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ESSENTIAL SAFETY

REQUIREMENTS

FOR STREET-VENDED FOODS

(Revised Edition)

Food Safety Unit
Division of Food and Nutrition
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Editorial note:

WHO amended the text as follow;

Paragraph 3 –Setting Priorities for Food Safety Interventions

The paragraph crossed out and the three relative footnotes (9,10,11) should be deleted and replaced by the following text and footnote:

The overview of the HACCP system in this section is based on the text, adopted by the Codex Alimentarius Commission at its 22nd session in 1997 in Geneva, “Hazard Analysis and Critical Control Point (HACCP) system and guidelines for its Application”.

(Footnote)

⁹ Alinorm 97/13 (annex to appendix II) and Volume 1B of the Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Rome

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Appreciation is also extended to the food safety authorities in the 109 countries and areas in all six WHO Regions who took part in the survey of street-vended foods as well as those who have cooperated in HACCP studies of street-vended foods within a number of these countries.

Preface

In their report¹, the Joint FAO/WHO Expert Committee on Food Safety, which was convened at WHO Headquarters in Geneva in 1983, identified both the importance and potential hazards of street-vended foods. Because of the possibility of microbiological, chemical and physical contamination, which conceivably could occur under street conditions, the Committee concluded that efforts must be made (a) to educate the personnel involved; (b) to improve the environmental conditions in which the trade is practised; and (c) to provide the essential services to assist street food vendors in assuring the safety of their wares.

In 1986, a Joint FAO/WHO Expert Consultation on Food Protection for Urban Consumers², in considering the benefits and problems associated with street-vended foods, recommended that, in addition to those efforts mentioned above, simple techniques for regulation of street foods be implemented and that the work of international organizations be extended to study street food practices and develop adequate strategies to improve their safety.

More recently, interest in the promotion of this important sector of the food supply system has been increasing in many countries, even in those which had previously ignored or attempted to suppress it. As a consequence, over-regulation and imposition of too many overhead costs are viewed as counter-productive and may substantially reduce the sector's capacity to provide a variety of nutritious foods at affordable prices.

The Codex Alimentarius Commission and its subsidiary bodies have discussed the need for a code of hygienic practice for street foods. Both the Codex Coordinating Committees for Africa and Asia have prepared draft codes while the Committee for Latin America and the Caribbean has adopted a Code of Hygienic Practice for the Preparation and Sale of Street-vended Foods.

At its 25th session in Washington, D.C. (1991), the Codex Committee on Food Hygiene reviewed the work done previously in this field and welcomed the proposal for WHO to prepare a uniform text taking into account existing draft codes as well as relevant Codex documents (Appendix to CX/FH 91/13). Subsequently, two documents were prepared. "Essential safety requirements for street-vended foods" was prepared to provide guidance for governments on food safety measures which might be specifically addressed to street food vendors. The second document, "Street-vended food: A HACCP-based food safety strategy for governments" was intended to provide guidance on critical food safety measures. The present document combines the previous two documents in a unified approach to further clarify how authorities may adopt a HACCP-based strategy to prioritize food control measures specific to the safety of street-vended foods.

¹ The role of food safety in health and development. Report of the Joint FAO/WHO Expert Committee on Food Safety. TRS 705, WHO, Geneva, 1984.

² Food Protection for Urban Consumers. Report of a Joint FAO/WHO Expert Consultation, 1-5 December 1986, Rome, Italy. FAO, Rome, 1987.

1. Introduction

This document focuses on "street-vended foods" or its equivalent "street foods" which are defined as foods and beverages prepared and/or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation. This definition includes fresh fruits and vegetables which are sold outside authorized market areas for immediate consumption.

Because of socioeconomic changes in many countries, this sector has experienced significant growth during the past few decades. Urbanization and population growth, especially in developing countries, are expected to continue into the next century and street-vended foods, which are largely but not exclusively an urban phenomenon, will expand accordingly.

Benefits of Street-Vended Foods

Street-vended foods provide:

- a source of inexpensive, convenient and often nutritious food for urban and rural poor;
- a source of attractive and varied food for tourists and the economically advantaged;
- a major source of income for a vast number of persons, particularly women; and
- a chance for self-employment and the opportunity to develop business skills with low capital investment.

While street-vended foods are appreciated for their unique flavours as well as their convenience, they are also often essential for maintaining the nutritional status of the population. Street food vending assures food security for low-income urban populations and provides a livelihood for a large number of workers who would otherwise be unable to establish a business for want of capital. Street food vending also offers business opportunities for developing entrepreneurs.

In contrast to these potential benefits, it is also recognized that street-food vendors are often poor and uneducated and lack appreciation for safe food handling. Consequently, street foods are perceived to be a major public health risk. If a community is to have the full benefits of street-vended foods with minimal risk of foodborne disease, government intervention is required to ensure that the standard of safety for such foods is the best attainable in the context of the prevailing local situation.

Street-vended foods may pose significant public health problems

- Lack of basic infrastructure and services, such as potable water supplies.
- Difficulty in controlling the large numbers of street food vending operations because of their diversity, mobility and temporary nature.
- Insufficient resources for inspection and laboratory analysis.
- General lack of factual knowledge about the microbiological status or the precise epidemiological significance of many street-vended foods.
- Poor knowledge of street vendors in basic food safety measures.
- Inadequate public awareness of hazards posed by certain street foods.

In 1993, the World Health Organization through its six Regional Offices undertook a survey of its Member States to assess the current situation in regard to street-vended food and to obtain the views of responsible authorities concerning the hazards posed by street-vended foods and contributing factors, as well as approaches for managing these hazards. Over 100 countries participated in this survey which represents the most extensive report on street-vended food available to date. The survey (see summarized results in annex V) noted that almost all countries reported a wide variety of foods, types of preparation, facilities and infrastructure.

Key findings of the WHO survey of street-vended foods

- 74% of countries reported street-vended foods to be a significant part of the urban food supply;
- Street-vended foods included foods as diverse as meat, fish, fruits, vegetables, grains, cereals, frozen produce and beverages;
- Types of preparation included foods without any preparation (65%)*, ready-to-eat food (97%) and food cooked on site (82%);
- Vending facilities varied from mobile carts to fixed stalls and food centres;
- Infrastructure developments were relatively limited with restricted access to potable water (47%), toilets (15%), refrigeration (43%) and washing and waste disposal facilities;
- The majority of countries reported contamination of food (from raw food, infected handlers and inadequately cleaned equipment) and time and temperature abuse to be the major factors contributing to foodborne disease; and
- Most countries reported insufficient inspection personnel, insufficient application of the HACCP concept and noted that registration, training and medical examinations were not amongst selected management strategies

* percentage of countries reporting yes to question .

2. Requirements in the Hygienic Handling of Street-vended Foods

To enable official recognition and control of street foods it may be appropriate to develop government guidelines or regulations specific to this food service sector. As stated in the preface of this document, many governments consider a Code of Hygienic Practice as an essential tool in this regard. If governments are considering the development of a Code of Hygienic Practice for street-vended foods, the following requirements focus on hygienic handling requirements to cover special needs³ resulting from the preparation and/or sale of foods on streets or other public places, often by mobile hawkers or peddlers. It takes into account the principles enunciated in the Codex document, "The Recommended International Code of Practice - General Principles of Food Hygiene", proposed by the twenty-eighth and twenty-ninth sessions of the Codex Committee on Food Hygiene. The information is presented in a format similar to that used in draft codes prepared for the discussion of a number of regional Codex Coordinating Committees, however emphasis has been placed on matters that relate directly to food safety rather than on those that are mainly aesthetic in nature.

2.1 General requirements

General issues commonly addressed in codes of practice or regulations include aspects such as licensing and display of notices. Where licences are included it may be appropriate to award them conditional to the commitment of the vendor to the preparation of safe food and subject to their knowledge of safe food-handling practices. Prior medical examination (clinical and laboratory) should not be a condition for licensing or for subsequent renewal of licence⁴.

Requirements on display of notices should also focus on food safety messages. For example, it may be a requirement that vendors selling raw or partially processed animal products for immediate consumption be required to display a sign that informs consumers of the increased public health risk associated with consuming food in such states. Of course, authorities may consider it appropriate to require the display of other notices but care should be taken to avoid over-regulation in this regard.

2.2 Raw materials

Food is susceptible to contamination at all stages of the food chain. Raw materials are therefore important to the safety of street-vended food because of the biological, chemical and physical hazards that may be introduced to the vending operation and which may persist through preparation and processing.

³ These special needs have been brought out in the studies referenced in footnotes 12-18.

⁴ See "Health Surveillance and Management Procedures for Food-handling Personnel". Technical Report Series No. 785, WHO, Geneva, 1989.

2.2.1 The type and extent of biological contamination of raw materials used in street food vending will differ little from those used in other businesses involved in the food service sector. The greatest differences will be noted when vendors purchase raw materials of a lower grade because of their lower cost. Consequently, raw materials should be obtained from known and reliable sources and not from clandestine dealers (such as illegal slaughterers). Raw materials should also be observed for visible deterioration and off-odours. In addition, it may be necessary to examine potentially hazardous food for temperature abuse, including signs of thawing for frozen raw materials.

2.2.2 Raw materials also need to be examined for the presence of physical hazards and gross chemical contamination prior to purchase (although it should be noted that chemical contamination can rarely be detected without laboratory analysis). Raw materials contaminated with obvious physical hazards should be avoided or the hazards removed. Control of chemical hazards in raw materials is often extremely difficult for street food vendors. Attention may be given to obtaining food colours and other additives from authorized dealers (where they exist), purchasing raw materials from reputable suppliers and examining foods for possible visible and olfactory signs of chemical contamination.

2.2.3 It should be assured that raw materials are not further exposed to contamination from accidental exposure to chemicals or growth of pathogens and toxin production during transport and storage. To protect against such hazards:

(a) Materials, which will be consumed in their raw state, should be transported and stored separately from other raw materials and non-food items.

(b) Materials should be transported in such a way as to limit pathogen growth or toxin formation by effectively controlling time of transportation and the temperature and water activity of such raw materials.

2.2.4 Vendors should pay particular attention to containers of pastes, sauces and other food additives, monitoring them for fungal growth and visible deterioration. Such ingredients should be replaced regularly to prevent growth and toxin formation.

2.3 Water and ice

Water is a critical raw material in many street food vending operations. It may also be contaminated with biological, chemical or physical hazards. As such contaminated water will create a public health risk if it is:
used for drinking purposes;
used for washing of food, incorporated into food as an ingredient and used in the processing of food; or
used in the washing of equipment, utensils and containers.

Freezing does not remove chemical hazards and should not be considered a safe process for the removal of biological hazards. Consequently contaminated ice may introduce hazards to food and beverages with which it is in contact.

One of the most critical problems in street food vending is the supply of water of acceptable quality and in sufficient quantities for drinking, washing, cleaning and other operations. The ambulant vendor can carry only limited supplies and even stationary food stalls may not have direct access to a water supply. Indeed, water is generally scarce in low-income areas in most developing countries. Water taps may run only for a few hours during the day and sometimes not for days. Street vendors in various parts of the world are known to wash their utensils, including those in which food has been served, in water which has been used previously, perhaps many times. Therefore, water supply needs close attention in street food operations. This is particularly true if contaminated water may be added to a food or applied to utensils without a subsequent step (eg heating or chemical sanitizing) to eliminate or reduce the potential hazards to an acceptable level.

2.3.1 As far as possible, the production and sales units should have their own supplies of potable⁵ water whether it is from a central system or an individual source, such as a hand pump. If potable water is not available, a suitable source of safe⁶ water should be used.

2.3.2 Water used for drinking and preparation of beverages should be potable. In any case, the quality of the water should not be inferior to that of drinking water available in the community. Special care should be taken to assure that such water is maintained in a sanitary state.

2.3.3 Water used for washing utensils, food and hands should be safe and should not be re-used. As far as possible, running water should be available for these purposes. If this is not feasible, a bucket or similar container can be used for washing, but it should be emptied and cleaned after each washing. Hot water, where available, makes cleaning and washing easier and more effective but is not generally available to street vendors.

2.3.4 Ice to be used in beverages and food should be prepared from potable water and should be transported and stored in a sanitary manner. Other items, such as food and beverages, should not be stored in the same container used to store ice intended for consumption.

2.4 Formulation

The safety of some foods lie in their high levels of salt, sugar or acid or low moisture content. The formulation of such foods is often critical and street-food vendors and health authorities must pay particular attention the correct amounts of ingredients and monitor critical limits through taste, appearance, texture, odour, mixing time, pH, water activity, etc.

⁵ Potable water meets the quality specifications defined in the national drinking water standard.

⁶ Safe water does not constitute an appreciable risk to health, but its appearance, smell or taste might be less than defined in the national drinking water standards.

2.5 Preparation and processing

Consumption of raw or inadequately processed animal foods may prove a significant public health risk as such foods are frequently contaminated with pathogens and occasionally with toxic chemicals. Similarly, vegetables, fruits and grains may carry hazardous contaminants.

Preparation and processing should:

- *be adequate to eliminate or reduce such hazards to an acceptable level;*
- *prevent growth of pathogens, production of toxic chemicals and the introduction of physical hazards; and*
- *ensure that foods are not recontaminated.*

2.5.1 Preparation and processing is a critical area in the series of steps to which foods are subjected before their sale and consumption and is important in determining the safety of food. Some vendors carry out the final preparation with cooking (e.g. frying, grilling, baking, etc.) in open stalls in front of their customers. This exposure tends to inspire confidence and, in many cases, improves the taste and enjoyment of food. However, this does not obviate the necessity of observing the basic rules of food safety which are very well stated in the Ten Golden Rules for Safe Food Preparation⁷.

2.5.2 An important principle in preparing and processing food is to avoid direct and indirect contact between raw and cooked or prepared foods which will be consumed without further heating⁸. Indirect contact may be caused by improper storage practices, unclean hands and unwashed or soiled equipment and surfaces such as cutting boards and knives.

2.5.3 Foods to be eaten raw (e.g. salads and peeled or cut fruit) should be prepared with special attention to cleanliness. Grains (e.g. rice, pulses, beans, etc.), vegetables and some fruits (especially if they are to be consumed raw) should be washed sufficiently with safe water in an effort to reduce contamination on their surfaces to an acceptable level. During this process, street food vendors should examine the food for and remove any physical hazards. Where the available water is considered unsafe and there is no subsequent control of biological hazards it may be preferable to remove gross contamination without the use of water. The washing of cut fruit such as pineapples, melons, papaya etc. is not recommended where water is of uncertain safety.

2.5.4 If frozen foods are used it may be necessary to thaw them before cooking in order to ensure adequate heat penetration. Thawing may be omitted in special cases where the manufacturer recommends doing so.

⁷ World Health, November 1988, p. 7 - as part of an article by Dr F.K. Käferstein; also published separately by WHO as a poster.

⁸ The use of salt, pepper and other condiments on cooked food shortly before consumption should be excepted from this general rule.

2.5.5 If food is processed by heat treatment (e.g. frying, grilling, baking, etc.) it should be thoroughly cooked, which means that the temperature of all parts of the food reaches at least 70°C. The adequacy of the cooking process may be monitored by the observation of temperature, boiling (bubble formation) or changes in texture and colour.

2.5.6 Attention should also be paid to the possible chemical hazards produced by overcooking (e.g. charring) and excessive reuse of cooking oils.

2.5.7 If food is processed by fermentation, acidic conditions should be achieved as rapidly as necessary to prevent growth of pathogens and toxin formation. Vendors should be encouraged to optimize parameters such as incubation time and temperature and addition of starter culture (e.g. back-slopping) to limit such hazards.

2.6. Transportation, handling and storage of prepared food

Proper transport, handling and storage of prepared food is often critical to the safety of street-vended food. Improper practices may lead to toxin formation, pathogen growth or recontamination.

2.6.1 The vehicle used for transport should be clean and should not carry animals, toxic substances or contaminating materials along with the prepared food, unless equipped with a structural barrier to prevent cross-contamination.

2.6.2 The time required to transport food between the preparation and vending units should be such that bacterial proliferation does not reach hazardous levels under the conditions of transport and eventual sale. Problems of transport are minimized if the point of sale is near the place of preparation.

2.6.3 Prepared foods served hot should be kept at a temperature of at least 60°C to prevent microbial growth, particularly if the sales period extends over 4-5 hours.

2.6.4 Prepared foods which are to be served cold and which may support the growth of pathogens should, if cooling capacity (ice of appropriate quality, refrigeration etc.) is available, be stored at less 10°C. If cooling capacity is unavailable to street food vendors they must regulate preparation and holding time prior to consumption to limit the opportunity for pathogens to reproduce. Chemical preservatives should not be used unless they are specifically approved.

2.6.5 Handling of cooked foods should be kept to a minimum to reduce the likelihood of introducing pathogens. Where possible vendors should use clean utensils rather than hands. Where it is impossible to avoid handling such foods, it is essential that the vendors limit the opportunity for any pathogens thus introduced, to reach an infective dose.

2.6.6 Most street vendors plan food preparation in such a way that prepared or semi-prepared items are consumed by the end of the daily business period, but sometimes they do have leftovers. If the latter is a potentially hazardous food and no cold storage (<10°C) is possible, the vendors should be encouraged to discard it. If cold storage facilities are available, the food may

be kept for sale after re-heating (>70°C) on the following day. However, it is preferable to discard leftovers, especially foods liable to support microbial growth.

2.6.7 If cold storage (refrigeration) is available, large quantities of hot food should not be put into the refrigerator in one batch as bacterial growth will occur in the centre of the food which remains warm (above 10°C). It is preferable to place food in smaller quantities in shallow containers to allow rapid cooling of all parts.

2.6.8 It is generally feasible to store dry, acidified and some fermented foods for varying periods in a cool, dry place protected from biological, chemical and physical hazards. Storage of pre-packed sterilized milk, bottled beverages and many canned foods present few hazards provided the packages were appropriately sealed during processing and remain intact and undamaged.

2.7 Vending units, equipment and utensils

As certain materials will leach hazardous chemicals into food the use of inappropriate equipment and utensils should be avoided, particularly with acidic food and beverages.

The design, construction and maintenance of vending units, equipment and utensils is also important to food safety. The use of inappropriate materials and the poor maintenance of materials may lead to the inability to effectively clean and sanitize surfaces. In turn this may then result in the build-up of residues of food leading to microbial growth and an increased likelihood of contamination. The appropriate use of equipment is also important to prevent cross-contamination from raw materials.

2.7.1 Vending units should be designed and constructed so that they are easily cleaned and maintained. Equipment and surfaces used for food preparation should be such that they can be cleaned easily and preferably be made or covered with impervious materials. Preparation should not be carried out on or near the ground.

2.7.2 Structurally, equipment, utensils and other containers should allow easy cleaning and should not have pitted, grooved or sculpted surfaces. They should not be used for purposes other than cooking, processing and keeping of food. They should be kept free from contamination from the environment. For example, bowls and dishes should be stored upside-down to prevent the accumulation of dust and foreign matter.

2.7.3 Equipment, utensils and other containers should be made of materials which do not release toxic or hazardous materials (copper, lead, cadmium etc.) into food and beverages, especially when foods are acidic. Similarly, chopping boards should be constructed and maintained so as to reduce the likelihood of contaminating foods with physical and biological hazards.

2.7.4 If raw meats, poultry or fish are handled, their preparation (e.g. washing, cutting etc.) should be carried out using separate equipment and utensils (e.g. containers, cutting boards and knives), by sanitizing equipment and utensils between uses or by sequencing food preparation practices to minimize the opportunity for cross-contamination.

2.7.5 Food should be held and transported in clean containers and protected from contamination through contact with unclean surfaces and exposure to undesirable or hazardous materials.

2.8 Food handlers

Food handlers may introduce biological hazards:

- *when suffering from specified diseases;*
- *from organisms on the food handlers' skin or in their intestine and faeces;*
- *when respiratory tract organisms contaminate foods or food contact surfaces;*
and
- *by cross-contamination after handling raw materials.*

Physical hazards may also be introduced by food handlers wearing jewelry, bandages or by careless food-handling practices.

The term “food handler” applies to persons who prepare food and to those who sell it, if they are different persons.

2.8.1 Food handlers should be educated, encouraged or supervised to stop their business promptly if at any time they suffer from jaundice, diarrhoea, vomiting, fever, sore throat with fever, discharges from ear, eye or nose or have visibly infected skin lesions (boils, cuts, etc.).

2.8.2 Food handlers should wear clean and proper clothing according to prevailing local standards. (The requirement for food handlers to wear aprons of a particular colour or shade or to wear hair coverings should be tempered by the realization that it has more to do with food aesthetics and inspiring consumer confidence than food safety).

2.8.3 Food handlers should wash their hands with soap and water after engaging in any activities that are likely to introduce biological, chemical or physical hazards (eg. after handling raw foods of animal origin, after using the toilet, after handling unsanitary objects such as garbage containers, after touching animals and after contact with toxic substances such as pesticides and disinfectants.) Particular attention should be given to this hygienic practice before handling ready to eat foods.

2.8.4 In the preparation and sale of food, food handlers should:

- refrain from unhygienic and unsightly practices, such as
 - chewing or smoking tobacco, chewing betel nut or chewing gum;

- touching mouth, tongue, nose, eyes, etc.; and
 - spitting, sneezing and coughing on or near food.
- avoid contamination of food with physical hazards by
 - careful food handling practices;
 - protecting food from the environment; and
 - removing jewelry prior to handling food.

2.9 Requirements at the point of sale

The sale of food represents the final stage in the chain of operations for street vending of foods and is of particular importance in assuring their safety. Preparation and sale may be carried out in the same place (particularly in stationary vending operations) or separately. Hygienic requirements are, however, similar in both cases.

2.9.1 Food should be prepared and sold in a clean, well-lit place protected from strong sun, dust, rain and wind. It should be away from sources of contaminants such as solid and liquid wastes, and from animals, including pets as well as pests.

2.9.2 Premises used for preparation, processing and sale should not be used for non-food practices which may lead to contamination of food with biological, chemical or physical hazards.

2.9.3 Sales points, stationary or ambulant, should be located in a place where risk of contamination from rubbish, sewerage and other noxious or toxic substances is absent or minimal. If such risks cannot be completely eliminated, food offered for sale should be suitably covered and protected from contamination.

2.9.4 Food vendors should either sanitize eating and drinking utensils between use or use disposable utensils (preferably recyclable or biodegradable), wherever possible.

2.9.5 When required, food should be wrapped in clean paper, plastic or other suitable material. Newsprint, used paper and other insanitary wrapping materials should not be used in direct contact with food.

2.9.6 Vendors who are patronized by high risk groups (e.g. around schools, institutions for the elderly, hospitals etc.) should be particularly vigilant in controlling food safety. Such vendors should also receive more intense education, training and auditing by regulatory authorities.

2.10 Cleaning and sanitizing

Vendors should employ cleaning procedures which ensure that vending unit, equipment and utensils are properly clean. Where sanitizing is required to control hazards, vendors should be educated regarding adequate steps and encouraged to adopt a suitable cleaning and sanitizing programme.

2.11 Waste disposal and pest control

2.11.1 All waste should be handled and disposed of in such a manner as to avoid contamination of food and water and the environment. In particular, access to food waste by pests (insects and rodents) as well as by animals (dogs and cats) should be avoided. The following types of waste should, if possible, be disposed of separately:

- (a) Liquid waste (except oil and fat) should be emptied into the nearest sewer or drain. Some form of a trap should be used to ensure that only liquid waste is discharged into the sewer or the drain.
- (b) Remains of food may be separated and kept for feeding animals. Animals should not, however, be allowed to eat from utensils used to serve customers.
- (c) Other solid waste should be kept in covered containers to be removed at least once daily by the public garbage collection system. The containers should be cleaned daily.
- (d) Used oil and fat may be stored and re-processed for animal feed.

2.11.2 Pest infestations may pose a threat to the acceptability and safety of street-vended food. Consequently, the area should be kept clean and tidy, left-over food should not be kept and waste should be properly managed.

3. Setting Priorities for Food Safety Interventions

3.1 Introduction

The requirements presented in the preceding section focus attention on raw materials and processes which need to be controlled to enhance food hygiene. They are fairly general, therefore they are applicable worldwide. While these recommendations provide a basis for the improvement of safety of street foods, and many of the recommendations may prove critical for safety, their application for ensuring safety has certain limitations:

- (i) they do not provide a mechanism for determining priority actions;
- (ii) the guidance is non-specific to foods, operations, special socioeconomic conditions where the food is prepared or the cultural factors leading to specific risky behaviour.

Therefore, it is recommended that authorities undertake Hazard Analysis and Critical Control Point (HACCP) studies to identify and integrate critical control measures into strategies for improving the safety of street foods (see section 4).

The HACCP system is recognized by the Codex Alimentarius Commission as the most cost-effective approach for assuring food safety at all stages of the food supply. HACCP will enable the systematic identification of potential hazards and their control measures and permit a distinction between control measures related to aesthetics and environmental planning and management and those related to critical control points for food safety. HACCP also provides guidance in selection of enforcement and education priorities, rather than general sanitation and

superficial improvements. Additionally, valuable information about food and processes will be obtained, and inspections to verify that the vendors are monitoring the critical control points will be more efficient than traditional inspections. The benefits derived from improved food safety should justify the time spent on the initial hazard analysis and verification. Additional benefits will ensue from inspections of foods and operations identified as hazardous rather than random inspections, when only a few high-risk foods or operations may be seen.

However, implementation of the HACCP approach will require a change in attitude by policy- and decision-makers and training of technical and inspection personnel in the application of HACCP to this sector.

Benefits of the HACCP approach

The application of HACCP for street-vended foods can address many of the difficulties identified above and offers additional benefits. While personnel will need to be trained in the conduct of HACCP studies, the HACCP approach has a number of important features, including:

- HACCP is a proactive approach which anticipates problems before they occur.
- HACCP provides control mechanisms which are rapid and easy to monitor.
- HACCP approaches to food safety assurance are inexpensive compared to chemical and microbiological methods of analysis.
- HACCP emphasizes monitoring of critical control points by persons directly involved with the food operation.
- HACCP can be used to predict potential hazards.
- HACCP focuses attention on controlling those aspects of the operation that are critical to safety and alleviates some of the resource constraints for inspection and training.
- HACCP studies can identify critical food safety risk factors which can be the basis for training and education of street food vendors as well as consumers.

The overview of the HACCP system in this section is based on the text, adopted by the Codex Alimentarius Commission at its 22nd session in 1997 in Geneva, “Hazard Analysis and Critical Control Point (HACCP) system and guidelines for its Application”⁹..

Studies should be patterned on those sponsored, in recent years, by WHO^{10,11,12,13} and FAO^{14,15,16}, amongst other organizations. Where data on consumption, dose-response,

⁹ Alinorm 97/13 (annex to appendix II) and Volume 1B of the Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Rome.

¹⁰ Bryan, F. et al. (1988) Critical control points of street-vended foods in the Dominican Republic, J. Food Prot., 51:373.

¹¹ Bryan, F., et al. (1992). Hazard analysis and critical control points of street vending operations in a mountain resort town in Pakistan. J. Food Prot. 55, 701.

contamination and epidemiological data on foodborne diseases are available, these should be taken into consideration. However, the inclusion of the HACCP approach as the basis of studies is vital, particularly in countries or areas where the availability of the former data is limited.

3.2 Participants in HACCP

Successful HACCP initiatives require the cooperation of all parties involved and the recognition that they each have important roles to play.

Although the industry is usually given the primary responsibility for the application of HACCP, in the case of street-vended foods the "industry" is comprised of a multitude of individuals who often lack the collective organization and resources to undertake HACCP studies. Consequently, governments may need to assume this task, at least until sufficient experience is gained and adequate resources are available for the street vendors to take over. Government authorities at local and municipal levels have the opportunity to provide leadership in improving the safety of street-vended food by assuming this responsibility. With this in mind, the roles of each sector are set out over page:

The role of government is to conduct the HACCP in cooperation with street vendors. During the HACCP study, the government should make available people trained in conducting HACCP studies and provide resources for this purpose.

Wherever possible, a team of persons with knowledge and skills covering the following topics should be drawn together: (i) basic principles of food microbiology; (ii) street food-vending flow operations; (iii) important factors that cause and contribute to foodborne diseases; and, (iv) sources of contamination and modes of transmission of agents of foodborne disease. The skills of an anthropologist and a social scientist may be beneficial in the understanding of underlying factors leading to risky behaviours and in improving the effectiveness of communication.

The team leader, at least, should be trained in conducting HACCP studies. Ideally, the entire team should be so trained. Training considerations for HACCP are set out in other WHO

(. . continued)

¹² Bryan, F., et al. (1992). Hazard analysis and critical control points of vending operations at a railroad station and bus station in Pakistan. J. Food Prot., 55, 534.

¹³ Desmarchelier, P., et al. (1992). Food safety - risk factors for foodborne disease in Malaysia. Bulletin of the World Health Organization, 72:6 pp 877-884 (1994).

¹⁴ Taller Latinoamericano FAO/OPS sobre alimentos comercializados en la via publica (1986): final report of meeting held 21-25 October 1985 in Lima, Peru, AMRO/HPV/FOS/0311V/III/86.

¹⁵ Report of the FAO Expert consultation on Street Foods, Jogjakarta, Indonesia, 5-9 December 1988, FAO, Rome.

¹⁶ Dawson, R.J. and C. Canet (1991). International activities in street foods. Food Control, July 1991, pp. 135-139.

documents.^{9, 17} In many instances, persons with the required knowledge and skills may not be available. Training, either on-the-job or abroad, may be necessary to develop the basic core of persons capable of conducting HACCP studies. Where human resources are limited and it proves impossible to draw together a team, it is even more imperative that the persons responsible for conducting HACCP studies in a community have the aforementioned knowledge and skills and access to as much data as possible regarding hazards and their control. It is also essential that the responsible persons make maximum use of the knowledge of the vendor.

After the HACCP study, the government should implement a food safety strategy based on the findings, including provision of appropriate education and training in safe food handling using the controls identified during the HACCP study.

The role of the vendors is to facilitate the HACCP process and implement the controls identified in the HACCP plan. During the HACCP study this will be achieved by providing the HACCP team with all the information necessary for the description of the product and the method of preparation as reflected in the flow diagram. Vendors also have an important role in ensuring that any proposed monitoring procedure and corrective action can be implemented effectively in practice.

After the HACCP study, vendors should implement the HACCP plan by monitoring the CCPs and taking corrective actions when necessary. Vendors should cooperate with the government in identifying new potential hazards, such as changes in sources of raw materials or preparation procedures.

3.3 Setting priorities for a HACCP study

In most cases, a complete HACCP study cannot be done for every type of street food and, therefore, priorities must be set. Whenever possible, epidemiological data should be used in establishing priorities. High priority should be given to foods that are commonly implicated as vehicles of foodborne disease and to the types of vending operation where outbreaks of foodborne diseases have been reported. However, not all countries have foodborne disease surveillance programmes which could provide such data. In the absence of such data, priorities may be based on the following four risk factors:

(a) Intrinsic properties of the foods involved

Some foods may contain toxic chemicals or microbial pathogens or their toxins because of the practices involved in the production of the raw materials. For example, raw meats may be contaminated with microbial pathogens at the slaughtering stage and raw vegetables might be contaminated with microbial pathogens or toxic chemicals from fertilizers, pesticides etc. Food properties also relate primarily to characteristics of the food that may support the survival and/or growth of microorganisms based on knowledge of microbial ecology and epidemiological history. The characteristics that are most useful are pH, water activity (a_w), and redox potential (E_h). These factors influence growth of infectious or toxigenic microorganisms. Foods which are possibly hazardous because they readily support rapid and progressive growth of microorganisms,

¹⁷ Report of a WHO Workshop on training aspects of the Hazard Analysis Critical Control Point system (WHO/FNU/FOS/96.3), WHO, Geneva, 1996.

should be given high priority. Next, give priority to foods that can support growth of pathogens during prolonged storage periods. Food which are shelf-stable at ambient temperatures, such as those having a pH of 4.5 or less or a water activity below 0.85, can be assigned lower priority.

(b) Preparation and handling

Food operations that commonly contribute to the causation of foodborne illnesses are those which (a) prepare hazardous foods in advance of serving, (b) store foods in a manner that might allow microbial growth, and (c) inadequately reheat food to inactivate pathogens. On the other hand, food which is thoroughly cooked just before consumption is safe from biological hazards although chemicals and certain toxins would not be affected. Food which has been processed, even in a simple form such as fermentation, may be safe when held at ambient temperatures by street vendors. Similarly, commercially processed foods, especially those that are well packaged, may pose little hazard to the consumer when sold by street vendors.

(c) Volume of food prepared

The concern about volume of food prepared relates primarily to the amount of food prepared in advance of sales and consumption. In street vending operations, it can be indirectly measured by the average daily sales, the amount of prepared foods on display, and the duration of holding cooked foods on display.

(d) Susceptibility of consumers

Infants and children, pregnant women, the hospitalised, immuno-compromised persons and the elderly are more susceptible to foodborne diseases than the general population. In some countries, under-nourished or malnourished population groups frequently rely on street-vended food and are particularly susceptible to foodborne diseases. Those vendors who cater for these persons should be assigned higher priority than those serving the general public. Sometimes, this is due to location - for example, vendors outside schools. In other cases, certain foods may be favoured by a group. For example, pregnant women in some cultures may seek to consume certain types of street-vended foods for "medicinal" reasons.

3.4 Principal Activities

The HACCP system consists of seven Principal Activities. Each Principal Activity should be considered during the HACCP process, but in implementing HACCP, each individual Principal Activity should be applied in a manner consistent with the needs and resources of the industry segment or sector under consideration.

- **Principal Activity 1:** Conduct hazard analysis
- **Principal Activity 2:** Determine critical control points (CCPs)
- **Principal Activity 3:** Establish critical limits at each CCP
- **Principal Activity 4:** Establish monitoring procedures
- **Principal Activity 5:** Establish corrective action procedures

- **Principal Activity 6:** Establish verification procedures
- **Principal Activity 7:** Establish documentation procedures, as appropriate

3.5 Steps in the HACCP process

At first glance the HACCP process may appear to be complex but closer inspection will reveal that it is in fact composed of a number of relatively simple steps. These steps are outlined below.

3.5.1 Hazard analysis (HACCP Principal Activity 1)

a) Pre-visits to vendors

Several street food vendors should first be visited to gain their confidence and cooperation and to observe their operations. Explain that you will be selecting some operations for a subsequent survey that will observe their operations from start to finish, make certain measurements, and possibly collect samples. Tell them that the results will not be used as a compliance inspection and will not be made public, but that the data will be used to develop food safety procedures that will be useful to them and other vendors.

b) Describe product

A full description of the product should be drawn up including information on composition and distribution. Analyse each ingredient as to its potential for being a source of contamination or a means of inhibiting microbial growth. Consider epidemiological data, published research and the suppliers' previous performances, if such data is available. List all ingredients used by either observing their incorporation into a product during preparation or by reading the recipe if one is used. Seek answers to questions such as those prescribed in annex II.

c) Identify intended use

The intended use refers to the normal use of the product by the end user or consumer. For street-vended foods this will generally be immediate consumption after purchase. However, in some cases, street-vended food may be taken to work or to the home for later consumption resulting in long holding times.

d) Construct flow diagram

All the steps in an operation should then be defined in a flow diagram, from the raw materials through all stages of preparation to final consumption. The word "step" has a particular meaning in the context of HACCP. It refers not only to points, operations, procedures and stages but also to raw materials. Examples of the details needed include the times and temperatures of cooking, cooling or storage and biological, chemical and physical details of ingredients. If any of this information is not known then it must be determined by taking measurements or analysing samples.

Details needed to construct a flow diagram may include:

Measurement of time/temperature exposures of foods;
Measurement of pH;
Measurement of water activity (a_w);
Analyses of samples - pathogens and/or indicator organisms;
Studies involving special protocols (challenge tests); and
Analyses of samples for potentially toxic chemicals.

Equipment to be used in the analyses will need to be obtained. Such equipment includes: thermometers or thermocouples and potentiometer units, watches or other timing devices, pH meters, a_w meters, sample containers and utensils, and forms for recording observations and measurements.

e) On-site confirmation of the flow diagram

It is important that all the members of the HACCP team should confirm that every step in the flow diagram is an accurate representation of the normal running of the food operation. Observe operations from start to finish. Be aware that initially, persons may be tense or uncomfortable when they are being watched and may modify their usual behaviour. As time goes by or as they get busy, however, they usually prepare foods in their customary manner because of time limitations, habits, available equipment and set procedures that have to be followed. Such practices emphasise the need for a HACCP programme.

Investigate receiving, storing, preparing, cooking, handling after cooking, hot holding, cooling, overnight holding, reheating and serving foods. Determine the likelihood that incoming foods and water are contaminated with foodborne pathogens as they arrive at the vending site. Evaluate the manner of storage to determine whether it is appropriate in relation to the food's properties and type of packaging. As raw products are prepared, determine the possibility that contaminants on them are spread to workers' hands and equipment surfaces. Follow the preparation to determine whether the contaminated hands touch other foods and whether other foods are processed on this equipment.

Observe the possibilities of spreading microorganisms by cloths and sponges that are used to clean raw-food areas. Furthermore, ascertain procedures used for thawing frozen foods and reconstituting dried products, if these practices are used. Watch operations after heating to see whether the foods are likely to become contaminated from either persons who handle them or by utensils or equipment. Observe the hygienic practices of persons who prepare foods. Evaluate the effectiveness of cleaning utensils and equipment by observing cleaning procedures and examining appearance of equipment after cleaning. Seek answers to questions such as those included in annex II.

The flow diagram must be amended to take into account any deviations from the original diagram.

f) List all potential hazards associated with each step, conduct a hazard analysis and consider any control measures to eliminate or minimize hazards

The HACCP team should list all the biological, chemical or physical hazards and hazards related to the condition of the food that may be reasonably expected to occur at each step. Note that all ingredients and raw materials are considered to be steps and any hazards associated with them should be identified. The team next conducts a hazard analysis to determine which of the hazards are of such a nature that their elimination or reduction to acceptable levels is essential to the production of a safe food. The team then should consider what control measures, if any, exist which can be applied for each hazard identified as being of public health significance.

No attempt is made at this stage to determine Critical Control Points (CCPs). This is a deliberate design feature to ensure that all reasonable hazards and measures for control are identified in a brainstorming session rather than just those hazards that are obvious at first glance. It is best to determine control measures at this stage because their existence is a factor in the determination of CCPs. Control measures are those actions and activities that are required to prevent or eliminate hazards or reduce their occurrence to acceptable levels. More than one control measure may be required to address a specific hazard. For example, if the hazard is the survival of *Salmonella* in a cooked product, then there might be a number of control measures at the cooking stage, e.g. the length of time of cooking coupled with the cooking temperature. Similarly, more than one hazard may be controlled by a specified control measure, e.g. a proper cooking process should destroy a range of vegetative pathogens such as *Salmonella* and *Listeria*.

Further information on hazard analysis is available in the WHO publication "Hazard Analysis Critical Control Point evaluations - a guide to identifying hazards and assessing risks associated with food preparation and storage".¹⁸ This publication provides guidance on the application of HACCP in food service establishments as well as street-vending operations.

3.5.2 Determine Critical Control Points (HACCP Principal Activity 2)

The determination of the Critical Control Points (CCPs) is the heart of a HACCP study. The keywords for success in this task are **flexibility** and **common sense**. Even when the HACCP procedure is followed correctly, there may be cases where opinions may differ about what is the appropriate CCP for the food operation. Furthermore, operations that appear to be similar might not necessarily have the same CCPs because of differences in operating procedures or because a particular step might be intended to do different things. The relevance and function of the questions in the decision tree can be shown using microbiological hazards as examples. Each step may have one or more hazards.

For persons not experienced in applying HACCP, CCPs may be identified through the HACCP decision tree (annex III) which can be applied to each hazard in turn. When all the hazards for a particular step have been dealt with, the hazards at the next step in the flow diagram are considered in sequence. The decision tree is based on a number of questions presented in annex IV:

¹⁸ Bryan, F.L. "Hazard Analysis Critical Control Point Evaluations", WHO, Geneva, 1992

3.5.3 Establish critical limits(HACCP Principal Activity 3)

In order to monitor the CCPs, critical limits must be specified for each control measure. In some cases more than one critical limit will be elaborated at a particular step, e.g. time **and** temperature of cooking. The exact limits required for each critical limit to be effective are specified for each CCP. Characteristics that can be measured quickly and easily are preferred. Examples of these include assessments of temperature, time, moisture level and organoleptic parameters such as visual and texture, for example "meat juices running clear" or "boiling of liquids" often indicate thorough cooking.

3.5.4 Establish monitoring procedures (HACCP Principal Activity 4)

Selection of the correct monitoring system is an essential part of any HACCP study. Monitoring is the scheduled measurement or observation at a CCP of the compliance with the critical limit(s) set down for each control measure. The monitoring system describes the methods by which the vendor is able to confirm that all CCPs are under control.

Monitoring procedures must be able to detect loss of control at the CCP. Ideally monitoring should provide this information in time for corrective actions to be taken to regain control of the operation before there is a need to reject product, but unfortunately, this is not always possible. Physical, chemical and sensory monitoring methods are preferred because of their speed of response. To monitor, either make observations, use senses to evaluate characteristics of foods, or measure physical or chemical attributes of foods, as applicable to the situations.

Examples of monitoring procedures

Observations: inspecting incoming raw materials, watching employee practices, watching operations and practices, observing whether liquids come to a boil, examining cleanliness of equipment and utensils.

Sensory evaluations: smelling to detect off-odours, looking to detect off-colours, and feeling to detect abnormal textures, e.g., sliminess or whether the temperature is appropriate (hot, cold, frozen).

Physical measurements: measuring temperature and/or time, measuring pH or a_w .

In addition to identifying the most appropriate monitoring system the team should address the following issues:

WHO is to act? The HACCP team should designate a person who will carry out the monitoring. Generally this will be the street-food vendor. The vendor must be told how to ensure that critical limits are observed and the corrective action to take if the critical limits are exceeded.

WHEN they are to act? The frequency of monitoring must be sufficient to guarantee that control is being exercised at the CCP.

HOW they are to act? This is a detailed description of precisely how the monitoring is to be carried out. The details should be relevant to the type of monitoring being carried out, e.g. temperature measurements for a heating process should be made at the coldest point of the product, while temperature measurements for a cooling process should be made at the warmest point. This requirement means that the vendors must be trained to properly carry out their monitoring functions.

3.5.5 Establish corrective action procedures (HACCP Principal Activity 5)

The HACCP team should specify the actions to be taken when monitoring shows that the CCP is not under control. Generally there are two types of action needed for each deviation: corrective actions and disposition actions. Corrective actions are those that will bring the CCP back under control.

Disposition actions are those actions to be taken with the food that has been produced in the time period that the CCP was "out of control". It may include increasing cooking temperatures and/or extending the cooking time; adjusting quantities of certain ingredients; adjusting preparation or storage at a later stage; decreasing holding time; increasing hot holding temperatures; reheating; re-washing and sanitizing; rejecting incoming foods; and, disposal of the product. Disposition actions will require judgement based on the hazards and their assessed severity and risks.

N.B. It is precisely the monitoring procedures and corrective actions outlined above that will form the basis of the education and training requirements for the street-food vendors.

3.5.6. Establish verification procedures (HACCP Principal Activity 6)

Upon completion of a HACCP system for a food vending operation, have the system critically reviewed, wherever possible. This can be done by other health personnel who are experienced in HACCP and knowledgeable about preparing the foods of concern. They should either approve the HACCP system or make recommendations to modify it by amending criteria or giving instructions for monitoring CCPs, as appropriate.

Routine monitoring of CCPs of a food operation is the responsibility of the vendor. Health authorities need to verify appropriateness of control measures and CCPs and the extent and effectiveness of the monitoring. As appropriate, during verification (a) observe operations at CCPs; (b) confirm accuracy of the establishment's monitoring; (c) test calibration of monitoring instruments; (d) collect samples; (e) interview vendor about the way CCPs are monitored; and (f) review any available logs or records, if appropriate. Compare the collected information with criteria developed for each HACCP system. Review composition of food products and operational procedures to see whether changes have been made since the HACCP systems were established or if any are contemplated. If so, select, as necessary, other CCPs or modify monitoring procedures.

3.5.7 Establish documentation procedures (HACCP Principal Activity 7)

HACCP systems call for maintenance of a log or record forms in which to put results of monitoring. Without monitoring and recording, there is no documentation that criteria at CCPs were met. This is essential for food processing operations and prudent in marketing and food service operations, but such record keeping will not be very likely for street vending operations. However, it is not the keeping of records that is important, but rather that CCPs are monitored and corrective actions taken when needed.

N.B. HACCP plans should be reviewed periodically or when information is received indicating a health risk associated with the product.

4. Strategies to Enhance the Safety of Street-vended Foods

Strategies for improving street food should only be developed after appropriate studies and other information on local foods, conditions and practices have been obtained. The factors on which such strategies should be based are best identified by preliminary studies of the street food system and the aforementioned HACCP based studies.

Strategies to enhance the safety of street-vended foods

Strategies for improving street food safety should be based upon studies of the local street food system and may include consideration of:

- Policy, regulation, registration and licences;
- Infrastructure, services and vending unit design and construction;
- Training of food handlers; and
- Education of consumers.

HACCP-based studies will better focus strategies on essential safety requirements.

4.1 Preliminary Studies of the Street Food System

To facilitate the implementation of these strategies an initial inventory of the street food trade should be conducted. The number of vendors and their general location should be ascertained. Vendors should be categorized (and eventually prioritized in relation to implementation of strategies) according to the type of food they sell, preparation practices and facilities. Stationary vendors with stalls who serve full meals may be considered like small restaurants and may need to be regulated almost like the latter. Vendors preparing potentially hazardous foods or preparing food at home and transporting ready to eat food to the vending location may also warrant increased attention. In contrast, vendors selling only bottled beverages or low-hazard items of food would warrant much less control.

Parched grains, dry bakery products, sufficiently sugared, salted or acidulated foods, and many fermented items have a much lower disease-producing potential than certain foods which readily support bacterial growth. Similarly, foods thoroughly fried or cooked and consumed while hot are inherently safer than pre-cooked foods especially when the latter are held at ambient temperatures (15-40°C) for more than four to five hours. Highly coloured foods and beverages are more likely to have unauthorized additives than others. Fruits in their structural covers and many foods which are industrially processed and pre-packed are generally safe even when exposed for sale on streets. Consequently, consideration of the varying potential of different food items to cause disease can be used in classifying local street foods for application of appropriate intervention measures.

4.2 Policy, regulation, registration and licences

In order to maintain the benefits of street-vended food while assuring the safety of the food sold, authorities must elucidate a policy aimed at assisting, controlling and maintaining the street food sector. The policy should be developed in response to an integrated consultation with vendors and consumers if it is to meet the needs of each of the partners in food safety (government, consumers and vendors).

Regulation is a common approach to controlling the street-vended food sector, with nearly three-quarters of countries reporting some regulation of this sector (see annex V). However, extensive regulation of street vendors may only guarantee that all will be, in some manner, in violation of the law (and subject to penalties) and does little to educate street-vendors in the most important aspects of safe food handling. HACCP can be used to focus regulations and inspection resources on the most critical foods and operations thus maximizing the benefits to public health from given resources.

Many countries currently license street food vendors, however a significant proportion of vendors commonly remain unlicensed. While unlicensed vendors operate outside the law, authorities often lack the resources to prevent their operation. Furthermore, consumers pay little attention to whether a vendor is licensed or not, as licensing rarely relates to the quality and safety of the food served. Registering or licensing vendors has many advantages for authorities. It enables authorities to identify persons employed in such enterprises and the types of food sold, to raise revenue and to provide an opportunity to give food handlers training in food safety. Licensing, however, currently provides few advantages to vendors. Licensing procedures are

often complex, require expenditure by the vendor with limited or no return and are seen as a burden by many vendors.

To facilitate licensing, authorities should centralize licensing requirements, remove the unnecessary requirement for an annual medical examination (such examinations are only relevant to the time of examination), make the issuance of a licence dependent upon food safety knowledge and a commitment to produce safe food and use the opportunity to train handlers regarding critical control points, control measures, monitoring procedures and corrective actions. Certificates might be awarded to trained food handlers. Renewal of licences should also be simplified, particularly for those implementing proper control measures during food preparation.

4.3 Location, infrastructure, services and design and construction of vending units

Street food vendors should be officially recognized and, where possible, be included in urban development programmes. In some countries it has been possible to locate street food vendors in specially designed centres. This grouping makes it possible to provide common facilities (potable water and electric supplies, waste disposal services, drainage, toilets, vehicle parks, etc.). In addition, common utensils can be centrally supplied and cleaned. The provision of such infrastructure and services is usually very expensive and it is beyond the resources of most authorities to apply this strategy on a broad scale. However, by identifying the critical infrastructure and service requirements of specific street-food vending operations and by helping to rank operations according to risk, HACCP can be used to target the provision of these facilities where they will be of the greatest benefit to protecting public health.

Many mistakes have also been made by regulatory authorities in the relocation of street food-vending activities. Government relocation of vendors into purpose-built centres has often produced varied results. In some instances, consumers have even refused to frequent such centres. In contrast, some centres which remained integrated into the local community have been quite successful.

In some countries it has also been possible to develop municipal building codes that require large buildings to incorporate the capacity for vendors to operate under hygienic conditions with access to power, water, toilet facilities and waste disposal systems. Such planning might also be considered in the planning of highway rest stops. Food safety provisions such as those of open-air food markets and in some respects, those required by restaurants and stationary food vendor stalls would apply to these centres.

It should be noted that street food vendors are, in many countries, part of the social and cultural fabric of their communities and, therefore, an effort should be made to keep them as close to their current business sites as possible, even though some facilities may not be available. In this context it should be recognized that the relocation of vendors can reduce the number of factors contributing to foodborne disease (e.g. potable water - provided local authorities can supply potable water) but may not automatically impact on raw material contamination, cross-contamination, personnel hygiene, poor food preparation practices or hot and cold holding capacity. Consequently, relocation should not be seen as a panacea for resolving the problems of street-vended foods.

In establishing a plan of action to improve the safety of street-vended food, many authorities have also identified the need to improve design and construction of vending carts, stalls

and markets. The application of technology to improve design and construction has focused on the provision of water, handling liquid and solid waste and sanitation facilities. Some technological advances will improve food safety. The provision of a safe water supply must innately reduce the risk of waterborne diseases. Design and construction that reduces the likelihood of cross-contamination between raw and cooked food will reduce the risk of microbiological hazards. Other advances, however, have not directly impacted on food safety but rather on aesthetics and environmental management. If the aim of applying technology has been to improve food safety, it may be said that many advances have failed in this regard. While the aims of environmental health programmes are broader than food safety, caution should be exercised in looking to technological improvements for improved food safety unless HACCP studies have highlighted their critical nature.

4.4 Training of Food Handlers

Training of food handlers regarding the hazards confronting their products, safe handling and preparation of food and good hygienic practice, as practicable under local street-vending conditions, is an essential part of any strategy to improve the safety and quality of street-vended food. This should, ideally, be done in conjunction with licensing, but ongoing education and training sessions at intervals are strongly suggested. Appropriate authorities may develop training programmes and materials for food handlers based on concepts presented in this text and other publications¹⁹ and adapted to local foods, conditions and practices.

Viewed from a general perspective, most foodborne hazards may be prevented by thorough cooking, hot holding, rapid cooling, cold storage, avoidance of cross-contamination or combinations of these. However, street-vended foods and their preparation and handling vary enormously among countries, reflecting the unique characteristics of the societies, and even within countries the variations in street-vended foods are often considerable. Consequently, training and education programmes should be based on the food safety hazards presented by the local street-food situation.

The low level of education of most vendors makes training difficult and, of course, precludes training them in HACCP principles. Consequently, quite different approaches must be taken in training industry personnel and street food vendors. For the latter group, training materials addressing simple messages must be developed and used to improve the safety of street-vended food. Governments can facilitate this process by using the information that has been gathered during HACCP studies to recommend monitoring procedures and corrective actions for training street food vendors. This information can also be used to inform food safety programme administrators and supervisors about the hazards associated with street food preparation and use it to influence programme activity priorities. Furthermore, by identifying the critical practices of specific street-food vending operations and by helping to rank operations according to risk, HACCP can be used to target education and training where they will be of the greatest benefit in protecting public health.

¹⁹ Jacob, M. (1989). Safe Food Handling - A training guide for managers of food service establishments. WHO, Geneva.

All vendors of high risk foods should be trained in safe food-handling practices. Certification may prove a useful tool to identify those with appropriate training. Such certification could also be used to encourage consumers to consider food safety in their food selection decisions. This approach is increasingly being adopted by regulatory agencies. Perhaps the greatest limitation to such a requirement is the inadequate resources of most health agencies and their inability to provide the training required for such a large and diverse group as street food vendors. However, for some countries, alternative approaches to training are being examined to reduce the direct involvement of government. For example, health authorities may consider government recognition of private schools and their curricula. Consequently, government would be able to set the training standard without intensive involvement in the training itself.

4.5 Education of consumers

Through their purchasing power, consumers provide perhaps the strongest motivating force for vendors to alter their food-handling practices. Ultimately, it is the consumer who makes the choice of what to consume and from whom to purchase it. Consumers also will bear the consequences if that food is unsafe. Unfortunately, consumers are often unaware of the relationship between contaminated food and foodborne disease. Consequently, consumers must be involved in efforts to improve the safety of street-vended food. To achieve this, health authorities must utilize a diversity of educational approaches including mass media, national seminars and community health education. To encourage consumer selection based upon the safety of the food, consumers must first be made aware of the benefits of street-vended food, their association with foodborne disease and what are safe and unsafe food-handling practices. For example, in advising travellers²⁰, WHO generally recommends that consumers make sure that their food has been thoroughly cooked and is still hot when served.

By identifying the critical food-handling practices of specific street-food vending operations and by helping to rank operations based on risk, HACCP can be used to target consumer awareness programmes on the operations and practices where they need take most care in selecting foods for consumption.

Children are a group of consumers at particular risk in relation to most foodborne diseases. Consequently, children should be awarded special consideration by health authorities in their efforts to improve the safety of street-vended food through consumer education. Approaches to improve the education of parents and children regarding food safety may be integrated into general and health education. Attendance of parents and children at health clinics offers the opportunity for integration of health and education regarding the safety of street-vended food. In particular, such clinics provide the opportunity to discuss the safety of street-vended weaning food. Similarly, incorporation of food safety messages into school curricula and school social elements provide opportunities for increasing awareness of children regarding food safety. Another approach to promoting the safety of food consumed by children might be to prioritize the training of vendors associated with or attached to schools.

4.6 Reinforcement of food safety measures for high risk occasions

²⁰ “A guide on safe food for travellers”, WHO brochure available on request to the Food Safety Unit, WHO, Geneva.

Large fairs, festivals and other celebrations in which large numbers of people come together provide a favourable occasion for street food vendors to do profitable business. The high demand for food may tempt vendors to prepare large quantities in advance and store such food under unsatisfactory conditions before sale. Untrained vendors or persons with inadequate knowledge and experience employed as cooks, waiters, etc. by stall owners may present special risks.

Food served at large fairs and similar gatherings are known to have been the sources of outbreaks of gastroenteric infections, including cholera and salmonellosis, as well as foodborne intoxications such as that caused by staphylococci. Control authorities have to be particularly vigilant on these occasions and take measures to enforce hygienic practices.

Some actions taken before the event may help in achieving this goal. Such actions may include:

- designating placement of stalls, kiosks, vehicles of ambulant vendors, etc. to assure the smooth flow of people and services into and out of the catering area;
- organizing and registering the vendors and other food handlers, who should be briefed or trained as required. Particular attention should be given to potentially hazardous foods and to their conditions of handling;
- providing or arranging for supplies of such essentials as potable water, ice, fuel and transport;
- providing conveniently located toilets and hand-washing facilities even in a simple form; and
- providing services for collection and removal of wastes, including disposable utensils, if used.

5. Further Guidance on Improving Street Food Safety

For more detailed guidance in improving street food safety and conducting HACCP studies, readers are referred to the WHO publication "Hazard Analysis and Critical Control Point system - A guide to identifying hazards and assessing risks associated with food preparation and storage" which was developed for "cottage" industries and other small scale food operations. In addition, specific case studies of the application of HACCP to street-vended food in developing countries are available in the WHO document entitled "Application of the Hazard Analysis Critical Control Point (HACCP) system for the improvement of food safety" (WHO/FNU/FOS/94.1). An extensive HACCP study of street-vended food in Zambia was carried out in 1995 by WHO and a report of this study is available on request to the WHO Food Safety Unit.²¹

The Unit welcomes the opportunity to collaborate in studies of street-vended foods and in the development of strategies and plans of action to improve street food safety. Feedback on the applicability of this document in improving street food safety in specific locations is also encouraged.

²¹ For further information and assistance on the application of HACCP interested parties are encouraged to contact the WHO Representative in their country or to directly contact:

Coordinator, Food Safety Programme, World Health Organization
CH-1211 Geneva 27, Switzerland
Facsimile: +41 22 791 4807

Definitions applicable in the HACCP system²²**Control:**

To take all necessary actions to ensure and maintain compliance with established criteria established in the HACCP plan(verb);

The state wherein correct procedures are being followed and criteria are being met (noun).

Control measure:

Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Corrective action:

Any action to be taken when the results of monitoring the CCP indicate a loss of control.

Critical Control Point:

A step at which control can be applied and is essential to prevent or eliminate a food safety hazard, or to reduce it to an acceptable level.

Critical limit:

A criterion which separates acceptability from unacceptability.

Deviation:

Failure to meet critical limit.

HACCP:

A system which identifies, evaluates and controls hazards which are significant for food safety.

HACCP plan:

A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food safety in the segment of the food chain under consideration.

²² Definitions have taken into account the modifications proposed in the report of the twenty-ninth session of the Codex Committee of Food Hygiene.

Hazard:

A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

Hazard analysis:

The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

Monitor:

The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

Step:

A point, procedure, operation or stage in the food chain, including raw materials, from primary production to final consumption.

Validation:

Obtaining evidence that the elements of the HACCP plan are effective.

Verification:

The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

Questions for use in hazard analysis

(To better describe product)

What raw materials or ingredients are used?

Are pathogenic microorganisms, toxins or chemicals of concern likely to be present on/in these materials? If so, what are they and at what level do they occur?

Do any ingredients have toxic properties or contain toxic substances?

Are physically harmful agents (e.g., glass, sticks, stones, bones, metal particles) likely to be present?

Are preservatives or other substances that either kill microorganisms or inhibit their growth used as ingredients? If so, what are they and is their concentration such that it prevents the growth of microorganisms of concern?

Are any of the ingredients hazardous if used in quantities too high or too low for culinary needs?

Does the amount and type of acid ingredients and the resulting pH of the final product affect growth or survival of pathogenic microorganisms?

Does the water activity (a_w) of the final product affect microbial growth or does it affect survival of pathogenic microorganisms during processing?

(To confirm the flow diagram on-site)

Can contaminants reach the product on the raw food or during preparation or storage?

For example, consider hands of workers, equipment surfaces and storage practices.

Will microorganisms or toxic substances of concern be inactivated during cooking, reheating, or other processes, including acidification? Will hazardous physical agents be removed?

Can microorganisms or toxins of concern contaminate the food after cooking? Consider the possibilities of subsequent handling and cross-contamination from raw products.

Can any microorganism of concern multiply during preparation/storage/transportation?

Conditions of storage and volume of food prepared are important factors.

How does the package or container affect survival and/or growth of microorganisms or protect the food from contamination?

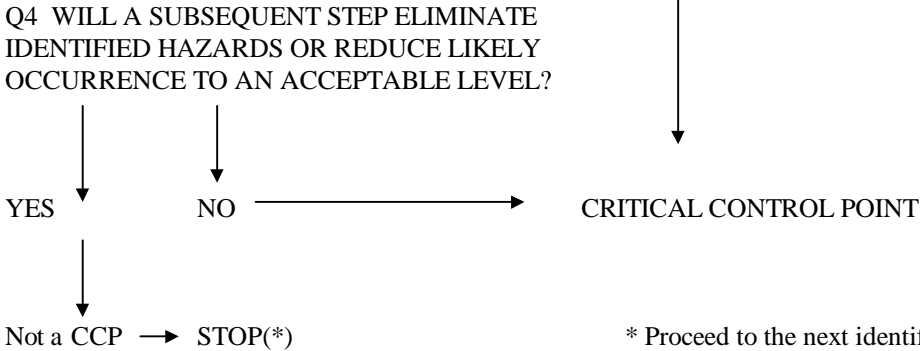
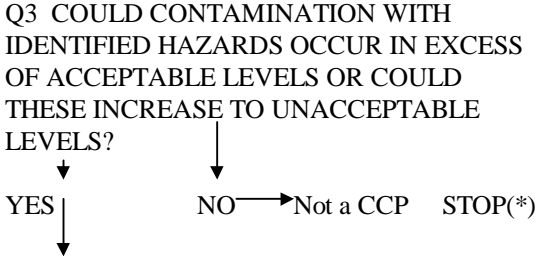
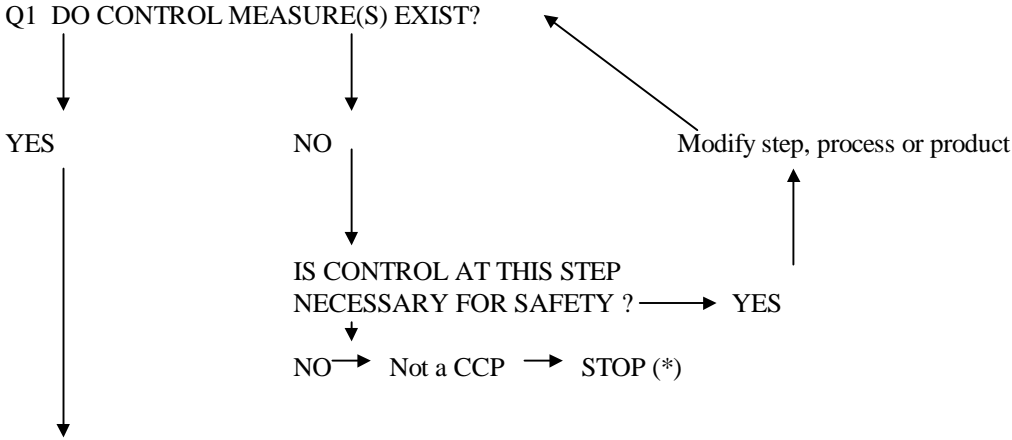
What is the time/temperature sequence of operations?

What is the efficacy of cleaning and disinfection of equipment and utensils?

Consider water temperatures and exposure times; sanitizing solution concentration, pH and exposure times; and appearance of the items after cleaning.

Does the final product have any abnormal characteristics?

EXAMPLE OF DECISION TREE FOR DETERMINING
CRITICAL CONTROL POINTS



Questions to determine critical control points

Q1 Do control measure(s) exist?

- If the answer is YES, then carry on to Q2.
- If the answer is NO, then by definition the step cannot be a CCP because it is not possible to effect control at this step. The team must then ask the supplementary question "Is control at this step necessary for safety? ". If the answer is YES then it is necessary to modify the step, process or product so that control is obtained over the specified hazard. If the answer is NO then the step is not a CCP and the decision tree should be applied to the next identified hazard or step in the operation.

Q2 Is the step specifically designed to eliminate or reduce the likely occurrence of a hazard to an acceptable level?

- If the answer is YES, then the step can be considered to be a CCP. This question allows flexibility, which would otherwise be denied by Q4.
- If the answer is NO, then carry on to Q3.

Q3 Could contamination with identified hazards occur in excess of acceptable levels or could these increase to unacceptable levels?

- This question forces us to consider those steps that could permit the contamination or the growth of microorganisms such as storage or handling of the food between processing stages.
- If the answer is NO, then the step cannot be a CCP because there is nothing that needs to be controlled. The whole decision tree is then repeated for the next hazard or step in the operation.
- If the answer is YES, then carry on to Q4.

Q4 Will a subsequent step eliminate identified hazards or reduce likely occurrence to an acceptable level?

- If the answer is NO then the step is a CCP.
- If the answer is YES then the step is not a CCP and the whole decision tree is repeated for the next hazard or step in the operation. This question has a very important function in determining CCPs: it allows the presence of a hazard at a step if that hazard will subsequently, either as part of the operation or by some action of the end user, be eliminated or reduced to an acceptable likelihood of occurrence. Otherwise, every step in an operation might be critical leading to too many CCPs for an effective, practical control system to be drawn up. Again, the keys to success with this question are flexibility and common sense. This question is designed to work in tandem with Q2. For example, the presence of low levels of *Salmonella* in the raw meat ingredient for a ready to eat cooked meat prior to the cooking stage may be a concern but it might **not necessarily** be critical.

SUMMARY OF WHO STREET-VENDED FOOD SURVEY

* Percentage of countries replying "YES" to question

SOCIOECONOMICS OF STREET FOOD SECTOR		%*
Are street-vended foods a significant part of the urban food supply?		74
Is street-vending of foods an important mean of employment?		69
Are a significant number of women employed in this sector?		62
Are street-vended foods important in rural areas?		22
DESCRIPTION OF STREET VENDED FOODS		%*
<i>TYPE OF FOOD</i>		
Grain & cereal		64
Fruit & vegetables		86
Meat & Fish		85
Frozen Produce		76
Beverages		65
<i>TYPE OF PREPARATION</i>		
Ready to eat		97
Cooked on site		82
None (raw)		65

CONDITIONS NORMALLY ENCOUNTERED IN THE TRADE		%*
<i>TYPE OF FACILITY</i>		
Mobile carts		75
Fixed stalls		88
Improved food centres		44
<i>TYPE OF INFRASTRUCTURE</i>		
Potable water		47
Toilets		15
Hand washing facilities		32
Dish/utensil washing		48
Refrigeration available		43
Waste disposal		47

THOSE FACTORS CONTRIBUTING TO FOODBORNE DISEASE OUTBREAKS WHICH ARE BELIEVED OR SHOWN TO BE IMPORTANT IN STREET-VENDED FOOD	%*
<i>GROWTH OF PATHOGENS</i>	
Preparation too far in advance	73
Left at room temperature	82
Foods cooked in large pots	33
Improper warm holding	72
Extra large quantities prepared	38
<i>SURVIVAL OF PATHOGENS</i>	
Inadequate cooking	58
Inadequate reheating	72
<i>CONTAMINATION BY PATHOGENS</i>	
Contamination of raw food	76
Infected handler	70
Cross-contamination	73
Inadequate cleaning of equipment	72
Unsafe source	56
Contaminated water	57

MANAGEMENT OF STREET FOODS	%*
Laws and regulations covering street-vented food exist	72
Registration of street vendors required	32
Code of practice applied	32
Periodical medical exam required <i>(N.B. Not generally regarded as cost-effective)</i>	41
Periodic training required	34
<i>INSPECTION PROCEDURE</i>	
Existing agency with responsibility for street food	79
Ratio of vendors: inspector <i>(N.B. Exact figures not generally available)</i>	Very large
HACCP concept applied to street food	23

Suggestions for further reading

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