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Review of Methods for Evaluating *Shokuiku* or Dietary Education from the Perspective of School Lunch Officials

C. Tokuhiro[1,*], I. Shimada[2], and K. Kitamura[3]

1 Faculty of Human Life Sciences, Department of Food and Nutrition, Mimasaka University, 50 Kitazono Town , Tsuyama, Okayama , 708-8511, Japan
2 Department of Nutrition, University of Kochi, Japan
3 Omiya Elementary School of Kami City, Japan

E-mail: chie_tokuhiro@yahoo.co.jp

This study aims to illuminate the effects of the attitudes and behaviour of school lunch officials on the "six strengths to build through dietary education." The study also attempts to explain the evaluation methods of shokuiku or dietary educational activities, utilization of results, and the ratio of local ingredients used in school lunches. The study was conducted in 148 facilities, including Kochi prefectural public elementary, junior-high, and high schools, joint kitchens of catering centres, and facilities at Kochi prefectural specially supported schools. The research was conducted from September 2009 to July 2010 and from January 4 to 31, 2010. The study examined the (1) utilization percentage of local produce in school lunches and (2) awareness and behaviour of school lunch officials concerning the actual usage of local produce. These values were analysed using PASW Statistics 18. Counter intuitively, the relationship between local produce usage and "support of local food culture" and "motivate appreciation for food, local food, food service, and food service personnel" showed negative correlation. Thus, the way in which local produce is used shows both positive and negative attitudes of those adopting its utilization in school lunches. This investigation included 10 out of the 12 items of dietary education evaluation indexes issued by the Ministry of Education, Culture, Sports, Science and Technology. The survey and items in this research established direct and indirect evaluation indexes for dietary education. By applying these indexes in real cases, this study proved that these evaluation indexes are indeed effective tools for assessing dietary education.

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Introduction

In order to move forward with Food Education in overall school educational activities, Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT) has begun advocating "Six Areas of Strengths to Master through Dietary Education " via teaching the young students about "the importance of meals, mind-body health, ability to choose food, gratitude, sociability, and food culture.[1] Among these, the ability to choose food, gratitude, sociability, and food culture seemed to have been strengthened by incorporating the dishes that were made from produces and ingredients grown in their region. The school lunch officials have initiated "eating with students," "ask students their opinion on school lunches," "education about food." These initiatives allowed physical contact with students and offered school lunches as learning materials. Through providing dietary education through school lunches, these schools are actively moving forward with "Mobilizing Dietary Education through School Lunches Prepared by Using Local Produce and Ingredients.[2]

As such, this research aims to describe the ways in which school lunch official's attitude and behavior is related to "six areas of strengths to master through dietary education," by analyzing the local product usage rates in school lunches, and the research will provide guidelines to evaluating effectiveness of the dietary education.

Materials and Methods

The following research results and forms were utilized for this research. The analysis of the data was conducted under the approval of the Office of Sports Health Education at Kochi Prefecture's Board of Education.

1) Results of survey on usage of local produce and ingredients
2) Investigation on school lunch officials' attitude and behavior toward incorporating local produce and ingredients

Survey areas

School cafeterias at Kochi prefecture's 100 private elementary- middle schools, 34 cooperative cooking facilities, 7 prefectural special schools, and 7 prefectural evening high schools (a total of 148 places).

Survey respondents

91 principals from above mentioned schools, 23 cafeteria managers, and 56 school dietitians (a total of 170).

Research period

1) School lunch days during September 2009- July 2010;
2) January 4-31, 2010

Research methods

1) The respondents entered the raw materials used in cooking for school lunches in Excel spread sheet on the day of school lunches at their schools. The entered raw materials are divided into four places of its origin: products from cities, towns, and villages; products from other prefectural areas than city, towns, and villages; products from Kochi prefecture; and products from overseas. These records were sent to the designated personnel at the Korean Prefectural Board of Education. (Return rate: 66.9%)
2) Survey forms made in MS Excel were sent to each school lunch facilities via E-mail and received the completed forms through Email. (Return rate: 100%)

Survey topics

1) The number of food items served at lunch, the amount and frequency of ingredients for one serving that was actually served at school lunch, and the rate of locally produced ingredients.
2) Total of 8 items, including strengths and problems of using locally-produced ingredients, school lunch officials' attitude and behavior, relationship between students and teachers, duties and initiatives, positive evaluation among students of using 11 basic ingredients from Kochi Prefecture (Major agricultural products that are largely produced in and distributed to Kochi prefecture: bell peppers, ginger, chives, okra, peppers, large Italian eggplant, myoga (Japanese ginger), cucumber, eggplants, green onions, and Ares melons).

Statistical analysis

PASW statistics 18 was used to analyze the data of this research.

Results

The average rate of locally produced ingredients usage was 44.9%. Correlation between the school lunch officials' attitude and behavior toward using locally produced ingredients and job description and efforts and the rate of using locally produced ingredients (applicable means, the person who entered the data after deciding it was time to enter the data).
a. The schools whose school lunch officials/providers expressed, "insufficient variety of available items and quantity of locally grown ingredients" (applicable, percentage of using locally produced ingredients: 42.6%; not applicable: the same 47.2%) and "no available suppliers" (applicable: percentage of using locally produced ingredients: 38.5%, not applicable: the same 47.2%), showed meaningfully low rate of using locally produced ingredients in their school lunch menus.

Table1. Relationship of each item

Rank	Number of related item	Items	Number of Significant probability P < 0.05	P < 0.01
1	15	Fresh and Tasty	6	9
2	13	Know Producers	4	9
3	13	Feelings of gratitude grow up	5	8
4	13	Leads to the succession of food culture	9	4
5	12	When making cooking, try to use the ingredients of local products	4	8
6	11	There are many opportunities to stop by producing corner at mass retailers	3	8
7	10	Increasing local special dish	3	7
8	10	Good for the environment (leading to reduction of carbon dioxide emissions)	6	4
9	9	Exchanging information on local product utilization with local suppliers	4	5
10	9	An opportunity to incorporate the students' hope for catering service (request menu etc.)	5	4

b. The schools, whose lunch providers expressed the school lunches would "lead to preservation of food culture" (applicable: rate of using locally produced ingredients:41.7%, not applicable: the same 46.1%), "would foster gratitude" (applicable: rate of using locally produced ingredients: 42.1%, not applicable: the same 45.7%), and "dietary education planning states utilization of locally produced ingredients" (applicable: rate of using locally produced ingredients: 41.5%, not applicable: the same 45.4%), showed meaningfully low rate of using locally produced ingredients in their school lunches. (Fig1).
c. When the rate of using locally produced ingredients were classified into three groups of low (under 40%), middle (between 40%-50%) and high (above 50%) and analyzed, the results were similar (Fig 2 and 3).

Correlation among the survey items

Table 1 shows the correlations among the survey items. The item with the highest frequency was "freshness and tasty" (15 items), "the suppliers are known" (13 items), "fostering gratitude" (13 items), and next "food culture legacy" (13 items), and the fifth place was "when cooking, I try to incorporate locally produced ingredients" (12 items). The rate of using locally produced ingredients showed different results from the general assumption. The relationship among items related to the items, "fostering gratitude," "food culture legacy," and "specified

usage of locally produced ingredients in dietary education planning" showed correlation to many items that predicted incorporation of locally produced ingredients in school lunches.

Table 2. The relation between the example of food education evaluation items indicated by the Ministry of Education, Culture, Sports, Science and Technology and this analysis

Items		Details		Relation of this analysis
I	Organization management Structure	1	Status of promotion system for dietary education such as positioning to educational curriculum and positioning to school division	
		2	Status of preparation and improvement of overall plan, annual guidance plan etc	Awareness survey · The content of utilization of local products is stated in the overall plan of teaching on food
		10	Status of environment improvement such as setting of appropriate lunch time	Awareness survey · Managers and school lunch facility chiefs have opportunities to eat lunch together with students · Cooking staff and students have
		11	Status of development and implementation of individual guidance system	
		12	Collaboration with schools, families and regions	Awareness survey · We provide information on utilization of local products to students (rather than meals, menus, broadcast materials, etc.)
Items		Details		Relation of this analysis
II	Evaluation of implementation status of initiatives Process Output 【Volume of implemented project 】	3	Implementation status of Food and Nutrition Education	Awareness survey · We are providing guidance on food in a systematic way.
		5	Implementation status of experiential activities in teaching about food, such as agriculture, forestry and fishery experience	Awareness survey · Utilizing prefectural industry promotion education promotion project (experience learning)
		7	Utilization status of school meals in Food and Nutrition Education	Awareness survey · We provide information on utilization of local products to students (rather than meals, menus, broadcast materials, etc.)
		11	Status of development and implementation of individual guidance system	
		12	Collaboration with schools, families and regions	Awareness survey · We provide information on utilization of local products to students (rather than meals, menus, broadcast materials, etc.) · There is a transaction with an organization that delivers local products · We are exchanging information on local product utilization with local suppliers
V		Details		Relation of this analysis
III	Evaluation of School Lunch Process Output 【Volume of implemented project 】	6	Status of improvement of nutritional balance and taste in menu preparation	Awareness survey · There is an opportunity to incorporate the students' hope for catering service (request menu etc.) · Cooking staff have opportunity to listen to students' impression of school meal
		8	Use situation of local products in school lunch	Survey on utilization situation of local products Awareness survey · Flexible change of menu to utilize local products
		9	Status of utilization for local meals and traditional dishes etc. for the succession of traditional food culture	Awareness survey · Describe the contents of utilization of local products in the menu plan
IV	Direct evaluation on students Outcome 【Results 】	4	Results of survey on lifestyle habits such as breakfast intake, sleeping time, bowel habits, etc.	Survey on life style of students

※Survey on consciousness: survey on consciousness and behavior of school meal officials concerning the utilization of food materials for school lunch of local products

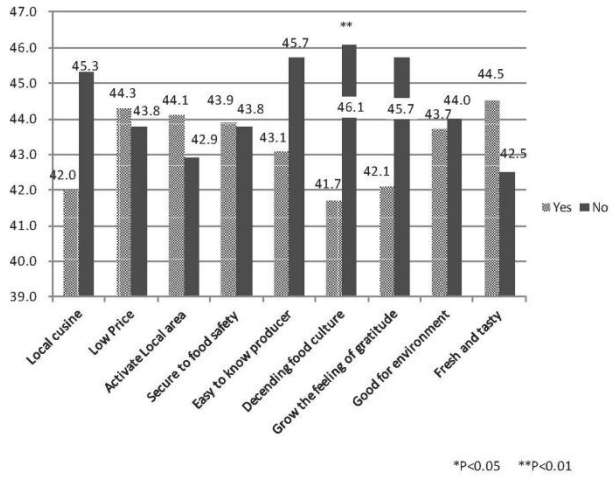

Fig. 1. Relationship between the benefits of utilization of local products and the utilization ratio of local products

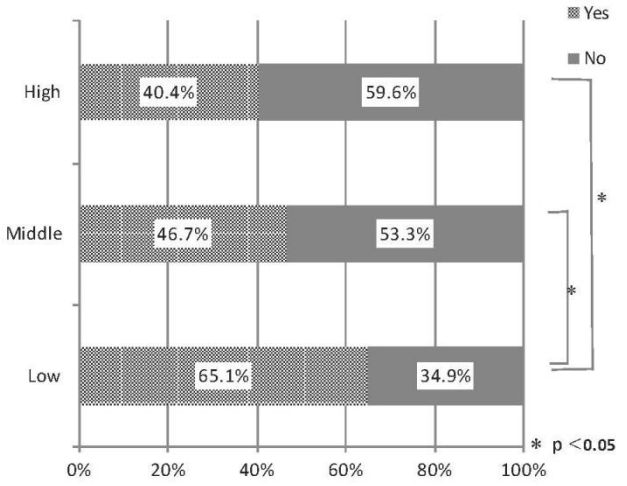

Fig. **2.** Relationship between high and low utilization and utilization of local products and responses to "utilization of food culture"

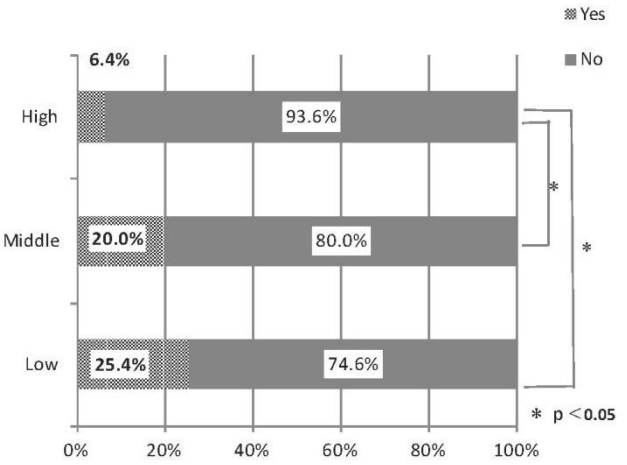

Fig. **3.** Relationship between high and low utilization of local products and responses of "want to use but no supplier"

Discussion

There are several findings on various status reports on school lunches and dietary education.[3-7] However, the existing literature does not explain how the current dietary education efforts are making progress, nor do these investigations show correlations between the dietary educations and the government's six areas of strengths.

As written in The White Paper on Dietary Education8) published in 2013, in order to obtain these 6 areas of strengths, it is important to use the school lunches as living textbook for dietary education. Particularly, the researchers of this paper hypothesized that the ability to choose food, gratitude, sociability, and food culture can

be more effective achieved by promoting school lunches made with locally produced ingredients.

Overall, the schools that sent the reports, "there are not enough items and quantity" and "there are no suppliers," showed meaningfully low rate of utilizing locally grown ingredients. Yet, on variables that should help increase the usage of locally grown materials, i.e., "leaving the legacy of food culture," "foster gratitude," and "the main plan for dietary education includes incorporating locally grown produces to school lunch menus," many of the respondents' attitude and behavior showed low rate of using locally grown ingredients which was quite contrary to the ordinary expectation. This could be inferred that there are variables that cannot be overcome by mere motivation and behavior such as location of the school, expansion of local agriculture, development of food delivery system in the area, the management style of the school lunch system, and/or the ways in which the suppliers are connected to the school.

So, PASW statistics 18 was used to analyze data. It has been proven that it can perform an analysis on multiple variables and thorough analysis. As a result, out of the six areas of strengths, the item, "the fresh taste of the food was good," in the category of "gratitude" showed correlation to 15 items.

In addition, other items showed correlations among each other. These also showed contrary results to expectations. Also if the categories of "leading to food culture legacy" or "foster gratitude" are related to "the number of local dishes increases" or "suppliers/growers are known," there could be increase in utilization of locally grown ingredients in school lunches.

Also "leading to food culture legacy" or "foster gratitude" showed correlations with other items. If the problems of "lack of sufficient number of ingredient items" or "there no suppliers" be solved, the rate of using locally grown ingredients in school lunches would increase, and by doing so, the future dietary education and promotion evaluation research will benefit in terms of hypothesis setting.

The current analysis and investigation on children's food consumption[4-7] coincides with the 12 dietary education evaluation index set by MEXT:

1) System development for dietary education including incorporation in curriculum and placement in school affairs
2) Comprehensive planning, annual planning, and evaluation
3) Implementation status of food education
4) Status of life style among students including breakfast, sleeping hours, and bowel habits
5) Status of dietary education activities such as field trips in agriculture and fishery areas
6) Report on current menu making process including nutritional balance and improved taste
7) Report on incorporation of using school lunches as dietary education textbook.
8) Rate of utilizing locally produced ingredients in school lunches.
9) Status of utilizing local and traditions cuisine in menu as a way to continue food culture
10) Status of facility for proper offering of school lunches
11) Status on facility and individual instruction system
12) The relationship between the school and home or community

Out of these 12 categories[9] except number 1 and 11, ten categories were complemented by the result of this research. But most of all, the current research established evaluative index that can more (in)directly evaluate dietary education, and the conclusion of the study illustrated that these index can be used as dietary education' effectiveness measure.

Conclusions

In review of this empirical investigation as an evaluation method, this study set its focus on "the six areas of strengths to build" which are 1) importance of meals, 2) mind and body health, 3) ability to choose food, 4) gratitude, 5) sociability, and 6) food culture. Also the current research set the evaluation method for dietary education's effectiveness by investigating young students' eating habits and lifestyle and school lunch officials' attitude and behavior toward utilizing locally produced ingredients in school lunches. In addition to basic analysis, the study used PASW statistics 18 for data analysis. Using statistical software in analysis allows 1) in addition to conventional basic counting of data, researchers can offer more convincing data to stakeholders; 2) without overlooking any measurable item, more scientific analysis can be performed in short time period. In addition, in examining the evaluation method from the analysis of the survey, it became clear that ten items out of the 12 items that the Ministry's the dietary education evaluative index, the current study's investigation overlapped with 10 items with an exception of the above-mentioned 2 items. The analysis of evaluation on student habits that could be observed in school settings can be based on the Survey on Young Students Lifestyle and Self-Esteem4)5) were on "breakfast eating habit", "vegetable eating habits," "sleeping hours," and "bowel habits."

The analysis of evaluation on student habits that could be observed in school settings can be based on the Survey on Young Students Lifestyle and Self-Esteem were on "breakfast eating habit", "vegetable eating habits," "sleeping hours," and "bowel habits." Furthermore, the contents of standardizing evaluation methods used by dietary education specialists was established immediately after designation of "Super Dietary Education Schools" and development of "Dietary Education Textbooks" as well as the initial discussions and researches by the specialists started. This research has aimed to raise the rate of incorporating locally produced ingredients in

school lunches and motivate school lunch officials' attitude and behavior to do so. Also it has aimed to establish proper monitoring method for behavioral changes in young students by comprehensively analyzing the current status of educational institutions' dietary education offered through school lunches. It is the strong inclination of the authors of this paper for this research to be the stepping stones to establishing even more scientifically rigorous evaluative measures for dietary education.

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Conflict of Interest

All the authors declare that they have no conflict of interest.

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