FIVE KEYS TO SAFER FOOD MANUAL

World Health Organization

DEPARTMENT OF FOOD SAFETY, ZOONOSES AND FOODBORNE DISEASES

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Contents

INTRODUCTION

Food safety is a significant public health issue

Unsafe food has been a human health problem since history was first recorded, and many food safety problems encountered today are not new. Although governments all over the world are doing their best to improve the safety of the food supply, the occurrence of foodborne disease remains a significant health issue in both developed and developing countries.

It has been estimated that each year 1.8 million people die as a result of diarrhoeal diseases and most of these cases can be attributed to contaminated food or water. Proper food preparation can prevent most foodborne diseases.

More than 200 known diseases are transmitted through food.[1]

The World Health Organization (WHO) has long been aware of the need to educate food handlers about their responsibilities for food safety. In the early 1990s, WHO developed the *Ten Golden Rules for Safe Food Preparation,* which were widely translated and reproduced. However, it became obvious that something simpler and more generally applicable was needed. After nearly a year of consultation with food safety experts and risk communicators, WHO introduced the Five Keys to Safer Food poster in 2001. The Five Keys to Safer Food poster incorporates all the messages of the *Ten Golden Rules for Safe Food Preparation* under simpler headings that are more easily remembered and also provides more details on the reasoning behind the suggested measures.

The Five Keys to Safer Food Poster

The core messages of the Five Keys to Safer Food are: (1) keep clean; (2) separate raw and cooked; (3) cook thoroughly; (4) keep food at safe temperatures; and (5) use safe water and raw materials. The poster has been translated into more than 40 languages and is being used to spread WHO's food hygiene message throughout the world.

[1] Mead, P.S., et al, *Food-Related Illness and Death in the United States* Emerging Infectious Diseases, Vol 5, No. 5, 1999.

The Five Keys to Safer Food Manual

The Five Keys to Safer Food Manual is divided into two sections. Section One is Background Material and Section Two is the Five Keys to Safer Food. Section Two elaborates the core food safety information provided in the WHO Five Keys to Safer Food poster and suggests how to communicate these messages. When presenting the material on the Five Keys to Safer Food it is important that this core information and rational (i.e. why) remain the same as that presented in the poster.

The information in Section One: Background Material is not meant to be presented in its current format. The trainer has flexibility on how and when to discuss the points provided in this section. The trainer should identify points within this section that are applicable to the audience and integrate these points into the presentation of the material in section two.

In both sections information is divided into two columns. The first column contains basic information that should be presented to all audiences. The second column contains additional information which is not designed to be presented to the audience, but is designed to aid the trainer in answering questions. For some sections, the manual also presents "Considerations and suggestions for the trainer", i.e. ways to adapt the material for different audiences and different locations.

When adapting the manual to prepare a training session, the following points and questions should be considered.

- Who is the audience (e.g. school children, young adults, home food handlers, food workers)?
- Will the audience understand the level of language used?
- Have enough visual cues been incorporated to accommodate those who might not understand the language?
- Is the material of an appropriate length to capture and hold the audience's attention?
- Are instructions clear, concise and easy to follow?
- Is the material presented in an interesting way that is easy to remember and understand?
- Does the material reinforce the core information?
- Have examples of local foods been incorporated?
- Are local food practices discussed?
- Does the material reflect local facilities (i.e., running water, refrigerators, etc.)?

Although the information provided in the Five Keys to Safer Food Manual will be adapted for each audience, the concepts of the core information should remain the same as that in the WHO Five Keys to Safer Food poster.

Evaluation

All aspects of the Five Keys to Safer Food training material should be evaluated. Included in the manual are two evaluation forms: one for the organizer and/or trainer and one for the participant. The evaluation form for the organizer and/or trainer evaluates the demographics of the audience and the suitability of the adaptation process and whether or not the training session achieved its goal. The evaluation form for the participants evaluates the impact of the training session on food safety knowledge, attitude and behaviours. It is recommended that the participants complete one evaluation form before the training session and one evaluation form after the training session.

Glossary

A glossary of terms used in the manual is provided for reference.

Resources

This section contains additional information for the organizer, trainer and participants. In addition to this manual, WHO intends to develop supplemental materials targeted to different audiences including school children and women as well as other supplemental materials on different food safety topics. When developed this information will be available at the web site: **www.who.int/foodsafety/consumer/5keys/en/index.html**

WHO aims to improve the exchange and reapplication of practical food safety knowledge among Member States by having them exchange experiences and tested solutions. A section of the WHO Food Safety web site was designed to enable countries and partners to access the different tools produced in different parts of the world. One can actively contribute to the success of delivering the Five Keys to Safer Food public health message and prevent foodborne disease by exchanging ideas, materials and experiences on this web site.

What is the problem?	Additional information
Every day people all over the world get sick from the food they eat. This sickness is called foodborne disease and is caused by dangerous microorganisms and/or toxic chemicals. Most foodborne disease is preventable with proper food handling.	Foodborne Disease: ♦ Is a problem in both developing and developed countries; ♦ Is a strain on health care systems; ♦ Severely affects infants, young children, elderly and the sick; ♦ Creates a vicious cycle of diarrhoea and malnutrition; and ♦ Hurts the national economy and development and international trade.

Considerations and suggestions for the trainer

For simpler language, use the terms "germ" for microorganisms and "poisons" for toxic chemicals.

What are microorganisms?	Additional information
Microorganisms are very small living things, so small that they cannot be seen with the naked eye. There are three different types of microorganisms: the good, the bad and the dangerous. Good microorganisms are useful. They: ♦ Make food and drinks (e.g. cheese, yoghurt, beer and wine); ♦ Make medicine (e.g. penicillin); and ♦ Help digest food in the gut. Bad microorganisms, or spoilage microorganisms, do not usually make people sick, but they cause our food to smell bad, taste horrible and look disgusting. Dangerous microorganisms make people sick and can even kill. These are called "pathogens". Most of these microorganisms do not change the appearance of the food.	Microorganisms are so small that it takes 1 million to cover the head of a pin. Bacteria, viruses, yeasts, moulds and parasites are all microorganisms. The smell, taste and appearance of food are not good indicators of whether the food will make you sick. Some spoilage microorganisms do change the appearance of food and are dangerous. An example is the green mould on bread which can produce toxins. Examples of common dangerous foodborne microorganisms include: ♦ Bacteria - *Salmonella, Shigella, Campylobacter* and *E. coli;* ♦ Parasites - *Giardia, Trichinella;* and ♦ Viruses – Hepatitis A, Norovirus.

Considerations and suggestions for the trainer

- Become familiar with dangerous microorganisms in your region.
- It may be appropriate to change the example showing the relative size of a microorganism. For example, 10 000 bacteria side by side would occupy one centimetre of space.
- Providing pictures or actual examples of mouldy fruit may add interest, but it must be stressed that dangerous bacteria may not always make the food smell, taste or look bad.

Where do microorganisms live?	Additional information
Microorganisms are everywhere, but are mostly found in: ♦ Faeces; ♦ Soil and water; ♦ Rats, mice, insects and pests; ♦ Domestic, marine and farm animals (e.g. dogs, fish, cows, chickens and pigs); and ♦ People (bowel, mouth, nose, intestines, hands, fingernails and skin).	Human and animal faeces contain disease-causing microorganisms. A single teaspoon of soil contains more than 1 billion microorganisms. All living things have microorganisms associated with them. Animals carry microorganisms on their feet, in their mouths and on their skin. An average 100 000 bacteria can be found on each square centimetre of human skin.
Considerations and suggestions for the trainer ♦ Name common sources of microorganisms in the local region.	
How do microorganisms move?	**Additional information**
Microorganisms rely on someone or something to move them around. The transfer of microorganisms from one surface to another is called "contamination". Hands are one of the most common means of moving microorganisms from one place to another. Microorganisms can be spread through contaminated food and water. Pets and domestic animals can also be a source of contamination.	If a food handler is infected with a virus and continues to prepare food, some viruses may be passed on to the consumer via the food. Hepatitis A and Norovirus are examples of viruses which can be transmitted in this way. Zoonoses are communicable diseases caused by microorganisms transmitted from animals to humans. Avian influenza and infections with *E. coli* 0157 are examples of zoonoses. Avian influenza can be transmitted to humans through direct contact with an infected bird or objects contaminated by their faeces.
Considerations and suggestions for the trainer ♦ Give a demonstration of contamination by touching your hand to your face and then touching some food with that same hand. ♦ Discuss a local foodborne disease outbreak, including the cause of the outbreak and what could be done to prevent infection in humans.	

How do microorganisms grow?	Additional information
Most microorganisms "grow" by multiplication. To multiply, microorganisms need: ♦ Food; ♦ Water; ♦ Time; and ♦ Warmth. Meat, seafood, cooked rice, cooked pasta, milk, cheese and eggs are foods that provide ideal conditions for microorganisms to grow.	One bacterium can become 2 in just 15 minutes. This means that within 6 hours, 1 bacterium can multiply to over 16 million. To be harmful, some bacteria need to grow to high levels. Other bacteria can cause illness when they are present in very low numbers. Viruses are many times smaller than bacteria. They do not grow in food or water, but these are vehicles for transmission.

Considerations and suggestions for the trainer

- Discuss local foods that do and do not provide the ideal conditions for growth of microorganisms.
- Dried beans, pebbles or other objects can be used to demonstrate bacterial growth. As an example of quick growth start with one object, in 15 seconds make it two objects, in another 15 seconds make it 4 objects and in another 15 seconds make it 8 objects, etc. (double the number of objects you have every 15 seconds). Please note that 15 seconds is used instead of 15 minutes so that it is possible to show how bacteria grow during a training session.

What are the symptoms of foodborne disease?	Additional information
Every year, billions of people experience one or more episodes of foodborne disease, without ever knowing that their illness was caused by food. The most common symptoms of foodborne disease are: ♦ Stomach pains; ♦ Vomiting; and ♦ Diarrhoea. The symptoms depend on the cause of the disease. Symptoms may occur very quickly after eating the food, or may take days or even weeks to appear. For most foodborne diseases, symptoms occur 24 -72 hours after the food has been eaten. Foodborne disease can lead to long-term health problems. Very severe diseases, including cancer, arthritis and neurological disorders can be caused by contaminated food.	For infants, the sick, pregnant women and the elderly, the consequences of foodborne disease are usually more severe and more often fatal. Drinking plenty of fluids will maintain hydration during diarrhoea. It is estimated that 3% of cases of foodborne disease can lead to long-term health problems. Mouth masks are recommended for people who may cough or sneeze while handling food. Gloves can be used to cover any cuts or lesions and should be changed frequently. Advice on treatment of foodborne illness differs between countries and should be adapted to the local region. However, one should seek medical advice when bowel movements are very frequent, very watery or contain blood, or last beyond 3 days.

What to do if you get sick

Try not to handle or prepare food while you are sick and for 48 hours after your symptoms stop. However, if this cannot be avoided, wash your hands with soap and water first and frequently during food preparation.

When symptoms are severe seek medical advice immediately.

Some foodborne diseases can be transferred from person to person. Caregivers can become sick from patients with a foodborne illness.

Considerations and suggestions for the trainer

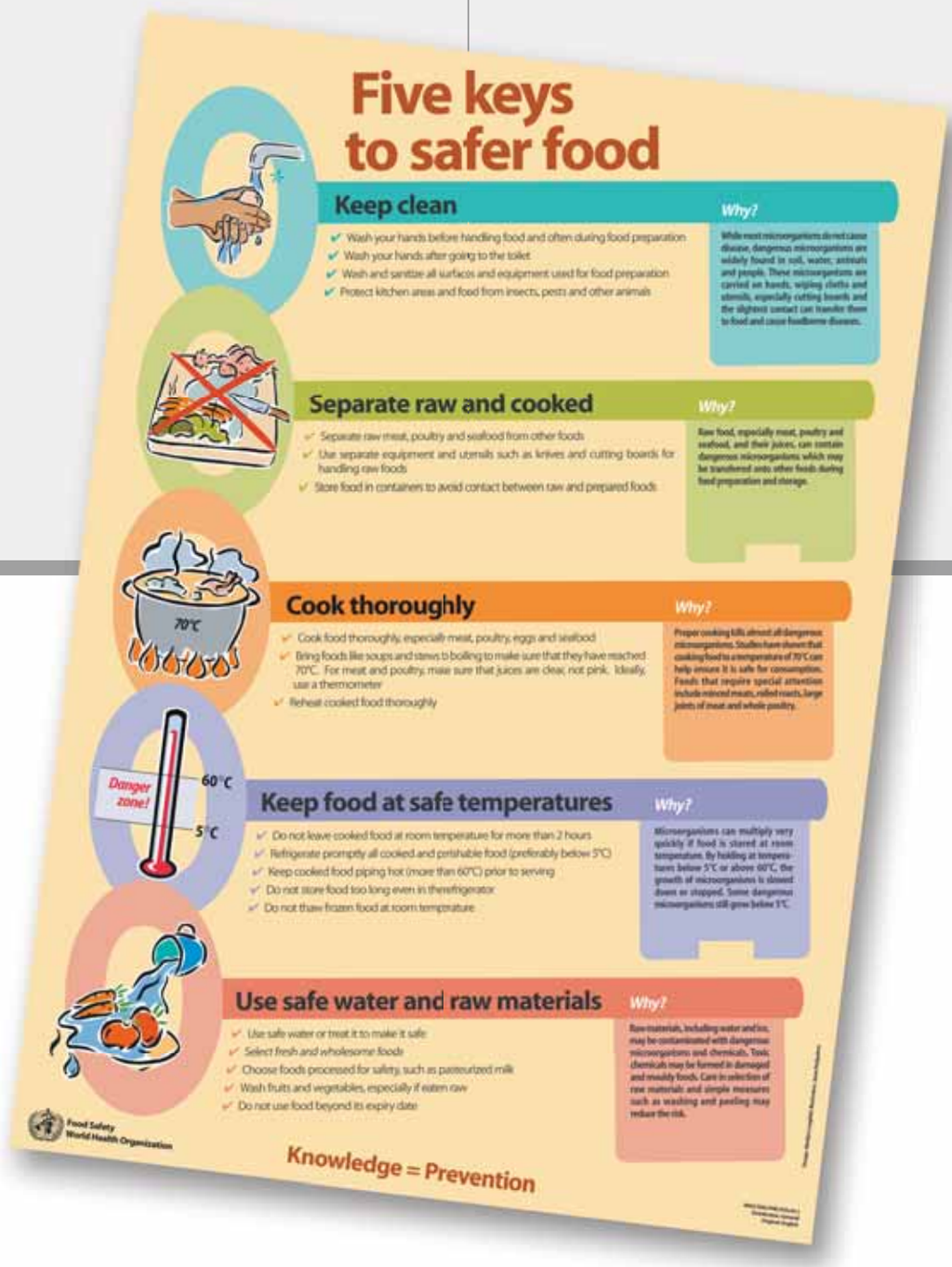
- Food industry workers need to notify their employers of the following: Hepatitis A, diarrhoea, vomiting, fever, sore throat, skin rash, other skin lesions (e.g. boils, cuts, etc.) or discharge from ears, eyes or nose.
- High risk activities such as slaughtering and preparing ready to eat foods may require special personal protective equipment. Contact the local government authority for more information.

Chemicals should not be forgotten	Additional information
Microorganisms are not the only cause of foodborne illness. People also get sick from poisonous chemicals, which include: ♦ Natural toxins; ♦ Metals and environmental pollutants; ♦ Chemicals used for treating animals; ♦ Improperly used pesticides; ♦ Chemicals used for cleaning; and ♦ Improperly used food additives. Simple measures such as washing and peeling may reduce the risk from chemicals that are found on the surface of foods. Appropriate storage can avoid or reduce the formation of some natural toxins.	"Poisoning" is a term used to describe sickness resulting from chemical contamination. Some "natural" toxins (e.g. aflatoxin) are caused by moulds growing on the food. Ingesting aflatoxins may have harmful effects on the liver that can lead to cancer.

Considerations and suggestions for the trainer

- It may be useful to elaborate on some of the chemicals that are a threat to specific populations (e.g. methylmercury, arsenic).
- Discuss the importance of reading and understanding instructions on the labels of chemicals used for cleaning.
- Using cookware and utensils glazed with materials containing heavy metals (e.g. lead, cadmium) can result in chemical poisoning. Discuss appropriate cookware.

You can make a difference!	Additional information
Stop microorganisms from making you and other people sick by following the Five Keys to Safer Food: 1. Keep clean; 2. Separate raw and cooked; 3. Cook thoroughly; 4. Keep food at safe temperatures; and 5. Use safe water and raw materials.	It is very important to follow the Five Keys to Safer Food because proper food handling is key to foodborne disease prevention. These messages are core information and should be presented to all audiences. In some countries, it may be necessary to address the use of safe water and raw materials before presenting the Five Keys to Safer Food.



KEEP CLEAN

Core information	Why?
♦ Wash your hands before handling food and often during food preparation ♦ Wash your hands after going to the toilet ♦ Wash and sanitize all surfaces and equipment used for food preparation ♦ Protect kitchen areas and food from insects, pests and other animals	While most microorganisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping cloths and utensils, especially cutting boards, and the slightest contact can transfer them to food and cause foodborne diseases.

Considerations and suggestions for the trainer

Just because something looks clean does not mean that it is. It takes over 2.5 billion bacteria to make 250 ml of water look cloudy, but in some cases it takes only 15-20 pathogenic bacteria to make one sick.

If slaughtering of animals at home is practised in your region, the following information is very important.

- Keep the area clean and separate from food preparation areas.
- Change clothes and wash hands and equipment after slaughtering.
- Do not slaughter sick animals.
- Be aware of on-going diseases in your area such as Avian influenza. Human health risks from these diseases may require additional controls such as using personal protective gear. Contact the local government authority for further information.
- Remove faeces from the home and keep it separate from food growing, preparation and storage areas.
- Wash hands to prevent contamination with faecal material.
- Keep domestic and other live animals away from the food growing, preparation and storage areas (e.g. pets, poultry, animals raised in the home).

How to keep yourself clean: hand-washing	Additional Information
Hands frequently transport microorganisms from one place to another, so hand-washing is very important. You should wash your hands: ♦ Before handling food and often during food preparation; ♦ Before eating; ♦ After going to the toilet; ♦ After handling raw meat or poultry; ♦ After changing a baby's nappy (diaper); ♦ After blowing your nose; ♦ After handling rubbish; ♦ After handling chemicals (including those used to clean); ♦ After playing with pet animals; and ♦ After smoking. To wash your hands you should: ♦ Wet hands under running water; ♦ Rub hands together for at least 20 seconds with soap; ♦ Rinse hands under running water; and ♦ Dry hands thoroughly with a clean dry towel, preferably a paper towel.	In the food industry, it is important to discuss personal hygiene. This discussion should include topics such as wearing gloves, keeping fingernails trimmed and wearing clean clothes. If gloves are used, they should be changed often. "Toilet" could be understood as defecation only, if urination is not also mentioned. Many people wash their hands improperly. They do not use soap or wash only part of their hands. When washing hands, pay attention to finger tips, fingernails, thumbs, wrists and in between fingers. The combination of hot water and soap helps remove grease, bacteria and dirt. A bucket with a tap or a bucket and a pitcher can be used to wash hands when no running water is available. It is best to wash hands with warm water, but in many areas warm water is not available. Cold or lukewarm water for washing is acceptable when used with soap.

Considerations and suggestions for the trainer

♦ While washing with soap and water is ideal, many people do not have access to soap or detergent. Coal ash is commonly used as a substitute for soap. This method for hand-washing is acceptable.

How to clean plates and utensils	Additional Information
In general, one should: ♦ Clean while preparing food, so microorganisms do not have a chance to grow; ♦ Pay special attention to eating, drinking and cooking utensils that touch raw food or the mouth; ♦ Sanitize cutting boards and utensils after they have been in contact with raw meat or seafood; and ♦ Don't forget to clean and dry the cleaning equipment, as microorganisms grow fast in damp places. For cleaning after the meal, one should: ♦ Scrape excess food into a rubbish bin; ♦ Wash in hot water with detergent, using a clean cloth or brush to remove left-over food and grease; ♦ Rinse in clean hot water; ♦ Sanitize utensils with boiling water or with a sanitizing solution; and ♦ Leave dishes and cooking utensils to air-dry, or wipe with a clean dry cloth.	It is important to distinguish between "cleaning" and "sanitizing". "Cleaning" is the process of physically removing dirt and crumbs of food. "Sanitizing" is the process of disinfecting or killing germs. Cloths, towels and other cleaning utensils need to be kept clean and changed daily. Sponges are not recommended. Use separate cloths for cleaning dishes and surfaces to prevent the spread of microorganisms. To make a sanitizing solution: mix 5 ml of household bleach in 750 ml of water. Use for utensils, surfaces and wiping cloths. Boiling water can also be used to sanitize utensils, but be careful to avoid burns!

How to protect food preparation areas from pests	Additional Information
Pests are rats, mice, birds, cockroaches, flies and other insects. Pet animals (dogs, cats, birds, etc.) carry microorganisms and pests (fleas, ticks, etc.) on their feet, fur and feathers. To keep food safe from pests, one should: ♦ Keep food covered or in closed containers; ♦ Keep rubbish bins covered and remove the rubbish regularly; ♦ Keep food preparation areas in good condition (repair wall cracks or holes); ♦ Use baits or insecticides to kill pests (taking care not to contaminate food); and ♦ Keep domestic animals away from food preparation areas.	Pests can transfer harmful microorganisms onto food and kitchen surfaces. Change the example of common pests depending on the prevalent pest within the chosen target area. Discuss ways to eliminate pests from food preparation and storage areas. In some countries, it may be impossible to ensure that the kitchen is totally pest-free. In this case, clean and sanitize surfaces and utensils before cooking. Cats carry a parasite that can contaminate food and cause serious disease in unborn babies. Keep cats away from food preparation and storage areas.

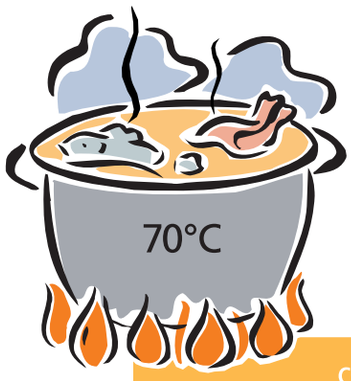
SEPARATE RAW AND COOKED

Core information	Why?
♦ Separate raw meat, poultry and seafood from other foods ♦ Use separate equipment and utensils such as knives and cutting boards for handling raw foods ♦ Store food in containers to avoid contact between raw and prepared foods	Raw food, especially meat, poultry and seafood and their juices, can contain dangerous microorganisms which may be transferred onto other foods during food preparation and storage.

Considerations and suggestions for the trainer

- ♦ Keeping raw and prepared food separate prevents the transfer of microorganisms.
- ♦ "Cross-contamination" is a term used to describe the transfer of microorganisms from raw to cooked food.
- ♦ Discuss local food handling and preparation habits to identify factors that may lead to contamination.

How to keep raw and prepared food separate	Additional Information
♦ While shopping, keep raw meat, poultry and seafood separate from other foods. ♦ In the refrigerator, store raw meat, seafood and poultry below cooked or ready to eat foods to avoid cross-contamination. ♦ Store food in containers with lids to avoid contact between raw and prepared foods. ♦ Wash plates used for raw food. Use a clean plate for cooked foods.	Emphasize that separation must occur not only when cooking, but during all phases of food preparation including slaughtering processes. Liquids used for marinating raw meat should not be poured over the meat when it is cooked and ready to eat.



COOK THOROUGHLY

Core information	Why?
♦ Cook food thoroughly, especially meat, poultry, eggs and seafood ♦ Bring foods like soups and stews to boiling to make sure that they have reached 70 °C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer ♦ Reheat cooked food thoroughly	Proper cooking can kill almost all dangerous microorganisms. Studies have shown that cooking food to a temperature of 70 °C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.

Considerations and suggestions for the trainer

- Provide examples of foods and/or dishes eaten by the audience. Use these foods and/or dishes along with the usual technique of cooking to emphasize how to ensure that the food is cooked thoroughly.
- If the audience does not have access to a thermometer, emphasize the use of colour as an indicator that the food is cooked thoroughly.

Cooking safely in the microwave oven

- Microwave ovens can cook unevenly and leave cold spots where dangerous bacteria can survive. Make sure that food cooked in a microwave oven is at a safe temperature throughout.
- Some plastic containers release toxic chemicals upon heating and should not be used in the microwave to heat food.

How to cook food thoroughly

Food must reach a temperature of 70 °C in order to ensure it is safe to eat. A temperature of 70 °C kills even high concentrations of microorganisms within 30 seconds.

Use a thermometer to check that foods reach 70 °C.

Some audiences will need to be taught how to use a thermometer. Instructions for use are as follows.

- Place the thermometer in the centre of the thickest part of the meat.
- Make sure the thermometer is not touching a bone or the side of the container.
- Make sure the thermometer is cleaned and sanitized between each use to avoid cross-contamination between raw and cooked food.

If a thermometer is not available:

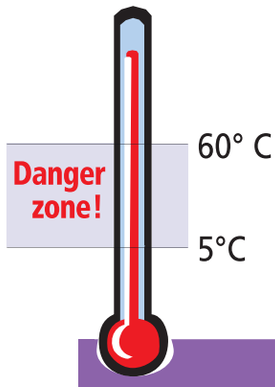
- Cook poultry until the juices are clear and the inside is no longer pink;
- Cook eggs and seafood until piping hot throughout; and
- Bring liquid based foods such as soups and stews to a boil and continue to boil for at least 1 minute.

Additional Information

The centre of an intact piece of meat is often sterile. Most bacteria are on the outer surface. Eating intact pieces of meat (e.g. roast beef) with red centres is usually not dangerous. However, in minced meat, rolled roasts or poultry, bacteria can be found both outside and in the centre.

Lower cooking temperatures can be used to kill microorganisms in certain foods. With lower temperatures, more cooking time is required.

Reheat cooked food until it is piping hot throughout.



KEEP FOOD AT SAFE TEMPERATURES

Core information	Why?
♦ Do not leave cooked food at room temperature for more than 2 hours ♦ Refrigerate promptly all cooked and perishable food (preferably below 5 °C) ♦ Keep cooked food piping hot (more than 60 °C) prior to serving ♦ Do not store food too long even in the refrigerator ♦ Do not thaw frozen food at room temperature	Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5 °C or above 60 °C, the growth of microorganisms is slowed down or stopped. Some dangerous microorganisms still grow below 5 °C.

Considerations and suggestions for the trainer

- Storage practices vary greatly. Become familiar with food storage practices in the area and discuss safe storage practices.
- Provide storage times for refrigerated foods common to the area.
- Explore options other than refrigeration to lower temperature (dig a hole, use cold water, etc.).
- If safe storage is not feasible, discuss the possibility of obtaining fresh food and using it immediately.
- Directions will need to be converted into Fahrenheit for some audiences. 70 °C is about 160 °F and can be used as common reference temperatures for cooking.
- Discuss how to safely thaw large pieces of meat (e.g. turkeys, roasts, etc).

Thawing Food Safely in the Microwave

Microwave ovens can be used to thaw food, but can leave warm spots where microorganisms can grow. Food thawed in the microwave oven should be cooked promptly.

What are safe temperatures for food?	Additional Information
The danger zone is the temperature range of 5 °C to 60 °C in which microorganisms multiply very fast. Refrigeration slows bacterial growth. However, even when food is stored in the refrigerator or freezer, microorganisms can grow.	Microorganisms cannot multiply if it is too hot or too cold. Cooling or freezing food does not kill microorganisms but limits growth. Normally microorganisms multiply faster at higher temperatures. But once temperatures reach 50 °C, most microorganisms do not multiply.
How to keep food at safe temperatures	**Additional Information**
♦ Promptly cool and store leftovers. ♦ Prepare food in small amounts to reduce the amount of leftovers. ♦ Leftover food should not be stored in the refrigerator for longer than 3 days and should not be reheated more than once. ♦ Thaw food in the refrigerator or other cool location.	Left-over food can be cooled quickly by: putting the food onto open trays; slicing large pieces of meat into smaller pieces; placing food in a cool, clean container; or stirring regularly for soups. Label leftovers to indicate how long they have been stored.

USE SAFE WATER AND RAW MATERIALS

Core information	Why?
♦ Use safe water or treat it to make it safe ♦ Select fresh and wholesome foods ♦ Choose foods processed for safety, such as pasteurized milk ♦ Wash fruits and vegetables, especially if eaten raw ♦ Do not use food beyond its expiry date	Raw materials, including water and ice, may be contaminated with dangerous microorganisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Care in selection of raw materials and simple measures such as washing and peeling may reduce risk.

Considerations and suggestions for the trainer

♦ "Safe" means that water and food is free from dangerous microorganisms and toxic chemicals at levels that could cause illness and/or disease.

What is safe water?	Additional Information
Untreated water from rivers and canals contain parasites and pathogens which can cause diarrhoea, typhoid or dysentery. Untreated water from rivers and canals is not safe! Rainwater collected in clean tanks is safe as long as the tanks are protected from contamination from birds or other animals. ***Safe water is needed to:*** ♦ Wash fruits and vegetables; ♦ Add to food; ♦ Make up drinks; ♦ Make ice, ♦ Clean cooking and eating utensils; and ♦ Wash hands.	Boiling, chlorination and filtration are important means to inactivate microbial pathogens, but do not remove harmful chemicals. To disinfect water: ♦ Bring to a rolling boil; ♦ Add 3 - 5 drops of chlorine to 1 litre of water; or ♦ Physically remove pathogens with appropriate filter. Covering tanks and other receptacles with netting prevents the breeding of dengue mosquito vectors.

How to select safe raw materials.	Additional Information
When buying or using food: ♦ Select fresh and wholesome food; ♦ Avoid food that is damaged or rotting; ♦ Choose foods processed for safety such as pasteurized milk or irradiated meat; ♦ Wash fruits and vegetables with safe water, especially if eaten raw; ♦ Do not use food after its expiry date; ♦ Throw away smashed, swollen or oxidized cans; and ♦ Choose ready to eat, cooked or perishable foods that are stored correctly (either hot or cold, but not in the danger zone).	Bacteria can grow in can goods that are not properly prepared. Fresh fruit and vegetables have been identified as a significant source of pathogens and chemical contaminants. Therefore it is critical to wash all fruits and vegetables with clean and safe water before eating. Cut away damaged or bruised areas of fruits or vegetables - bacteria can thrive in these places. Pay attention to the expiry date on food items and throw away food when the date has passed.

EVALUATION FORMS

I: For the organizer and/or trainer

This form evaluates the demographics of the audience, the suitability of the adaptation process and whether or not the training session achieved its goal.

Demographics of the Audience

1. Who was the audience? _____

2. What was the age range of the audience? _____

3. What was the general educational level of the audience?

☐ No education ☐ Low education ☐ High education

4. What was the average literacy level of the audience?

☐ Cannot read ☐ Can read a little ☐ Can read

5. What was the living environment of the audience?

☐ Rural ☐ Urban

6. Were there any cultural practices that compromised food safety?

☐ Yes ☐ No

If yes, please describe these practices _____

_____

7. What resources are available to the participants? (tick all appropriate boxes and add any sources that are not listed)

☐ Safe water ☐ Thermometer

☐ Running water ☐ Oven

☐ Refrigerator ☐ Human waste disposal

☐ Electricity ☐ Other _____

Adaptation of the Five Keys to Safer Food Manual

8. Do you think the level of language in the Five Keys to Safer Food poster was appropriate?

☐ Yes

☐ No

9. Do you think the manual presents the Five Keys to Safer Food information clearly?

☐ Yes ☐ No

If no, please explain _____

_____

10. How did you adapt Key 1 *(Keep clean)*? _____

_____

11. How did you adapt Key 2 *(Separate raw and cooked)*? _____

_____

12. How did you adapt Key 3 *(Cook thoroughly)*? _____

_____

13. How did you adapt Key 4 *(Keep food at safe temperatures)*? _____

_____

14. How did you adapt Key 5 *(Safe water and raw materials)*? _____

_____

15. Was there a general adaptation made for the audience? _____

_____

16. Please provide feedback on audience participation, concerns and accomplishments. _____

_____

17. Please provide recommendations for changes to the manual (e.g., inclusions, deletions, edits). _____

_____

II: For the participants

This form evaluates the food safety knowledge, attitude and behaviour of the participants. Participants should complete the form before and after training.

Knowledge

Key 1 – Keep clean

1a. It is important to wash hands before handling food. ☐ True ☐ False

1b. Wiping cloths can spread microorganisms. ☐ True ☐ False

Key 2 – Separate raw and cooked

2a. The same cutting board can be used for raw and cooked foods provided it looks clean. ☐ True ☐ False

2b. Raw food needs to be stored separately from cooked food. ☐ True ☐ False

Key 3 – Cook thoroughly

3a. Cooked foods do not need to be thoroughly reheated. ☐ True ☐ False

3b. Proper cooking includes meat cooked to 40 °C. ☐ True ☐ False

Key 4 – Keep food at safe temperatures

4a. Cooked meat can be left at room temperature overnight to cool before refrigerating. ☐ True ☐ False

4b. Cooked food should be kept very hot before serving. ☐ True ☐ False

4c. Refrigerating food only slows bacterial growth. ☐ True ☐ False

Key 5 – Use safe water and raw materials

5a. Safe water can be identified by the way it looks. ☐ True ☐ False

5b. Wash fruit and vegetables. ☐ True ☐ False

Answers: p. 26

Attitude

Key 1 – Keep clean

1a. Frequent hand-washing during food preparation is worth the extra time.

☐ Agree ☐ Not sure ☐ Disagree

1b. Keeping kitchen surfaces clean reduces the risk of illness.

☐ Agree ☐ Not sure ☐ Disagree

Key 2 – Separate raw and cooked

2a. Keeping raw and cooked food separate helps to prevent illness.

☐ Agree ☐ Not sure ☐ Disagree

2b. Using different knives and cutting boards for raw and cooked foods is worth the extra effort.

☐ Agree ☐ Not sure ☐ Disagree

Key 3 – Cook thoroughly

3a. Meat thermometers are useful for ensuring food is cooked thoroughly.

☐ Agree ☐ Not sure ☐ Disagree

3b. Soups and stews should always be boiled to ensure safety.

☐ Agree ☐ Not sure ☐ Disagree

Key 4 – Keep food at safe temperatures

4a. Thawing food in a cool place is safer.

☐ Agree ☐ Not sure ☐ Disagree

4b. I think it is unsafe to leave cooked food out of the refrigerator for more than two hours.

☐ Agree ☐ Not sure ☐ Disagree

Key 5 – Use safe water and raw materials

5a. Inspecting food for freshness and wholesomeness is valuable.

☐ Agree ☐ Not sure ☐ Disagree

5b. I think it is important to throw away foods that have reached their expiry date.

☐ Agree ☐ Not sure ☐ Disagree

Answers: p. 26

Self-reported behaviour

Key 1 – Keep clean

1a. I wash my hands before and during food preparation.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

1b. I clean surfaces and equipment used for food preparation before re-using on other food.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

Key 2 – Separate raw and cooked

2a. I use separate utensils and cutting-boards when preparing raw and cooked food.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

2b. I separate raw and cooked food during storage.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

Key 3 – Cook thoroughly

3a. I check that meats are cooked thoroughly by ensuring that the juices are clear or by using a thermometer.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

3b. I reheat cooked food until it is piping hot throughout.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

Key 4 – Keep food at safe temperatures

4a. I thaw frozen food in the refrigerator or other cool place.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

4b. After I have cooked a meal I store any left-overs in a cool place within two hours.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

Key 5 – Use safe water and raw materials

5a. I check and throw away food beyond its expiry date.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

5b. I wash fruit and vegetables with safe water before eating them.

☐ Always ☐ Most times ☐ Sometimes ☐ Not often ☐ Never

ANSWERS

Knowledge	Attitude	Self-reported behaviour
1a) True, 1b) True	1a) Agree, 1b) Agree	1a) Always, 1b) Always
2a) False, 2b) True	2a) Agree, 2b) Agree	2a) Always, 2b) Always
3a) False, 3b) False	3a) Agree, 3b) Agree	3a) Always, 3b) Always,
4a) False, 4b) True, 4c) True	4a) Agree, 4b) Agree	4a) Always, 4b) Always
5a) False, 5b) True	5a) Agree, 5b) Agree	5a) Always, 5b) Always

GLOSSARY

Bacteria	A microscopic organism which may be found in the environment, in foods and on animals.
Bleach (chlorine)	A strong smelling liquid containing chlorine that is used for disinfecting food contact surfaces and sanitizing plates and utensils.
Contaminant	Any biological or chemical agent, foreign matter or other substances not intentionally added to food that may compromise food safety or suitability.
Cross-contamination	The introduction of microorganisms or disease agents from raw food into ready-to-eat food making it unsafe.
Danger zone	The temperature range 5 °C to 60 °C, in which microorganisms grow and multiply very fast.
Diarrhoea	A disorder of the intestine marked by abnormally frequent and fluid evacuation of the bowels.
Disinfection	The reduction by means of chemical agents and/or physical methods, of the number of microorganisms in the environment, to a level that does not compromise food safety or suitability.
Equipment	All stoves, hot-plates, cutting boards, tables and kitchen surfaces/counters, refrigerators and freezers, sinks, dishwashers and similar items (other than utensils) used in food processing and food service establishments.
Faeces	Waste matter or excrement eliminated from humans and animals.
Food	Any plant or animal product prepared or sold for human consumption. Includes drink and chewing substances and any ingredient, food additive or other substance that enters into or is used in the preparation of food. Does not include substances used as a drug or medicine.
Foodborne disease	A general term used to describe any disease or illness caused by eating contaminated food or drink. Traditionally referred to as "food poisoning".
Food contact surfaces	Surfaces of equipment and utensils normally in contact with food.
Food handler	Any person who directly handles packaged or unpacked food, food equipment and utensils or food contact surfaces, and is therefore expected to comply with food hygiene requirements.
Food hygiene	All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food-chain.
Food preparation	The manipulation of food intended for human consumption by processes such as washing, slicing, peeling, shelling, mixing, cooking and portioning.
Food safety	All measures to ensure that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.
Microorganisms	Microscopic organisms such as bacteria, moulds, viruses and parasites, which may be found in the environment, in foods and on animals.
Pathogen	Any disease-causing microorganism such as a bacterium, virus or parasite. Often referred to as a "germ" or "bug".
Perishable food	Food that spoils within a short amount of time.
Pest control	The reduction or elimination of pests such as flies, cockroaches, mice and rats and other animals that can infest food products.
Risk	Is the severity and likelihood of harm resulting from exposure to a hazard.
Ready to eat	Food that is consumed without any further preparation, such as cooking, from the consumer.
Toxic	Harmful or poisonous
Utensils	Objects such as pots, pans, ladles, scoops, plates, bowls, forks, spoons, knives, cutting boards or food containers used in the preparation, storage, transport or serving of food.
Virus	A non-cellular, microscopic infectious agent that relies upon a host cell to reproduce.

RESOURCES

More information regarding the Five Keys to Safer Food is available at:
www.who.int/foodsafety/consumer/5keys/en/index.html

Electronic copies of the poster in various languages are available at:
www.who.int/foodsafety/publications/consumer/5keys/en/index.html

The adaptation of the Five Keys to Healthy Food Markets settings is available at:
www.who.int/foodsafety/capacity/healthy_marketplaces/en/index.html

Implementation of the Five Keys to Safer Food in countries:
WHO Regional Advisors and WHO country representatives play a crucial role in creating and promoting WHO policies and practices at the regional and national levels. They may be contacted directly for assistance and advice in the implementation of the Five Keys to Safer Food. Contact details can be found at:
www.who.int/foodsafety/consumer/5keys/en/index4.html

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Five keys to safer food

Keep clean

- Wash your hands before handling food and often during food preparation
- Wash your hands after going to the toilet
- Wash and sanitize all surfaces and equipment used for food preparation
- Protect kitchen areas and food from insects, pests and other animals

Why?

While most microorganisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause foodborne diseases.

Separate raw and cooked

- Separate raw meat, poultry and seafood from other foods
- Use separate equipment and utensils such as knives and cutting boards for handling raw foods
- Store food in containers to avoid contact between raw and prepared foods

Why?

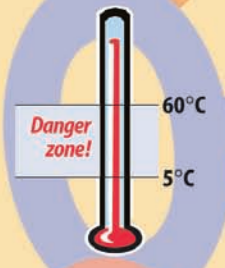
Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous microorganisms which may be transferred onto other foods during food preparation and storage.

Cook thoroughly

- Cook food thoroughly, especially meat, poultry, eggs and seafood
- Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer
- Reheat cooked food thoroughly

Why?

Proper cooking kills almost all dangerous microorganisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.



Keep food at safe temperatures

- Do not leave cooked food at room temperature for more than 2 hours
- Refrigerate promptly all cooked and perishable food (preferably below 5°C)
- Keep cooked food piping hot (more than 60°C) prior to serving
- Do not store food too long even in the refrigerator
- Do not thaw frozen food at room temperature

Why?

Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of microorganisms is slowed down or stopped. Some dangerous microorganisms still grow below 5°C.

Use safe water and raw materials

- Use safe water or treat it to make it safe
- Select fresh and wholesome foods
- Choose foods processed for safety, such as pasteurized milk
- Wash fruits and vegetables, especially if eaten raw
- Do not use food beyond its expiry date

Why?

Raw materials, including water and ice, may be contaminated with dangerous microorganisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Care in selection of raw materials and simple measures such as washing and peeling may reduce the risk.

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Food Safety
World Health Organization

Knowledge = Prevention

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