10.8)	182(45.7)	171(43.0)	2(0.5)	0(0.0)	398(100.0)

Table 4 Association between changes in children as seen by parents since their children started eating school lunches and experience of lunch service before entering elementary school

Changes in children as seen by parents since their children started eating school lunches in October	Experience of lunch service before entering elementary school				p-value*	effect size**
	presence (n=306)	median (minimum - maximum)	mean rank	absence (n=92)		
Talked about school lunches at home	198.26	4 (1-5)	203.61	4 (1-5)	0.675	0.02
Increased awareness in eating and food	195.68	3 (2-5)	210.00	4 (3-5)	0.243	0.06
Increased talking about meals and food themselves	200.72	4 (1-5)	193.29	3.5(1-5)	0.551	0.03
Decreased food likes and dislikes	197.34	3 (1-5)	204.49	3 (2-5)	0.549	0.03
Changed to enjoy eating more	195.80	3 (2-5)	211.80	4 (2-5)	0.193	0.07

* Mann-Whitney's U test

The 5-point Likert scale used for each question was graded in order from 5 points for a positive response to 1 point for a negative response.

**The effect size r was obtained from the test statistic of the Mann-Whitney U test as $r = Z/\sqrt{N}$.

The effect sizes were judged to be 0.10 (small), 0.30 (medium), and 0.50 (large)

Table 5 Relationship between changes in children and changes in families since their children started eating school lunch

	Families' awareness in eating and food				Families' talking about eating and food			
	median (minimum - maximum)	mean rank	<i>p</i> -value ‡	effect sizes §	median (minimum - maximum)	mean rank	<i>p</i> -value ‡	effect sizes §
Presence or absence of older siblings from the perspective of the subject child								
Older siblings	presence (n=177) absence (n=219)	209.25 189.81	0.063	0.09	4(2-5) 3(2-5)	211.6 186.96	0.016	0.12
Changes in children as seen by parents since their children started eating school lunches*								
Talked about school lunches at home	positive (n=276) no change and negative (n=173)	226.62 140.28	<0.001	0.38	4(3-5) 3(2-5)	235.06 119.99	<0.001	0.51
Increased awareness in eating and food	positive (n=188) no change and negative (n=170)	258.71 146.49	<0.001	0.54	4(3-5) 3(2-5)	258.39 146.12	<0.001	0.54
Increased talking about meals and food themselves	positive (n=209) no change and negative (n=180)	247.12 146.84	<0.001	0.48	4(3-5) 3(2-5)	256.37 135.87	<0.001	0.58
Decreased food likes and dislikes	positive (n=145) no change and negative (n=253)	263.26 162.96	<0.001	0.46	4(3-5) 3(2-5)	251.49 169.12	<0.001	0.38
Changed to enjoy eating more	positive (n=177) no change and negative (n=222)	250.88 159.43	<0.001	0.44	4(3-5) 3(2-5)	248.04 161.02	<0.001	0.41
Parents' interest in school lunch menus and school lunch newsletters †								
school lunch menus	interested (n=302) no interested (n=97)	208.17 174.55	0.006	0.14	4(2-5) 3(3-5)	208.19 172.54	0.003	0.15
school lunch newsletters	interested (n=285) no interested (n=114)	210.44 173.90	0.002	0.16	4(2-5) 3(3-5)	211.88 168.66	<0.001	0.19

* The respondents of changes in children were divided into a positive response group (fairly/slightly applicable) and no change and a negative response group (neither and fairly/slightly different).

† The respondents were divided into an interested group (strong/ a little interest) and no interested group.

‡ Mann-Whitney's U test

§ The 5-point Likert scale used for each question was graded in order from 5 points for a positive response to 1 point for a negative response.

§ The effect size *r* was obtained from the test statistic of the Mann-Whitney U test as $r = Z/\sqrt{N}$.

The effect sizes were judged to be 0.10 (small), 0.30 (medium), and 0.50 (large)

In the positive group in which children talk about school lunches at home, both family's interest in eating and food and talking about eating and food increased significantly compared to the negative group (both $p < 0.001$) (Table 5). A similar relationship was found among the positive groups of children's changes as a result of eating school lunch as seen by parents: "Increased awareness in eating and food", "Talking about meals and food themselves", "decreased food likes and dislikes" and "Changed to enjoy eating more" (all $p < 0.001$) (table 5).

62 parents (15.5%) read monthly school lunch menus with strong interest, 240 (59.9%) read with a little interest, 52 (13.0%) were not interested but read, and 45 (11.2%) rarely read. Regarding school lunch newsletters, 39 parents (9.7%) read with strong interest, 246 (61.3%) read with a little interest, 53 (13.2%) were not interested but read, and 61 (15.2%) rarely read. The group that was interested in the school lunch menus showed significantly greater awareness in eating and food, and talking about meals and food than the group that was not interested ($p = 0.006$ and $p = 0.003$, respectively). Similar results were found for "school lunch newsletter" ($p = 0.002$ for awareness and $p < 0.001$ for talking) (table 5).

The effect size for the comparison of the presence or absence of interest in school lunch menus and school lunch newsletters were small, ranging from 0.14 to 0.19. On the other hand, the effect sizes for the comparison of positive and negative groups of children's changes as seen by parents were relatively large, ranging from 0.38 to 0.58 (Table 5).

DISCUSSION

1. Changes in children since started eating school lunch

In the provision of school lunches, the Ministry of Education, Culture, Sports, Science and Technology's "Food Guidance Guide (Second Revised Edition)" is referred to as the policy. In this guide, examples of goals for teaching lower grade elementary school students (1st and 2nd graders) are "to be able to enjoy eating with interest and concern for food" and "to be able to think about the importance of eating without liking or disliking food" (11). With regard to children who had experienced school lunch for six months, 47% of parents perceived that their children's interest in food had increased. In addition, 53% of parents perceived that their children had been more likely to talk about food themselves, and 45% of parents perceived that their children changed to enjoy eating more. We speculate that these results are the educational effects of school lunches. Regarding the decrease in likes and dislikes, Furushima et al. (13), in their one-year observation of first-grade school lunches, reported that the number of foods that even children with dislikes increased due to school lunch rules and encouragement from friends and teachers,

and that this experience increased their self-confidence and motivation to eat. Similarity, in the results of this study, school lunch, which is eaten in an environment different from that of the home, is assumed to have increased the children's self-efficacy through the experience of eating food that they had never eaten before or disliked.

It is assumed that school lunches are a subject of great interest to children as soon as they start eating school lunches, and that they have many opportunities to talk about school lunches to their families after they return home. However, even in October, six months after the start of eating school lunches, nearly 70% of the children were talking about school lunches at home. This situation was not significantly different from June, two months after the start of eating school lunches. Preschools also have guidelines on *Shokuiku* (14), and lunch services are provided based on these guidelines. However, the presence or absence of lunch service experience at a preschool, was not related to the change since their children started eating school lunch. These findings indicate that many children continue to have an interest in school lunch after entering elementary school. In addition, we found that regardless of the children's experience with lunch service prior to entering school, school lunch provided an opportunity for them to learn something new about eating and food.

Children who have just entered elementary school are in a period of rapid growth, both physically and mentally, and it is natural that their attitudes and awareness will change as they grow. However, in this survey we asked parents about changes in their children's attitudes and awareness in eating and food after they started eating school lunch. Therefore, we considered that even if changes due to growth are subtracted, the effects of school lunch on children's attitudes and awareness in eating and food were sufficient.

2. Changes in families since their children started eating school lunch

More than half of the parents perceive that their family's awareness in eating and food has increased since their children started eating school lunch, and that they have more opportunities to talk about eating and food with their families. In the group that read the monthly school lunch menus and school lunch newsletters with interest, more families showed an increase in their awareness in eating and food, and talking about eating and food in family than in the group that did not. However, rather than providing such information, the presence or absence of changes in children since eating school lunches as seen parents had a larger effect size on changes in families. In addition, families' awareness in eating and food increased regardless the subject children had older siblings. Based on these results, we speculate that even

if school lunches were not the first experience for the families, it may have been stimulating for the families to have their first-grade children eat school lunch for the first time. On the other hand, families with older siblings also showed a significant increase in talking about eating and food compared to families without older siblings. Although not shown in the results, there was also a description in the free description that the siblings often talked about school lunches. It was speculated that in families with older siblings, school lunches became a common experience among siblings, and food-related topics were likely to become a topic of conversation at home. Based on the findings obtained in this study, we consider that more appropriate information should be provided by nutrition teachers and more appropriate educational materials on school lunch should be developed in the future.

Worldwide, studies have been conducted on the child-to-family or child-to-parent approach to health-related education. Daudet IT et al. (9) and Feng JH et al. (10) reported child-to-family approaches that have been implemented for education about stroke, salt intake and systolic blood pressure. School lunches in Japan, unlike these approaches, are not a simple issue-focused approach. However, this study found that eating school lunch improved children's attitudes toward food and changed their behaviors, such as talking more about food, and that these factors also changed the attitudes of their families. It was suggested that it is possible to improve more appropriate ways of eating for a wide range of families through the child-to-family method through school lunches in Japan. It has been reported that parents of elementary school students in the 20s to 40s generation are less motivated than other generations to improve their own dietary habits (15). We believe that school lunch management that is also conscious of reaching out to parents help improve the eating habits of this generation of parents.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to report.

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