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**Report**

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# Report on a Visit to Meal Service Facilities in the Educational, Medical, and Welfare Sectors in the Kingdom of Thailand

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## 要約

タイ王国の教育施設、医療・福祉施設の7か所の給食施設を視察したため、フードサービスについて報告する。視察先は義務教育を含む学校が2施設、大学が3施設、医療・福祉施設が2施設であった。そのうち、直営での運営が2施設（学校と福祉施設）、その他は委託での運営であった。幼稚園から小学校3～4年生までは学校給食を提供することが多く、それ以上の学年になると、カフェテリアで各自昼食を購入していた。その際、時間差で購入するように学校から指導されていた。学校給食では、主食・主菜・副菜・デザートが揃った献立であった。タイの児童・生徒は休憩時間に売店で購入し食べているが、どの施設でも、残食は少なかった。大学には、複数のレストランや売店があり、学生が各自購入していた。医療・福祉施設においては、複数の治療食が提供されていた。特筆すべきことは、大学にて紫外線での食具滅菌器が導入されていたことである。また、給食の生産（調理）・提供システムは、6施設がコンベンショナルシステムであり、病院はセントラルキッチンシステムであった。調理システムは7施設全てにおいてクックサーブシステムであった。タイ王国の給食施設のフードサービスについての報告は前例がなく、日本のフードサービスとの違いも浮き彫りとなった。

## I. Introduction

The Kingdom of Thailand (hereinafter referred to as Thailand) is located in the center of Southeast Asia. The long, narrow land lies north to south. Its area is about 1.4 times larger than Japan<sup>1)</sup> and has a tropical monsoon climate with humidity and an average annual temperature of approximately 29°C. The year is divided into three seasons: dry (November to March), summer (April to May), and rainy (June to October)<sup>2)</sup>. People enjoy various foods from the sea and mountains, thanks to the fertile ground and water. Various fruits and vegetables are cultivated in each district, and the country is one of the largest rice producers in the world.

The population was 67 million in 2019<sup>2)</sup>, and the majority of the population was Thai. The total fertility rate for Thailand was 1.4 as of 2013<sup>3)</sup> and it is decreasing<sup>4)</sup>.

The average life expectancy was 72.4 for men and 78.9 for women in 2020<sup>5)</sup>, and was 76.93 years for the entire population in 2018<sup>6)</sup>. It is projected to gradually increase and reach 75 years for men and 82 years for women in 2040.

According to a report by the Ministry of Public Health in 2019, the principal causes of death in Thailand are non-communicable

diseases including malignant neoplasm, heart disease, and stroke<sup>7)</sup>. Thailand had 75,674 Japanese residents as of October 2018 and about 1.8 million Japanese visitors in 2019<sup>8)</sup>.

Compulsory education is provided by six-year primary and three-year lower secondary schools. It is constitutionally guaranteed that public schools are free of charge. The school system is comprised of three-year upper secondary schools and three-year kindergartens in addition to compulsory education.

Thailand is a great rice farming nation because of its large, flat land area. People normally eat indica rice, which is less sticky than the Japanese staple rice, *uruchimai*, and glutinous rice, which is also eaten in the northern and northeastern regions. Noodles are also essential to the diet. The principal four types are thin rice noodles called *sen mee*, medium-thick *sen lek*, flat thick *sen yai*, and egg noodles called *ba mee*. They are boiled and served with or without soup, stir-fried, or finished with starch-thickened sauce. Typical toppings include seafood, fish balls, pork, chicken, beef and vegetables. At restaurants, people first decide on the noodle type and then select the toppings.

Seafood is regularly eaten in coastal areas, while freshwater fish are mainly consumed in other parts of the country, caught from

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large rivers such as the Chao Phraya River that passes through Bangkok toward the Gulf of Thailand and the Mekong River flowing along the border between Laos and Thailand<sup>9)</sup>.

In addition to fruits, vegetables, fish, and shellfish, people also eat chicken, pork, beef, and eggs.

Although soy sauce is used to enhance the taste of Japanese dishes, *nam pla* fish sauce is an essential seasoning that adds a unique flavor and aroma to Thai cuisine. It is produced by fermenting fish and tastes salty and is rich in umami. In proportion to the diversity of available ingredients, numerous fermented foods, including *kapi* shrimp paste, are used for dipping sauces, in Thai curry soup, and in stir-fried recipes.

Thai dishes are characterized by distinctive, complex tastes of saltiness, spiciness, acidity, and sweetness. Since the southern region is surrounded by sea and is abundant in seafood, turmeric and other spices are used to remove fishy odors. The food in the central region is affected by all the other regions, so the flavors are relatively mild and sweet. One of the herbs that is crucial is *phak chi* (fresh coriander). Since herbs are not only used to add flavor and aroma but also have various effects such as detoxification and antioxidant activity, they are cooked for a short time, which is another feature of Thai dishes.

The authors of this paper had been to the Kingdom of Thailand for food and health surveys about ten times in these twelve years but had not had any opportunity to visit meal service facilities. In addition, no papers on meal service facilities in Thailand were found.

Therefore, the objectives of this study were defined as visiting kindergartens, primary and secondary schools, universities, corporate work places, hospitals, and elderly-care facilities in Thailand in order to investigate presence of meal services as well as existing methods of cooking, serving and operation there.

For the purpose, we requested a visit from some meal service facilities in the educational, medical, and welfare sectors and made a tour of the facilities that gave a permission. Their findings are reported in this paper.

## II. Methods

### 1. Outline of the monitoring visit

When making requests to visit meal service facilities in Thailand, the authors received a response that a tour at a national institution required an agreement between the institution of the two countries. Then, with the support of acquaintances and facility staff who had taken care of us during past surveys, we wrote letters of request for a visit at lunchtime to the meal service facilities (kindergartens, schools, elderly-care service facilities, and hospitals) in the capital city, Bangkok, and the largest city in the northern region, Chiang Mai, and our research collaborators contacted by phone many times. After arranging appointments, we looked round the facilities, accompanied by either one of the operational managers, cooking manager, dietitian, and teachers,

together with a translator at lunchtime in January 2020.

The number of facilities we visited was 7 in total: 1 integrated private school from kindergarten to lower secondary education, 1 integrated private school from kindergarten to upper secondary education, 3 public universities, 1 hospital, and 1 elderly-care long stay service provider.

## 2. Facility overview

### (1) Jittra Wittaya School

Established in 1968, Jittra Wittaya School the private school emphasizes morality education in addition to knowledge, literacy, and contributions to society. It conducts classes in folk dance, Muay Thai, piano, and swimming. It is a mixed-sex school with 1,422 students in total (3-year kindergarten: 339 in 3-4 classes/grade; primary school: 796 in 4 classes/grade; lower secondary school: 288 in 3 classes/grade) (recorded in January 2020). They wear different school uniforms according to the day of the week, and one of the features is traditional Thai clothing made from orthodox cotton fabric, worn on Fridays.

### (2) Regina Coeli College Chiangmai

It is a convent of Christ the King and the building used to be a hospital. Established 87 years ago, it is the only private Catholic girls' school in Chiang Mai and has 1,868 students from kindergarten to higher secondary school (recorded in January 2020). The sisters have total power, and the students live a disciplined school life. They sing the national anthem and hoist the flag at 8:00. Classes are given from 8:20 to 9:10 and from 9:10 to 10:00. Then, They have a short break from 10:00 to 10:20, and many students bring and eat rice and some other dishes (10 baht), mainly because they skip breakfast. At 12:00, a meal song is played and they start eating after expressing thanks for food and praying. The national flag is lowered at 16:00. Classes on cooking, sewing, mathematics, and computers are available. As for foreign language education, there are lists of foreign languages provided and student could choose what they want to learn for 10 periods a week. Even the kindergarten offers English classes from the start. A total of four teachers provide English lessons: an English teacher, an assistant English teacher, and two class teachers.

### (3) Chulalongkorn University

Chulalongkorn University is a prestigious national public university founded in 1917, making it the oldest university in Thailand. The campus is located in the central part of Bangkok. It has 38 departments and research institutes, 37,280 students, and 7,861 teachers and staff members (recorded in January 2020). More than 120,000 graduates play an active role in diverse areas of expertise.

### (4) Mahidol University

Mahidol University is a national public university founded in

1943 as the first medical school in Thailand. It has 17 faculties, 9 institutes (including the Institute of Nutrition), 6 colleges, and centers. The main campus is close to Bangkok, and there are three other campuses in Thailand. The number of students were 20,743 undergraduates, 5,943 and 2,707 graduates in the master and PhD programs respectively, and 240,717 alumni as of 2019 (recorded in January 2020).

#### (5) Chiang Mai University

This national public local university was established in 1964 as the first higher educational institution in the northern region of Thailand. Since then, the comprehensive educational body has provided academic programs in a wide variety of areas. It has 21 faculties and 3 colleges with 14,000 personnel including 2,274 teaching teachers. Every year 7,000 students enter and graduate and there are 180,000 alumni in total.

#### (6) Geriatric Medical Center

The Geriatric Medical Center was established in 2015. It is an affiliate hospital of Chiang Mai University as a private sector, specialized in chronic illness mainly of elderly people. There are about 130 staff members: 5 full-time doctors, 38 nurses, 5 pharmacists, 4 med technicians, 2 med radiologists, 3 physical therapists, 1 occupational therapist, 2 dieticians, 70 other professionals, and 50 part-time doctors (specialists) as of 2021. The center only accepted inpatient with the age over 60 years old and need to stay at the center at least 5 days. The number of service users was 81,956 (80,552 outpatients and 1,404 inpatients) in 2020. Both outpatients and inpatients with cancer, diabetes, and chronic kidney disease can consult with an expert about nutrition, and a dedicated room is provided. They provide group and personal nutrition instructions.

#### (7) Vivobene Village

Vivobene Village is a private facility to care for elderly people who look for life support services or need nursing care. Target customer is foreign elderly people. Europeans elderly people were about 80% as of 2020. It has 80 rooms with a capacity for two persons, accommodating 160 persons in total. There are 6 buildings, each building has 12 guest rooms. Up to 25 people stay in each building, which has a nurse station at the center. The facility encourages healthy people to live an independent life as far as possible. At Vivobene Village, people with diverse demands of nursing, including attention to high blood pressure, diabetes, kidney disease, heart disease, cerebral stroke, Parkinson's disease, and arthritis, and physically challenged persons live together with those who do not require nursing. It offers around-the-clock nursing services and, at night, it is optionally available for a resident to receive care services on a one-to-one basis. Made-in-Japan care aid is used. The facility also supports dementia patients with help from medical institution.

### 3. Observation

The following items were observed: (a) Meals, (b) Menu items including price per meal, (c) Workers and Kitchen equipment, (d) Purchase of ingredients, (e) Cooking methods, (f) Preparation on the previous day, (g) Food service system, and (h) Hygiene.

### III. Findings

#### 1. Jittra Wittaya School

(a) **Meals:** Two types of lunch service were provided:

(i) A school lunch was provided for the kindergarten children to third graders of the primary school, and meals for about 30 students per class (there were 49 classes) were prepared by contractor restaurants. The menu differed day by day as selected by the school teachers and then checked by the school principal, and consisted of a staple, main and side dishes, and a dessert. For kindergartners, food was delivered to school at 10:30; two cooks dispensed it into rectangular metal food containers, another four cooks carried the containers to each class, and the children ate the food (Figure 1). In addition, the government distributed milk to kindergartners to sixth graders in primary school every morning.

(ii) A self selected and paid meals offered to the third to sixth graders of the primary school used the cafeterias from 11:30 and the lower secondary school students from 12:00 (Figure 2). There were seven vendors sold lunch meal in the cafeteria and small



Fig. 1 Lunch at Jittra Wittaya School's kindergarten



Fig. 2 Cafeteria at Jittra Wittaya School

shops outside.

**(b) Menu items including price per meal:** The cafeterias served a variety of items: 33 light meals in total for 7 vendors, noodles, 20 curry dishes, fixed menus, desserts, 12 packaged ice creams, 16 made-to-order ice creams, 50 snacks, 10 drinks, 13 100-percent juices, 5 sodas (with 6 toppings), 5 sherbets, and water. It was 40 baht (139 Japanese yen, calculated at the exchange rate of 3.47 yen to the Thai baht as of June 28 in 2021) for a school meal. It was 5 to 25 baht (17 to 87 yen) at paid cafeterias. The children could buy and eat sweets and soft drinks from the shop in school during breaks.

**(c) Workers and kitchen equipment:**

**(c-1) Workers:** There were 2 to 3 workers at each one of the seven vendors. They worked from 8:00 to 14:00, 6 hours in total.

**(c-2) Kitchen equipment:** Freezer refrigerators, gas stoves, steamers, and two counter-top gas rice cookers were equipped with per cafeteria. Commercial convection ovens were not used.

**(d) Purchase of ingredients:** The staff of each cafeteria went to Muang Mai fresh Market and chose ingredients without flavor enhancers.

**(e) Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, dressing, etc. were applied.

**(f) Preparation on the previous day:** It was not performed. They came to the school at five in the morning and started the preparation.

**(g) Food service system:** The food production system was a conventional system. Cooking system was Cook-Serve.

**(h) Hygiene:** The staff who handled food underwent annual medical checkups, urine and blood tests, and monthly stool tests. The government performed on-site inspections. It was obligatory to wear a mask, gloves, cap, and an apron.

## 2 . Regina Coeli College Chiangmai

**(a) Meals:** They prepared 1,800 meals per day. Two categories of lunch were offered:

(i) School lunches for the kindergartners to the fourth graders of the primary school:

[Kindergarten's lunch] Two teachers went to the kitchen at 10:30 to carry the food on a hand cart to the kindergarten ward. At 10:40, the cook checked the food (rice, main and side dishes, and fruit) and took the cart back. The children started playing outside at 11:10, and the teachers prepared the meal while watching over them.

Eating began at approximately 11:20 to 11:45. Two teachers per class distributed the food on each child's plate. The children did not wait for the others to be served, but rather started eating right away. Those who could not eat school lunches for religious reasons brought a lunch box. Many children brought their own forks and spoons. They brushed their teeth using a toothbrush, toothpaste, and cup once they had finished eating.

[Primary school lunch] The cafeteria manager posted the menu

on the school bulletin board at 11:00. The workers started preparing the primary school's lunches at 11:00. Each grade's students went to a food station and received their portion on a divided plate from the grade teachers and ate it at 11:30 (Figure 3). Three dining places were provided for the third and fourth graders, the fifth and sixth graders, and the lower and higher secondary school students.

(ii) A self selected and paid meal offered at cafeteria with 5 vendors and few small shops for fifth graders of the primary school to the higher secondary school students: they paid for food by themselves. The fifth graders and older students ate at 11:30 and the higher secondary school students at 12:00 in the cafeteria. They also consumed drinks and desserts bought from the three food stores after lunch in the cafeteria.

We saw only a few children eat lunch with a drink (water) maybe because their parents brought them up not to drink water during eating meal since it could make stomach full with water instead of food. In addition, the government distributed milk to kindergartners to sixth graders in primary school every day. This milk was given at once in the case of long school holidays.

**(b) Menu items including price per meal:** For the kindergartners, they served milk and cookies at 10:00, lunch at 11:20 (rice, main dish, side dish, and dessert), and refreshments at 15:00.

The school lunch was a set menu without options, and the content changed every day. The items that cafeteria served in total were 10 types of dishes with rice, noodles accompanied by topping with/without soup, rice porridge, 12 deep-fried foods, 14 bread rolls (changed daily from Monday to Friday), 40 snacks, 5 yogurts, more than 50 drinks, and 25 ice creams. Traditional northern Thai dishes, such as *kab moo* fried pork skin, were also provided.

The school lunch cost 30 baht (104 yen). The prices at the cafeteria were as follows: rice dish was about 20 baht (69 yen); deep-fried food was 15 baht (52 yen); skewered food was 10 baht (35 yen); bread was about 20 baht (69 yen); snacks, yogurts, drinks, coffee, ice creams, and shaved ice were 5 to 10 baht (17 to 35 yen); sandwiches were 15 baht (52 yen); and fruits were 5



Fig. 3 Serving

baht (17 yen).

**(c) Workers and kitchen equipment:**

**(c-1) Workers:** There were 10 workers in blue polo shirts worked in the central kitchen. The working hour here using the shift system, early shift started from 5:30 hrs and late shift ended at 18:00 hrs. The additional wage of 50-150 baht will be added on base salary.

**(c-2) Kitchen equipment:** Freezer refrigerators, gas stoves, steamers, counter-top gas rice cookers, and commercial convection ovens were equipped with.

**(d) Purchase of ingredients:** The cooks went to Muang Mai Fresh Market during their lunch break on the previous day.

**(e) Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, and dressing were applied.

**(f) Preparation on the previous day:** Flour-based foods were partly prepared on the previous day. The rest was prepared on the meal day.

**(g) Food service system:** The food production system was a conventional system. Cooking system was Cook-Serve.

**(h) Hygiene:** The staff who handled food underwent annual medical checkups, urine and blood tests, and monthly stool tests. The government performed on-site inspections. It was obligatory to wear a mask, gloves, and cap.

Everyone from kindergarten children to higher secondary school students washed their used three-compartment divided plate and spoon by themselves (Figure 4). The steps were as follows: (i) disposal of the leftovers, (ii) rough cleaning in a water bowl, (iii) cleaning with detergent, (iv) rinsing the detergent, (v) washing with water; (vi) flushing with clean water; and (vii) drying. The students had the cleaned dish and spoon checked by the cook. The kindergartners had their dish checked by the class teacher for leftovers before washing it. There was almost no food left on their plates.

### 3 . Chulalongkorn University

**(a) Meals:** There were at least 11 canteens across the university. Author visited to the President office canteen.



Fig. 4 Washing up

**(b) Menu items including price per meal:** There were 5 vendors in this canteen and provided 25 types of dishes per vendor. A variety of ingredients were used to prepare rice, noodles, rice porridge, main and side dishes, and soups with different flavors. Nine types of bottled drinks and 13 types of made-to-order beverages were also available. It was 13 to 35 baht (45 to 122 yen) per dish.

**(c) Workers and kitchen equipment:**

**(c-1) Workers:** There were 2 to 5 workers per vendor and there were 5 vendors at this canteen.

**(c-2) Kitchen equipment:** The cooking equipment of the kitchen was not purchased by the vendor owner but procured and installed by the University. Freezer refrigerators, gas stoves, steamers, and counter-top-gas rice cookers were equipped with.

**(d) Purchase of ingredients:** Each vendor went to the close by fresh market in the early morning.

**(e) Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, dressing, etc. were applied.

**(f) Preparation on the previous day:** It was not performed. Preparation started early in the morning.

**(g) Food service system:** The food production system was a conventional system. Cooking system was Cook-Serve.

**(h) Hygiene:** Cutlery sterilizers (Figure 5) and posters of hand washing and waste sorting instructions (Figure 6) were provided. When student finish eating their meals, they sort out



Fig. 5 Tableware disinfection



Fig. 6 Waste sorting

leftover food and return used cutlery and dishes to the cleaning station. Wearing a mask, gloves, caps, and apron is obligatory for staff who work in the kitchen and canteen.

#### 4 . Mahidol University

**(a) Meals:** The main dining hall (12 vendors on the ground floor and 8 on the first floor) was open from 6:00 to 19:00. The building contained a restaurant, a café, two drink stores, and a sushi shop. Each faculty also had a canteen (7:00 to 14:00) and about five external food stores.

**(b) Menu items including price per meal:** They provided 36 items for main dish and drinks on average per vendor. A variety of ingredients were used to prepare rice, noodles, rice porridge, main and side dishes, and soups with different flavors. It was 25 to 50 baht (87 to 174 yen) per dish. Most items were 25 to 35 baht (87 to 121 yen) paid by student. An extra dish was 5 to 10 baht (17 to 35 yen).

#### **(c) Workers and kitchen equipment:**

**(c-1) Workers:** There were 1 to 2 workers per vendor.

**(c-2) Kitchen equipment:** Freezer refrigerators, gas stoves, steamers, and two counter-top gas rice cookers were equipped with at each vendor (Figure 7).

#### **(d) Purchase of ingredients:**

The vendor owner went to the nearby fresh market or supermarket by themselves in the early morning.

**(e) Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, dressing, etc. were applied.

**(f) Preparation on the previous day:** Partly, it was performed in the evening.

**(g) Food service system:** The food production system was a conventional system. Cooking system was Cook-Serve.

**(h) Hygiene:** Cutlery sterilizers and hand washing instructions were provided. When student finish eating their meals, they return used cutlery and dishes to the cleaning station. Wearing a mask, gloves, caps, and apron is obligatory for staff who work in the kitchen and canteen.

#### 5 . Chiang Mai University

**(a) Meals:** Each faculty had a canteen and there were many food vendors and small shops on the premises (Figure 8).

**(b) Menu items including price per meal:** They provided 6 to 10 items per vendor. The menu items included rice, noodles, rice porridge, main and side dishes, and soups. It was 30 to 40 baht (104 yen to 139 yen) per dish. Water was 7 to 10 baht (24 to 35 yen).

#### **(c) Workers and kitchen equipment:**

**(c-1) Workers:** There were 2 to 3 workers per vendor. They worked from 5:00 to 15:00, 16:00 or 18:00. The stores opened at 8:00.

**(c-2) Kitchen equipment:** Each store prepared necessary items. Freezer refrigerators, gas stoves, steamers, and counter-top-



Fig. 7 Vendor Store



Fig. 8 Shop

gas rice cookers were equipped with.

**(d) Purchase of ingredients:** The staff from each store went to the fresh food market around 1:00 to 3:00 in the morning.

**(e) Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, dressing, etc. were applied.

**(f) Preparation on the previous day:** It was not performed. Food was prepared on the day from 5:00. Some stores made the staff prepare raw material food at home. Cooking started at 5:00 at the university.

**(g) Food service system:** The food production system was a conventional system. Cooking system was Cook-Serve.

**(h) Hygiene:** Cutlery sterilizers and hand washing instructions were provided. When student finish eating their meals, they return used cutlery and dishes to the cleaning station. Wearing a mask, gloves, caps, and apron is obligatory for staff who work in the kitchen and canteen.

#### 6 . Geriatric Medical Center

**(a) Meals:** Since the capacity of inpatient is 16 persons. The number of meals provided was on 16 per time.

Meals were prepared collectively at a central kitchen in a different place, carried in a truck, and provided to the patients by the Cook-Serve system. Arranged meal set for special treat patient would be cooked at the Geriatric medical Center kitchen.

“9 rules of good diet” placemats were set on the trays to deliver

nutrition education. The menus on a four-week cycle were planned based on different levels of swallowability (Figure 9). The food delivered from the center was set on trays (Figure 10) and brought to the hospital wards (Figure 11)

**(b) Menu items including price per meal:** Four types of food including dysphagia and liquid diets (pudding, honey, pumpkin, etc.) were provided. It was 80 baht (278 yen) per meal and government subsidies were available.

**(c) Workers and kitchen equipment:**

**(c-1) Workers:** There were one administrative dietitian, one cook, and two assistants at the in Geriatric Medical Center kitchen.

**(c-2) Kitchen equipment:** Freezer refrigerators, gas stoves, and counter-top-gas rice cookers were installed at the Geriatric Medical Center kitchen.

**(d) Purchase of ingredients:** Suppliers delivered the ingredients to the Geriatric Medical Center kitchen daily.

**(e) Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, dressing, etc. were applied.

**(f) Preparation on the previous day:** It was not performed.

**(g) Food service system:** The food production system was a central kitchen system. Cooking system was Cook-Serve.

**(h) Hygiene:** The staff who handled food underwent annual medical checkups, urine and blood tests, and monthly stool tests. The government performed on-site inspections. They wore a mask, gloves, cap, and an apron. In case staff or family members got a cold or diarrhea, staff must stay home. For each meal, both the ingredients and the food must be frozen stored for 2 weeks in case there is any investigation for food poisoning later.

## 7. Vivobene Village

**(a) Meals:** They prepared 160 meals per meal that the guests wanted at the requested time. Dysphagia diets were available but parenteral and enteral nutrition were not.

**(b) Menu items including price per meal:** There were 30 to 40 items as a buffet style. A small buffet was provided for simple choices. A French dinner (entree, soup, main course, and dessert) and therapeutic meals (obesity, high blood pressure, diabetes, kidney disease, heart disease, and dysphagia) were available. At each meal time, the customer could choose the place to eat between their own room or the restaurant. A buffet is about 500 baht (1735 yen). A pizza and a drink cost about 300 baht (1044 yen). The guest meal price is quite high; however, the meal for staff is around 30 baht (104 yen) per meal which sold at the staff dining room.

**(c) Workers and kitchen equipment:**

**(c-1) Workers:** They were divided into two teams: the restaurant (cooks and waiting staff) and the nurses. Though no nutritionist was employed, the nurses assessed their nutrition and worked together with the restaurant team.

**(c-2) Kitchen equipment:** Made-in-Europe cooking

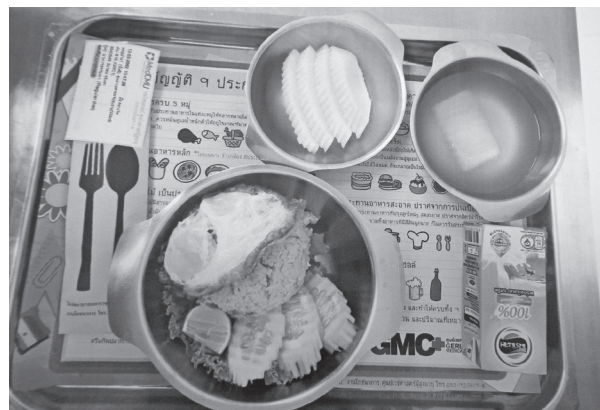


Fig. 9 Meal



Fig. 10 Set



Fig. 11 Serving cart

equipment was used in the kitchen. Chip-resistant melamine and polypropylene tableware were adopted for use by the elderly. Freezer refrigerators, gas stoves, steamers, counter-top gas rice cookers, and commercial convection ovens were equipped with in center kitchen.

**(d) Purchase of ingredients:** Market staff and suppliers delivered ingredients every day. In addition, organic vegetables were grown in-house with help from the guests and used in their

dishes.

(e) **Cooking methods:** Boiling, simmering, grilling, deep-frying, stir-frying, steaming, dressing, etc. were applied.

(f) **Preparation on the previous day:** The seasonings were prepared in the afternoon of the previous day and vegetables and other perishable foods were processed on the day when delivered.

(g) **Food service system:** The food production system was a conventional system. Cooking system was Cook-Serve.

(h) **Hygiene:** The staff underwent medical checkups and stool tests. The staff wore uniforms, it was obligatory to wear a mask, gloves, caps, and an apron.

#### IV. Discussion

Regarding the meal service systems, while Japanese facilities adopt various systems depending on their characteristics, it was revealed that the Cook-Serve system was common in Thailand because of the climate and costs, although this report is based on the visit of only seven facilities.

During the visit at the kindergartens and other educational institutions, the students ate slowly and quietly. While the hot climate might be one of the causes of their attitude, the pre-meal ritual and the daily education to appreciate the lives of plants and animals also seemed to have a good effect.

Each meal service facility sold many sweet drinks, including commercially available 500 mL bottles of green tea which contained 12 teaspoons of sugar<sup>10</sup>. Future increase in lifestyle-related diseases is anticipated.

At kindergartens, different styles of meal, such as lunch boxes and meal services, were adopted depending on the school. Food was either prepared in the kitchen on the premises or brought in by contracted suppliers, and the teachers served the food to the children in the classroom.

While Thai cuisine has complex flavors featuring spiciness, acidity, sweetness, saltiness, umami, tartness of lime, and herbs, the food for kindergarten and primary school children had plain taste.

As for primary schools, the situation was slightly different between public and private schools.

The Free School Lunch Project<sup>11</sup> was applied to first to sixth graders in public schools. If the pupils had food allergies, were Muslim, or had certain conditions, then their families prepared lunch boxes for them. The first- to third-year students at lower secondary schools bought lunch at the canteen or brought a lunch box. Meanwhile, at private primary schools, the first to second/ third graders ate school lunches similar to in Japan, which their parents paid for in advance. The food was prepared in the school kitchen and brought to the classroom or dining room, where pupils were seated at tables and ate together. The menu usually consisted of well-balanced dishes, in addition to rice and soup.

Since Thailand is a hot country, the upper grade student who were not in special circumstances brought money to buy meals at the food store and eat at the canteen rather than bringing a lunch

box, in consideration of food sanitation.

In response to the indication of the Food and Agriculture Organization (FAO) as to undernutrition, the government started the School Milk Project<sup>12</sup> in 1992 in public schools. It covered up to fourth graders at primary schools and distributed shelf-stable milk in the morning to provide nutrition support for their growth. Before long school holidays, they could take home the packs to cover the period.

Students of private lower and upper secondary schools and universities bought and ate what they wanted at school cafeterias, which were in the style of a food court with various food vendors.

Between meals, students from primary schools to universities ate light meal. For example, *gai yang* grilled chicken, fruits, packaged snacks, ice cream and etc. Even though they seemed to eat often between meals, there were little leftovers in their lunch.

While school lunch at elementary and junior high schools in Japan is served by students who are on duty, it was done mostly by teachers in Thailand.

In contrast to Japanese schools, Thai students disposed of their leftovers by themselves according to the waste sorting rules and even washed their tableware in some schools.

At the universities, the use of UV cutlery sterilizers before meals attracted our attention because they are not installed in Japan.

There are various cooking system for example, conventional system, ready food, assembly serve, and commissary system (Central kitchen system), the Thai dietitian at the Geriatric Medical Center explained to us that public and private hospitals adopted different food service systems, and at the Geriatric Medical Center kitchen use a commissary system (central kitchen system).

The dietitian also mentioned that the situation in elderly care facilities was similar to that of hospitals and they might use a conventional system to cook within the facility and serve immediately, whether it was a public or private facility. What we observed at Vivobene Village was a conventional system.

The meals at the hospital and the elderly-care facility in Thailand were simple and had fewer types than in Japan.

While the Thai law stipulates regular working hours of eight hours per day and 48 hours per week, their actual hours were determined based on the agreement between the employer and the workers. For example, Some store staff worked from 8:00 to 20:00 and some from 7:00 to 14:00, and their overtime works were paid.

Although no reports on meal service facilities in Thailand were found in the past, we have discovered differences from Japanese food service.

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### **Conflict of Interest**

The authors declare no conflicts of interest.

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