

**Five keys to growing safer fruits  
and vegetables:**  
promoting health by decreasing  
microbial contamination



World Health  
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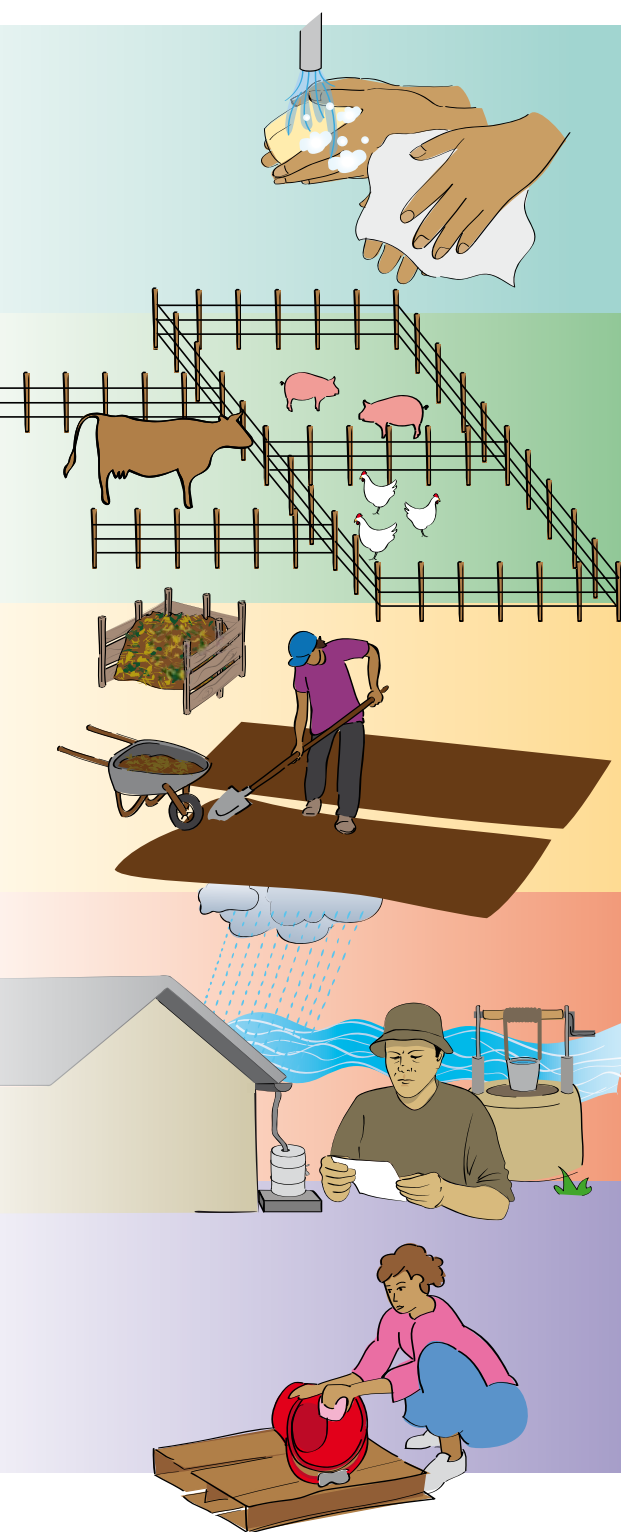
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## Safety of fruits and vegetables is a significant public health security issue

**WHO promotes  
integration of food safety  
education in nutrition and  
food security programmes**

The importance of fruits and vegetables in nutritious and healthy diets is well recognized, and in recent years consumers have been encouraged to eat more of these products. For many countries, particularly developing countries, these products have become a valuable commodity. At the same time, food safety problems linked to the consumption of fresh fruits and vegetables contaminated with microorganisms are increasing. Recent foodborne outbreaks linked to the consumption of leafy greens, tomatoes, sprouts and green peppers clearly demonstrate that the consumption of contaminated fruits and vegetables represents an important source of foodborne disease. Efforts to minimize the microbial contamination of fresh fruits and vegetables are essential and timely.

### The work of the World Health Organization (WHO)

As part of its strategy to decrease the burden of foodborne diseases, WHO develops risk assessments, recommends risk management options, and translates complex scientific knowledge into simple risk communication messages for stakeholders, including consumers. In 2001, WHO developed the *Five Keys to Safer Food*<sup>1</sup> global message and training materials to educate all food handlers, especially consumers preparing food for their families in the home. The *Five Keys to Safer Food* message is now recognized as an international reference source for conducting national food safety education programmes aimed at preventing foodborne diseases. WHO is now extending the *Five Keys to Safer Food* concept to cover additional groups across the farm to table continuum to promote safe food handling practices.

### The manual *Five keys to growing safer fruits and vegetables: promoting health by decreasing microbial contamination*

In 2008, a joint Food and Agriculture Organization of the United Nations (FAO)/WHO Expert Meeting on the microbiological hazards in fresh leafy vegetables and herbs reviewed the scientific data and made recommendations for limiting the risks associated with microbial contamination of these products<sup>2</sup>. An important recommendation from the meeting was that the WHO develop educational materials based on the *Five Keys to Safer Food* concept. This concept is that a simple global message based on scientific evidence must be easy to use, adopt and adapt so that community and health educators can tailor the training materials to meet local needs.

The manual *Five keys to growing safer fruits and vegetables* promotes understanding of the links between the health of humans, animals and the environment and how failures in good hygienic practices in one sector can affect the others.

**Education in food safety  
goes far beyond its goals**

The adoption of effective food safety behaviors when growing and handling fruits and vegetables will have impact on overall hygienic behaviors, which will contribute to improve community health and ultimately aid in achieving the UN Millennium Development Goals<sup>3</sup> that aim to reduce poverty, empower women, reduce child mortality and improve access to basic sanitation.

<sup>1</sup> The WHO *Five Keys to Safer Food* at [www.who.int/foodsafety/consumer/5keys/en](http://www.who.int/foodsafety/consumer/5keys/en)

<sup>2</sup> Microbiological hazards in fresh leafy vegetables and herbs at [www.who.int/foodsafety/publications/micro/mra\\_fruit-veges/en/](http://www.who.int/foodsafety/publications/micro/mra_fruit-veges/en/)

<sup>3</sup> UN Millenium Development Goals at [www.who.int/topics/millennium\\_development\\_goals/en/](http://www.who.int/topics/millennium_development_goals/en/)



## Target audience

The manual is designed to support food safety education of rural workers, including small farmers<sup>4</sup> who grow fresh fruits and vegetables for themselves, their families and for sale in local markets. The course is designed to be used by health educators conducting health promotional teaching in rural communities. However, the manual can also be used by sanitarians, producers, environmental engineers, agriculture school teachers and health professionals, or by rural workers themselves.

## Contents

The manual describes key practices to reduce microbial contamination of fresh fruits and vegetables during planting, growing, harvesting and storing.

The Five keys practices are:

1. Practice good personal hygiene
2. Protect fields from animal faecal contamination
3. Use treated faecal waste
4. Evaluate and manage risks from irrigation water
5. Keep harvest and storage equipment clean and dry

The Five keys practices presented in the manual aim at reducing microbial contamination only, thus do not address contamination by chemical or other hazards. It is important to note that the key practices discuss reducing rather than eliminating contamination of fruits and vegetables from dangerous microorganisms. Knowledge and technologies that can eliminate all food safety problems associated with the microbial contamination of fruits and vegetables do not exist.

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<sup>4</sup> Major industrial farmers would refer to the Good Agricultural Practices (GAP) developed by the FAO

**The manual is divided into three sections.**

**Section One** explains the basic concepts of microbial contamination which should be explained to the trainees.

**Section Two** presents the core information of the Five keys messages, the scientific rationale, the public health and environmental security aspects, and suggests how to communicate the messages.

**Section Three** contains information for the trainer related to planning the training sessions, and suggests training exercises and discussion points that emphasize and review the practices. Included in the manual is an example of evaluation form for the trainers.

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

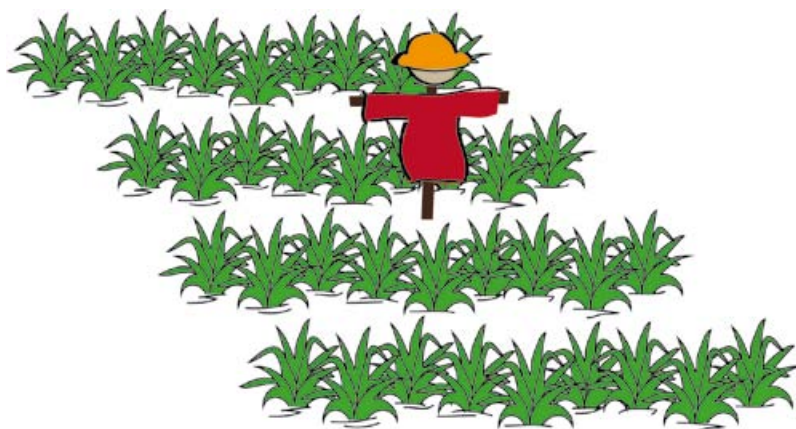
## **Adaptation**

WHO encourages trainers to adapt the non-scientific content of the training materials and develop the most effective ways to deliver the messages and influence behavioral changes. WHO also recognizes that the health professionals are the most qualified to tailor this material and design a training session that is adapted to their local needs.

## **Validation of the course and acknowledgements**

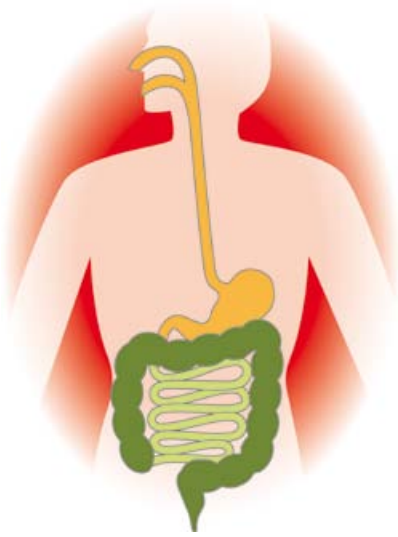
This course was developed by the WHO Department of Food Safety and Zoonoses with the technical contribution from the Water, Sanitation, Hygiene and Health unit. The support of the Pan American Health Organization (PAHO) and the governments of Belize, Guatemala and El Salvador in organizing three pilot-sessions to validate the manual is greatly acknowledged, as well as the contributions from the participants attending the pilot-sessions.

Thanks are also extended to the United States Food and Drug Administration (USFDA) for their technical and financial support.





## What is foodborne disease?



Every day, people all over the world get sick from the food they eat. This sickness is called foodborne disease and can be caused by dangerous microorganisms.

Eating fruits and vegetables contaminated with dangerous microorganisms is a source of foodborne disease.

Preventing microbial contamination is the best way to prevent disease and improve your health and that of your family and community.

### Training tip:

For simpler language, use the terms "germs" for microorganisms.

## What are microorganisms?

Microorganisms are very small living things. In fact, they are 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 are used to:

- ◆ Make food and drinks (e.g. cheese, yoghurt, beer and wine)
- ◆ Make medicine (e.g. penicillin) ; and
- ◆ Help digest the food you eat

Bad microorganisms, or spoilage microorganisms, usually do not make people sick. However, they cause food to look, smell and taste bad.

Dangerous microorganisms make people sick and can even cause death. Bacteria, viruses, yeasts, moulds and parasites are all microorganisms.

Most dangerous microorganisms do not change the appearance of the food, so you usually can't tell that the food is contaminated with dangerous microor-



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