

Developing a school food safety plan based on HACCP system (for school lunch box caterers)



食物安全中心
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(I) Background/Introduction

To further reduce food waste and disposable containers, the Government launched a new initiative in 2009 to encourage schools to use reusable containers and cutlery and adopt the “on-site meal portioning” approach where possible.

Under the “on-site meal portioning” approach, meals ordered from school lunch caterers are delivered to schools where rice and vegetables are cooked on the same day. This is different from the traditional mode of operation in which food is prepared and portioned in advance and delivered in lunch boxes. In addition, some caterers may provide on-site catering service to students.

Regardless of the mode of catering operation, school caterers (caterers) should minimise food-borne hazards (hazards) which may affect health and lead to food poisoning.



(II) Overview

To build a healthy school environment, caterers have the responsibility to serve safe food.

Food-borne hazards, such as biological, chemical or physical agents that may affect health, are unavoidable. Since Hazard Analysis and Critical Control Point (HACCP) system can effectively enhance food safety and prevent food related diseases, caterers should implement appropriate measures to minimise the risks associated with the hazards to a level acceptable to the consumers.

To facilitate the school lunch caterers, including meal box suppliers (suppliers), tuck shop and school canteen operators, in developing an effective food safety plan, we will provide hereafter a hazard analysis, suggested critical control points and well-recognised critical limits for food business planners' reference. We will also highlight considerations that

deserve special attention during the development of a specific food safety plan for food business.

(III) What is HACCP?

There are seven principles in HACCP:

Principle 1: Analyse hazards

Principle 2: Determine the Critical Control Points (CCPs)

Principle 3: Establish critical limit(s) for CCPs

Principle 4: Establish monitoring procedures

Principle 5: Establish corrective action(s)

Principle 6: Establish verification procedures

Principle 7: Establish a record system

(IV) How to develop a Food Safety Plan?

1. Implementing Prerequisite Programme (PRP)

An effective implementation of PRP can facilitate introduction of Food Safety Plan. In this connection, the caterers should implement PRP which includes a series of basic measures for prevention of potential problems arising from the food production process before introduction of Food Safety Plan. PRP includes some basic activities such as:

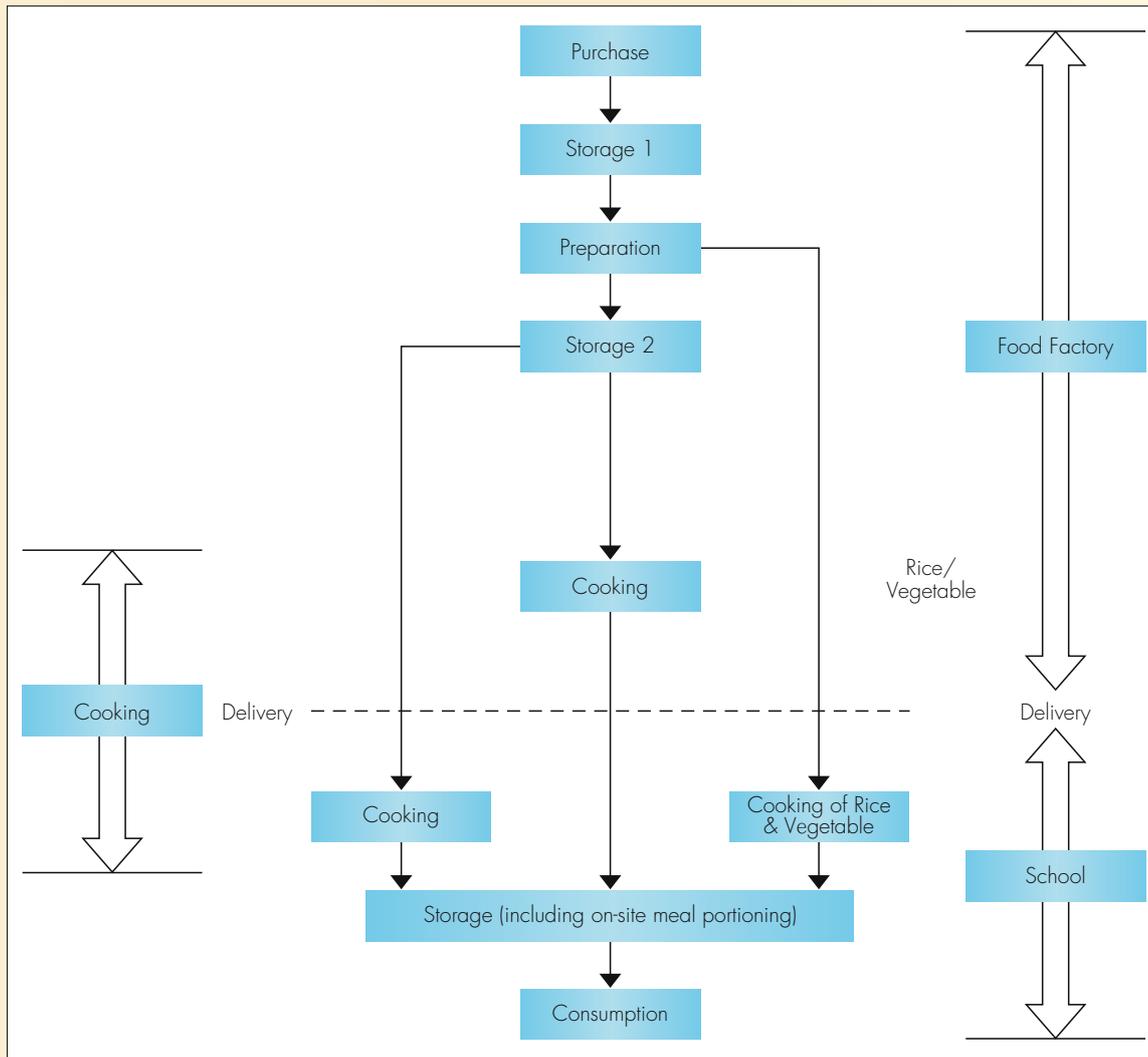
- Supplier Management
- Cleaning and Sanitation
- Control of Facilities and Design
- Control of Operation and Transportation
- Control of Environmental Hygiene
- Control of Personal Hygiene
- Pest Control
- Staff Training
- Management of Traceability System



2. Drawing a flow diagram

Before conducting the hazard analysis, the caterers should first take stock of their own products, understand the workflow and draw the flow diagram of the food preparation process (the flow diagram may vary with the business size). In Figure 1, we provide a generic flow diagram highlighting the main steps of a typical school lunch production. Each main step can be further subdivided into more specific steps. Whether to subdivide the main step depends on the particular needs of caterers.

Figure 1



3. Analyse hazards (Principle 1)

Generally speaking, hazards associated with caterers come from:-

- the ingredients;
- food processing steps; and
- post-cooking handling, such as packaging, delivery and meal portioning.



Hazards in the ingredients are mostly chemical (e.g. pesticides in vegetables) and biological (e.g. *Salmonella* species in chicken); food processing steps (including storage, preparation and cooking of ingredients) mostly bring biological hazards (e.g. survival of *E.coli* O157 in food without adequate cooking) to the food; post-cooking handling may introduce chemical (e.g. contamination from the internal environment of delivery vehicle), physical (e.g. contamination during packaging of lunch boxes) and biological (e.g. *Staphylococcus aureus* contamination from food handlers) hazards to the food. Table 1 lists some examples of potential hazards and their control measures in school lunch services.

Table 1: Examples of potential hazards and their control measures in school lunch services

Source of hazards	Related food / steps	Nature of hazards	Control Measures	Remarks
Ingredients	Meat, poultry, seafood	<ul style="list-style-type: none"> – Bacteria, viruses and parasites – Toxin 	<ul style="list-style-type: none"> – Purchase from licensed/ approved suppliers which are reliable 	PRP (Supplier Management)
	Vegetables	Pesticide residues	<ul style="list-style-type: none"> – Check suppliers' quality specification or relevant health certificates 	
	Cereals	Bacterial growth		
Food processing steps	Storage	Bacterial growth	Store ingredients at appropriate temperature	PRP (Control of Operation)
	Preparation	Bacterial growth	Defrost frozen food in running water or inside fridge	PRP (Control of Operation)
	Cooking	Survival of bacteria in food	Cook food thoroughly	CCP
Post-cooking handling	Packaging	Bacterial cross contamination	Establish separate zones and use separate utensils to handle raw and cooked food	PRP (Control of Operation)
	Delivery	Foreign bodies or chemical contamination inside the delivery vehicles	Inspect delivery vehicle	PRP (Control of Transportation)
		Bacterial growth	Store food in insulated container at 4°C or below or above 60°C	CCP
	Meal portioning	Foreign bodies in the food preparation area	Take effective environmental hygiene measures	PRP (Control of Environmental Hygiene)
		Bacterial contamination from food handlers	Food handlers maintain good personal hygiene practices	PRP (Control of Personal Hygiene)
		Bacterial growth during storage	Store food in hot holding apparatus above 60°C	CCP

6. Establishing corrective actions, verification procedures and record system (Principles 5-7)

These principles can be very specific to individual school caterer and recipe. Some useful references and ways of establishing these principles are provided below.

Plant management should establish corrective actions in advance to correct deviations from established critical limits immediately (e.g. adjust or repair the chiller if its temperature is higher than 4°C) and to stop supply of unsafe food, once the deviation occurs.

The establishment of verification procedures aims to ensure the HACCP system is functioning properly. For example, production manager should regularly check the temperature of freezers or chillers and audit the monitoring records to make sure the freezers or chillers are functioning properly.

A good record system should include records of food product safety (e.g. health certificate), food processing, monitoring procedures and corrective action. If there is any food incident, the system can facilitate the supplier to trace the source of ingredients, production process and the status of lunch box distribution, and recall the food if necessary.

(V) Guidelines on production of safe school lunch box

(A) Recommendations on the production procedures

1. Purchase and receiving

These two steps are very important in minimising food hazards. Raw materials and ingredients may be contaminated with harmful bacteria, toxins, chemicals (e.g. pesticides), glass, metal, etc. Supplier should ensure that all food received is fresh and safe. Unsatisfactory food items should be disposed of.

Recommendations:

- Purchase raw materials and ingredients from licensed/ approved supplier which are reliable.
- Control temperature during delivery (at or below 4°C for chilled food and at or below -18°C for frozen food).
- Establish quality and safety specifications of raw materials and ingredients.
- Choose least hazardous ingredients.
- Check general conditions of food and reject abnormal or off-odoured food.



- Check the expiry dates of milk, eggs and other perishable goods to ensure safety and quality.
- Check integrity of food packaging and the food label. Do not use food beyond its expiry date.
- Check the temperature of chilled and frozen food. Frozen food must be frozen solid and show no signs of thawing and refreezing (e.g. large ice crystals or liquid at the bottom of carton).
- Move chilled and frozen food to cold storage as soon as possible.
- Check the interior temperature of refrigerating trucks.
- Keep records (including the name, date and total quantity of the food acquired and details of the supplier) of ingredients to facilitate tracing (template records of local acquisition of food and acquisition of imported food in Annex I).
- Establish supplier list and carry out supplier performance monitoring program regularly (e.g. regular supplier audit, examination of health certificate or test reports, etc.) (approved supplier record form in Annex II).



2.Storage of raw materials and other ingredients

The purpose of this control point is to prevent deterioration (e.g. microbiological deterioration) of food. Raw food may contain microorganisms (such as *Salmonella* species in chicken fillet) which multiply rapidly at room temperature. By keeping food temperature at or below 4°C or above 60°C, the growth of the microorganisms will slow down or even pause. Thus, food should be stored at appropriate temperature. Also, raw food may contaminate cooked and ready-to-eat food through direct contact or by dripping its juice onto cooked and ready-to-eat food. Therefore, it is important to store the raw food and the cooked and ready-to-eat food separately to prevent cross-contamination.

Recommendations:

- Keep chilled food at or below 4°C, frozen food at or below -18°C, and hot food above 60°C.
- Place dry goods on food shelf which is at least 0.3 metre above floor.
- Adopt "first-in-first-out" approach.
- Do not use food beyond its expiry date.
- Do not use food that appears or smells spoilt.
- Storage area should be dry and clean with pest-proof measures in place.



- Inside the refrigerators, the supplier should:
 1. Store food in impervious containers wrapped with cling wrap or covered with a lid.
 2. Place food properly to allow good air circulation.
 3. Store cooked food in shallow containers.
 4. Separate cooked food from the raw food and place cooked food above the raw food. If possible, use two separate refrigerators for storage.
 5. Establish date marking system. Place date labels on the food to avoid prolonged storage in refrigerator.

3. Food Preparation

Supplier should adopt the recipe that does not damage nutrition value of food but still inhibit bacterial growth. Proper preparation, such as washing, rinsing, sanitising and peeling of the fruits and vegetables, can reduce food-borne hazards associated with chemical contaminants.

Recommendations:

- Wash, rinse, sanitise and peel off damaged parts before preparation of all fresh fruit and vegetables.
- Defrost frozen meat and poultry in fridge or under running water thoroughly before cooking.
- Frozen food should be adequately thawed before cooking.
- When handling ready-to-eat food, use separate utensils, equipment and cutting boards to avoid cross contamination.
- When preparing cold dishes (e.g. salad), always cool the cooked component before adding other ingredients.

4. Cooking

Cooking is a very important step to ensure microbiological food safety. Bacteria (e.g. *E.coli* O157 in beef) may survive if food is not cooked thoroughly.

Recommendations:

- Cook food thoroughly - boil soup and stew; for meat and poultry, make sure that juice is clear and not red. Ideally, use a thermometer to check that the core temperature of meat reaches at least 75°C, and keep proper temperature logs.
- Reheat foods or leftovers thoroughly to make sure that the core temperature reaches at least 75°C.



- Use a clean, sanitised and calibrated food thermometer to measure food temperature.
- Insert the food thermometer into the centre of the thickest part of the food to obtain an accurate temperature reading.

5. Packaging and delivery

If handled improperly during packaging and delivery, food is likely at risk of contamination and bacterial growth. Therefore, hygienic condition inside the delivery vehicles and maintenance of proper holding temperature are crucial to ensure safe meal.

Recommendations:

- Keep all food in hygienic and covered containers.
- Store lunch boxes in hygienic insulation boxes during transportation.
- Store the food for on-site portioning in containers that can be put inside insulation boxes or bain marie.
- Conduct temperature checks before delivery and on arrival at schools to ensure hot meals are kept at above 60°C and cold food at 4°C or below during transportation.
- Shorten the time between finishing production and consumption of food (transportation time is included) to lower the risk of bacterial growth and maintain food temperature.
- Internal surfaces of the transporting vehicle should be smooth and impervious, and be frequently cleaned and disinfected. It is desirable to install a cooling or heating device in the vehicle to maintain food temperature during transportation.
- Inspect the hygienic condition of the vehicle before each food delivery (Inspection checklist for food delivery vehicles in Annex III).
- Transporting vehicle should not be used for purposes other than delivering school lunch, especially transportation of raw food or chemicals and maintain delivery log for checking purpose.



6. Meal portioning and serving

It is easy for food to be contaminated in these two steps. During meal portioning, foreign bodies, such as hair, hair clip, button, etc., may be introduced. During the serving process, cooked food contaminated by *Staphylococcus aureus* from food handlers is likely.

Recommendations:

- All vegetable and rice for cooking on-site should be properly washed and stored.
- Use separate utensil and equipment for handling and storing raw and cooked food and label utensils with different colour codes to distinguish utensils handling raw and cooked food.
- Cooking and portioning should be performed in separate areas.
- Cooked food should be properly stored to prevent contamination.
- Hot food should be stored in warming device immediately upon arrival and kept at above 60°C until they are ready for portioning or consumption.
- Reserve adequate space, equipment (e.g. food warming device and cupboard) and manpower to maintain cleanliness and to portion and distribute the lunch efficiently.
- The knife and equipment for cutting fruit should be properly cleaned and sterilised before and after use. The cut fruit should be properly stored to prevent contamination.
- Store reusable containers and cutlery in sealed cupboards or containers that are rendered proof against dust and pests.
- Provide the staff with a complete set of hand-washing facility.
- Provide designated room or area for staff to change clothes and store personal items.
- Designate different staff to handle food and collect cash.



(B) Recommendations on establishment, environment and personnel

The successful implementation of a food safety plan depends upon three factors, namely facilities, equipment and people. These factors not only serve as the foundation of food safety, but also help to control food-borne hazards not outlined specifically in the HACCP system.

1. Design of facilities and equipment

Supplier should choose facilities and equipment that enable food handlers to prepare food safe for consumption, review the facilities and equipment, and overcome other difficulties (e.g. lack of appropriate thermometers).

Recommendations:

- Always keep your premises clean, in particular the food preparation room and the toilet.

- Provide different set of utensils for handling raw food and cooked food and label the utensils with different colour codes. Utensils used for handling raw food should not be used to handle cooked food unless the utensils have been washed and sanitised thoroughly.
- Make sure the refrigerators are in good working condition. Clean and defrost them regularly to avoid frost accumulation. Check the temperature regularly and keep proper temperature logs.
- Put rubbish and food waste into impervious waste containers. Always cover containers with lids. Remember to remove rubbish daily.
- Prevent pest infests in food preparation room and storage area. Appoint personnel who have received training in pest control or professional pest control company to eliminate pest if infestation is detected. Keep proper records of pest control programme (Pest control inspection and monitoring record forms in Annex IV).



2. Environmental hygiene (including cleaning and sanitisation)

Proper cleaning and sanitisation of food preparation areas, facilities and equipments and other food contact surfaces help to remove food residues and dirt.

Recommendations:

- Wash used utensils with water and detergent and sanitise them in either boiling water or with an approved bactericidal agent afterwards.
- Keep all dangerous chemicals, such as disinfectants and insecticides, in labelled and closed containers and away from food preparation area.
- Document standard operation procedures on cleaning and sanitisation for staff to follow.

3. Personal hygiene

Food handlers with good personal hygiene practices help to reduce food contamination from bacteria (e.g. *Staphylococcus aureus* on the skin) or physical contaminants (e.g. hair).

Recommendations:

- Wear clean and light-coloured outfit during work.
- Wear face masks and hairnets properly.
- Remove all accessories before working.
- Cover all wounds on hands or arms with bright-coloured waterproof dressings.
- Wash hands thoroughly with soapy water every time, before or after work, and after visiting toilet.



- When sneezing and coughing, turn away from food and use a tissue to cover your nose and mouth and wash hands immediately.
- Avoid smoking when handling food.
- Don't touch cooked food with bare hands. If necessary, wear disposable gloves first.
- Food handlers with symptoms such as sore throat, diarrhoea and vomiting should stop handling food.

(C) Management responsibilities

A food safety plan will only be effective when staff are willing to commit completely to safe food production and the management provide sufficient resources to implement the food safety plan. Every employee should know his/her role and commit to make the plan work. Management have to consider difficulties in carrying out the plan (e.g. high employee turnover, improper training and difficulty in developing a crisis management plan).

1. Staff training

Proper staff training enable staff to understand better on how food can be contaminated and how food-borne illnesses can be prevented through proper food handling.

Recommendation:

- Employers should provide job-related food hygiene training for new employees and refresher courses for staff whenever necessary, to reinforce and update their food safety knowledge (Staff training record form in Annex V).



2. Incident management planning

Suppliers should document a detailed crisis management plan so that they can respond proactively in handling food complaints or food poisoning cases.

Recommendations:

- Suppliers should formulate a crisis management plan for handling crises such as food complaints and food poisoning. All stakeholders should understand their role in handling the crisis.
- Conduct food recall drill regularly to assess the food traceability.

More resources:

- Centre for Food Safety (CFS)'s website - <http://www.cfs.gov.hk>
- CFS Communication Resource Unit - Tel: 2381 6096
- Templates provided in annexes

紀錄範本^註
TEMPLATE RECORD^{Note}
 本地獲取食物的紀錄
RECORD OF LOCAL ACQUISITION OF FOOD

20 _____ 年 _____ 月份收貨紀錄表 (本地食物)
 Record of local acquisition of food for the month of _____ 20 _____

公司名稱：
 Name of company

收貨日期 Date of food acquired	食物名稱 Food description	數量 Quantity	供應商資料 Particulars of supplier		
			名稱 Name	聯絡電話 Contact tel. no.	地址 Address

紀錄範本^註
TEMPLATE RECORD^{Note}
 獲取進口食物的紀錄
RECORD OF ACQUISITION OF IMPORTED FOOD

20 _____ 年 _____ 月份收貨紀錄表 (進口食物)
 Record of acquisition of imported food for the month of _____ 20 _____

公司名稱：
 Name of company

收貨日期 Date of food acquired	食物名稱 Food description	數量 Quantity	供應商資料 Particulars of supplier			食物出口國家 / 地方 Exporting country/ place
			名稱 Name	聯絡電話 Contact tel. no.	地址 Address	

