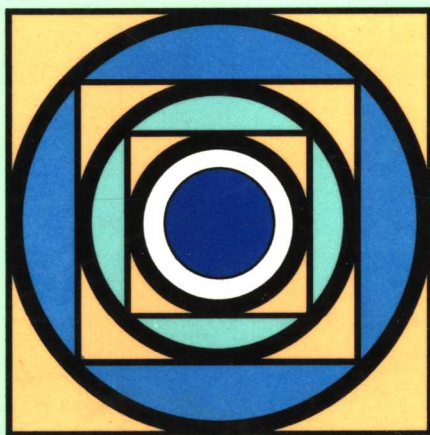


EVALUATION OF PROGRAMMES TO ENSURE FOOD SAFETY



Guiding principles



WORLD HEALTH ORGANIZATION
Geneva

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EVALUATION OF PROGRAMMES TO ENSURE FOOD SAFETY

Guiding principles



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PREFACE

This publication stresses the need to consider evaluation as an integral part of national, regional, and local programmes for food safety. Recognizing that countries are at different stages of development and have different priorities for food safety and food control, it presents guiding principles rather than precise rules on how to monitor and evaluate programmes to ensure food safety.

The book in its present form is the result of the collaborative efforts of many people from both industrialized and developing countries. In 1982, a WHO consultation was held in Atlanta, GA, USA, to discuss the evaluation of food safety programmes and assessment of national needs, and the report of the consultation was incorporated in modified form into the report of the Joint FAO/WHO Expert Committee on Food Safety, published in 1984.¹

Subsequently, both FAO and WHO agreed upon the need to elaborate a text for publication. Accordingly a preliminary draft document was prepared for review at an FAO/WHO Consultation on Food Safety Evaluation, University of North Carolina, Chapel Hill, NC, USA, in October 1984. A list of the participants in this meeting is given in Annex 4. The text was subsequently reviewed by an editorial group at WHO Headquarters, Geneva, in August 1985, and issued in provisional form in 1986. This publication has been developed in the light of experience with that provisional version.

The various drafts were commented on by a number of individual reviewers and their suggestions greatly facilitated the development of the final draft. Particular thanks are due to Professor M.A. Shiffman, University of North Carolina, Chapel Hill, NC, USA, who was instrumental in developing the preliminary draft, and to Mr D.L. Sporn, Director, Evaluation and Analysis Staff, Food and Drug Administration, Rockville, MD, USA, for his valuable contribution in finalizing the text.

¹ WHO Technical Report Series, No. 705, 1984.

INTRODUCTION

Having accepted the goal of health for all by the year 2000, most countries have stated, or are in the process of enunciating, their health policies, preparing their strategic plans, and formulating appropriate programmes. Primary health care has been adopted as the most appropriate approach to achieve this goal. The provision of adequate and wholesome food free from harmful ingredients (safe food) is one of the essential components of primary health care.

Illness resulting from eating contaminated food is perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity (1). Contamination and adulteration of foods cause serious food losses and adversely affect trade and consumer confidence. Many countries are becoming increasingly aware of this situation and have established or are in the process of establishing and strengthening national programmes in response to this challenge.

Programme development (2) requires continuous re-examination and evaluation (3, 4) to ensure that the activities that are being undertaken are those that bring substantial improvements. Nowhere is this more true than in situations where the task at hand contains diverse components and where resources are limited and fragmented. This is the case with food safety, where so many things need to be done, problem awareness is frequently low, and responsibility may be spread over numerous ministries. It is not enough simply to proceed with programme implementation. There must also be continuing evaluation to examine issues such as (a) the relevance of the existing food safety policy to human needs, i.e., health, and social and economic well-being; (b) the adequacy of the current food control activities, and (c) the relative effectiveness of various interventions. Only through such a process can programme performance and implementation be improved. Continuous evaluation is particularly warranted in view of the fact that in many countries food safety programmes are not systematic, but rather opportunistic.

The aim of this publication is to support the work of national authorities in the development of food safety and related programmes by providing information and suggesting possible methods whereby progress in such programmes may be measured and resource utilization maximized. It should be used in conjunction with two other sets of guidelines produced by FAO and WHO (5, 6).

In particular this book is intended to:

- (i) create awareness among food safety and food control personnel that evaluation is an essential management tool which should be employed where possible to increase the contribution that food safety can make to improving health and development;
- (ii) help national authorities to review and analyse national needs in food safety and determine the appropriate measures to meet those needs;
- (iii) guide food safety and food control personnel in the design and operation of an evaluation programme and the interpretation of the results;
- (iv) provide examples of some of the objectives and basic indicators for the various subjects of evaluation.

The applicability of these guidelines in individual countries will depend on the stage of development of the national food safety programme; the guidelines are likely to be most useful in developing countries. While it is realized that a number of countries have neither an established food safety programme nor a formal management system, there are in all countries officials charged with the responsibility for food safety, who from time to time should evaluate the progress of their programmes. Such evaluations are indispensable in that they provide the basis for not only the reformulation of policies, but also determination of appropriate measures for the future development of programme activities.

FOOD SAFETY PROBLEMS

Nature and extent of the problem

Food contamination by biological agents of disease is now recognized as a major public health problem all over the world.

In industrialized countries, while diseases such as cancer and cardiovascular disorders attract widespread attention as major causes of death, food-borne diseases, though less newsworthy, also make an enormous contribution to morbidity. The WHO Regional Office for Europe has estimated that food-borne diseases may be the second largest cause of morbidity in Europe during the period 1986–1989, second in importance only to respiratory tract infections (WHO, unpublished data, 1984). This increase in morbidity is due to different factors in different countries. For example, in Europe and North America there has been explosive growth, since the Second World War, in the mass rearing of food animals and their centralized processing. This has resulted in much greater trade in food and animal feed and in greater spread of various enteric pathogens in both raw and processed foods. The migration of millions of people (tourists, immigrants) has resulted in the international spread of human enteric pathogens. Moreover, food habits have significantly changed in recent decades both in the autochthonous populations and under the influence of those who migrate. Last, but not least, increasing environmental pollution has resulted in new transmission cycles and hence the contamination of a high percentage of food and feed lots.

In developing countries, diarrhoeal diseases are of paramount importance. It has been estimated that in 1980 there were some 1000 million cases of acute diarrhoea in children under 5 years of age in Africa, Asia (excluding China), and Latin America and it is increasingly recognized that contaminated food is responsible for a high proportion of cases of infant diarrhoea. Even when diarrhoeal disease is not fatal, the associated withdrawal of food, reduced intake, nutrient losses, and malabsorption may severely accentuate the effects of poor diet, thus initiating or aggravating malnutrition.

Salmonellae are at present the most important causal agents of food-borne disease in many countries, the number of cases of salmonellosis in man having increased significantly in various

countries over the last 30 years. Research in various countries, particularly in the industrialized world, has demonstrated that poultry and red meat play a major causative role in human salmonellosis. Contamination of animal feeds has been recognized as a primary source of infection in animals and the slaughter of great numbers of clinically healthy salmonellae carriers has led to considerable supplies of contaminated food of animal origin on the markets of the world. It has been demonstrated that a polluted environment, including polluted surface waters and effluents, insects, birds, and rodents, forms part of an infection cycle in which human and animal carriers, as well as diseased individuals and animals, play an important role. These cycles seem to be responsible for the high contamination rates of foods and feed and hence for the frequent infections found in animals and humans. Epidemiological studies have shown that, because of the permanent presence of salmonellae in so many foods, secondary contamination during production, processing, and culinary preparation of foods may play a greater role than does the primary contamination of foods that may be consumed raw or insufficiently heated, e.g., minced beef, hamburgers, and fresh pork sausages. In most well documented outbreaks, contaminated surfaces, kitchen utensils, and human hands play a significant role in cross-contamination, particularly of already cooked and ready-to-eat foods, such as poultry, meat, and meat products.

In recent years *Campylobacter* enteritis has been recognized as an important cause of diarrhoeal disease. Data collected in recent years in many countries show that clinical isolations of *Campylobacter jejuni* in diarrhoeal disease surpass those of salmonellae. *C. jejuni* infections probably originate from food of animal origin, such as milk and meat, with poultry being the most important source, since the organism is frequently found in chickens and turkeys (1). With better surveillance and microbiological isolation procedures, it is to be expected that this organism will be isolated more frequently in many parts of the world.

Staphylococcus aureus has long been recognized as a major cause of food-borne illness. It grows well in foods with a high salt or sugar content and produces toxins that are resistant to heat and radiation. It is important to eliminate the organism before it has an opportunity to produce the toxin.

Clostridium perfringens and *Bacillus cereus* are frequently the cause of mild food-borne illness in Europe and North America. *C. perfringens* is very commonly present in the faeces of people and animals and hence in food of animal origin, especially meat and meat products. Large joints of red meat, large turkeys, stews,

gravy, and meat pies are common vehicles of this infection, almost always after temperature abuse (e.g., inadequate cooking followed by storage without adequate refrigeration). *Bacillus cereus* is also widespread in the environment and causes illness after the consumption of contaminated meat and poultry products, as well as puddings and rice dishes. Both these organisms are probably frequent causes of illness in developing countries.

Vibrio parahaemolyticus and *Vibrio cholerae* 01 are major causes of food-borne illness from marine products in Japan, the United States of America, and many subtropical and tropical regions. More recently, other *Vibrio* spp, such as *V. cholerae* non-01 and *V. vulnificus*, have been responsible for food-borne illness in the southern states of the USA. *Vibrio vulnificus* infections are particularly serious for patients with liver problems.

Two other organisms that have recently been recognized as significant food-borne pathogens are *Escherichia coli* 0157:H7 and *Listeria monocytogenes*, both of which have caused major outbreaks of illness in Canada, the United Kingdom, and the United States of America. Haemorrhagic colitis (severe bloody or watery diarrhoea) as a result of *E. coli* 0157:H7 infection may lead to the more serious haemolytic uraemic syndrome (kidney damage) and coma. Young children have been made seriously ill and patients in homes for the aged have died from this colitis. Improperly cooked meat, chicken, and raw milk have been implicated in outbreaks of this disease, and cattle and poultry may be major sources of the organism, although its ecology has not yet been fully determined. Outbreaks of listeriosis have occurred from contaminated vegetables and dairy products, but *Listeria* may also occur in red meat since it frequently infects cattle and sheep. Most healthy adults experience a mild influenza-like syndrome if they are infected, but pregnant women often abort and the infection may be fatal for newborn infants and immunocompromised persons.

Over 100 parasitic species may be transmitted to man by infected food, although only five zoonotic parasites are currently targeted for control by irradiation—the causal agents of trichinellosis, taeniasis, toxoplasmosis, anisakiasis, and opisthorchiasis/clonorchiasis. This does not prevent the future extension of irradiation to the control of other parasitic infections of local importance.

Trichinella infections are common in the northern hemisphere and Latin America. There is an extensive reservoir of infection in wild-life, and in certain areas it spreads easily on small farms and may cause epizootics in industrialized pig farms. As the intensity of infection is generally low, it is possible that *Trichinella spiralis*

infections in animals may not be diagnosed by trichinoscopy or pool-digestion techniques. However, automated enzyme-linked immunosorbent assay (ELISA) techniques can detect most, but not all, cases.

Toxoplasmosis occurs throughout the world, with prevalence rates of over 50% in some countries. Congenital toxoplasmosis and toxoplasmosis in immunosuppressed patients represent serious health problems. Meat of several animals can serve as a source of this infection, the most commonly involved being pork, mutton, beef, and rabbit. Control of the spread of toxoplasmosis in animals is difficult and meat inspection is not designed to detect this disease. The prevention of human infection is therefore based mainly on discouraging the consumption of raw or undercooked meat.

Taenia solium taeniasis, as a cause of human neurocysticercosis, is a serious public health problem in several developing countries where pig husbandry is deficient and meat inspection sporadic or non-existent.

Taenia saginata infections are common in several developed and developing countries where beef is produced and create more economic problems than health problems. Control of *T. saginata* infections is difficult because mild infections are difficult to detect through meat inspection.

Infections with *Opisthorchis viverrini* and/or *Clonorchis sinensis* are a serious problem in South-East Asia because of their high prevalence. At present, prevention is based on industrial processing of infected fish (cooking, freezing, salting, and drying).

In several countries anisakiasis and *Anisakis*-related infections are no longer serious public health problems owing to the early evisceration and freezing of sea fish. However, sporadic infections in humans still occur, and it is also possible that the killed larvae remain toxic or allergenic.

While there is no evidence that any of the food additives evaluated by the Joint FAO/WHO Expert Committee on Food Additives and used in accordance with the recommendations of the Codex Alimentarius Commission have led to ill health, there is a risk that the illegal use of these chemicals in food can mask poor quality, disguise deterioration, or constitute a deliberate adulteration.

Similarly no evidence has been found of harm to human beings when pesticides are properly used and the Codex-established limits

are not exceeded. However, serious harm may result when they are improperly used without rigorous control and monitoring.

In certain circumstances, the adulteration of food not only defrauds the consumer about the identity or value of the food but can be harmful to health as well. Contaminants such as heavy metals may also pose a health risk if their intake exceeds certain limits.

A serious problem in assessing the health hazards of chemicals in foods is the paucity of records of cases of ill health associated with such contamination. However, while the effects produced by the ingestion of foods contaminated by undesirable levels of chemicals may appear less dramatic than those produced by biological agents, they are nevertheless potentially as dangerous and should not be minimized because of their long-term impact on human health.

The above review indicates the global nature and extent of some food safety problems. This topic has been reviewed in the report of a Joint FAO/WHO Expert Committee on Food Safety (1). That Committee felt that the impact on health of food-borne illness related to contamination of the food supply has not been well recognized by national governments, and that the efforts made by international organizations have not proved effective. To a significant extent, the ubiquitous nature of food safety problems has made them less visible than the less globally significant but more dramatic outbreaks of other diseases, which have consequently received greater attention and resources than food safety. The Joint Expert Committee concluded on the basis of the data available to it that "illness due to contaminated food is perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity".

Status of current national policies and programmes

The status of food safety programmes varies considerably from country to country. Many countries have yet to formulate a national food safety policy responding appropriately to their health situation and economy, and in other countries where these policies have been formulated, they often do not reflect appropriately the true nature and extent of the current or emerging food safety problems. Some of the major constraints in the development of effective food safety policies include:

- lack of appreciation of the nature and extent of national food safety problems;
- lack of awareness of the consequences of contaminated food on the nation's health status and economic development;