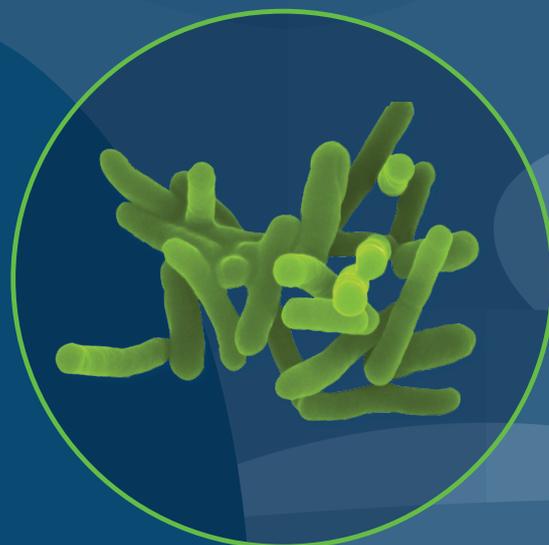


In brief: Assessing the risk of microbiological hazards in foods

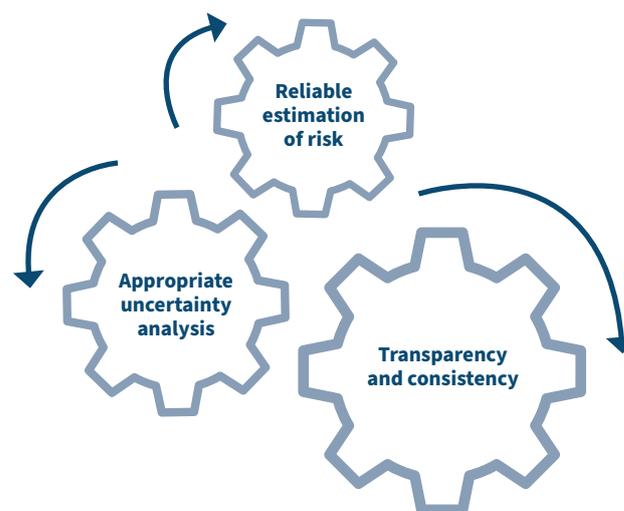


The *Microbiological Risk Assessment Guidance for Food (MRA 36)* provides a structured framework for assessing the risk of microbiological hazards in food. It was developed for the global community of scientists and risk assessors, both experienced and inexperienced in risk assessment, and the risk managers or others responsible for risk decision-making and/or communication so that they can:

- identify the key issues and features of a microbiological risk;
- recognize the properties of a best-practice risk assessment;
- avoid some common pitfalls of risk assessment; and
- perform risk assessments that are responsive to the needs of risk managers.

The *Microbiological Risk Assessment Guidance for Food* updates three previous guidance documents by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) and brings them into a single volume, providing an overall umbrella for microbiological risk assessment. In doing so it captures recent growth and experience in this field, which continues to evolve in line with science and risk management demands.

The *Microbiological Risk Assessment Guidance for Food* provides descriptive guidance on how to conduct a risk assessment, utilizing a variety of tools and techniques. The approaches have been developed in recognition of the fact that a reliable estimation of risk, combined with appropriate uncertainty analysis, is critical for transparent and consistent risk management decision-making as well as for effective risk communication.



Food safety risk assessment

Risk assessments could be initiated in response to well-defined risk management questions. Where possible these questions should target the evaluation of the specific risk management options under consideration.

Assessing risk requires resources which, depending on the question(s), include:

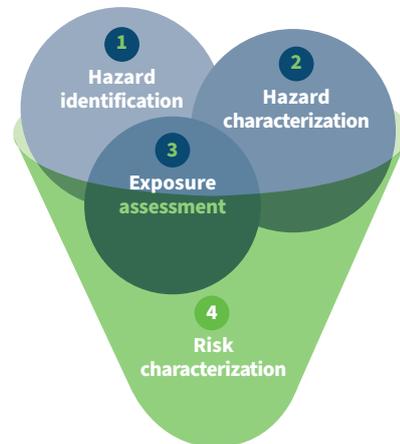
- **Access to expertise.** While the assessment may be carried out by one individual or a small team, access to a range of expertise from multiple disciplines is usually needed.
- **Informed risk managers and policymakers** who are aware of the need for, use and limitations of risk assessment.
- **Financial and human resources** to complete the risk assessment in a timely manner and to an acceptable level that provides useful support for risk management decisions.
- **Communication channels.** Good communication is needed among technical experts, risk managers and risk assessors to facilitate efficient exchange of data and knowledge.
- **Information technology.** Computing facilities, both hardware and software, and access to appropriate information networks are needed to collect, collate and process data, and to provide outputs in a form suitable for communicating results.
- Where data on microbiological hazards are not available, **the capacity to conduct surveillance for microbiological hazards**, including access to microbiologists, epidemiologists, trained field staff and competent laboratories, is needed.



Risk assessment is a “decision-support” tool. Its purpose is not necessarily to extend scientific knowledge. Its aim is to provide risk managers with a rational and objective picture of what is known about a health risk and its causes at a particular point in time.

For the risk assessment to be transparent, the process must be documented. This includes calls for data and information, scientific peer review and public review, among others. The MRA report should include an explanation of the data used, a description of the models used to assess risk, and explanations of any assumptions made, including the likely effect those assumptions have on the risk estimates.

The Codex Alimentarius Commission defines risk assessment for microbiological hazards in foods as a science-based process comprising four components:



1. Hazard identification: microbial hazards in foods include infectious agents or toxins produced by microorganisms;
2. Hazards characterization: evaluates the adverse effects that can arise following ingestion;
3. Exposure assessment: evaluates the likely amount of hazard a population may ingest over time; and
4. Risk characterization: the integration of these three – an estimate of likelihood and severity of an adverse effect in a population.

The *Microbiological Risk Assessment Guidance for Food* further explores the requirements for each of these components with an additional focus on hazard identification and examines the three possible approaches to risk assessment.

- **Qualitative risk assessments** are descriptive or categorical treatments of information. A qualitative assessment may be undertaken as part of a first evaluation of a food safety issue, to determine if the risk is significant enough to warrant a more detailed analysis.
- **Semi-quantitative risk assessments** evaluate risks with a score. They provide an intermediary level between the textual evaluation of risk of qualitative risk assessments and the numerical evaluation of quantitative risk assessments. They offer a more consistent and rigorous approach to assessing and comparing risks and risk management strategies than qualitative risk assessment.
- **Quantitative risk assessments** provide numerical estimates of risk and most models use combinations of mathematics and logic statements. Quantitative risk assessments require the development of mathematical models, such as dose-response curve to quantify the relationships and estimate the level of risk.

What our readers say

The *Microbiological Risk Assessment Guidance for Food* is the 36th publication of the Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment (JEMRA) Microbiological Risk Assessment (MRA) series. The publications within the MRA series are used by scientists from around the world for research purposes, teaching materials for undergraduate and graduate levels, and by governments and private industry to guide policy development.

Here is what some experts had to say:

“ I use these documents as teaching materials in postgraduate teaching whose major is food safety from Chinese Center for Disease Control and Prevention (CDC), as training documents for locals who engage in microbiology...widely used for research purposes. ”

L. Bai, *China National Center for Food Safety Risk Assessment (CFSA)*, China

“ We often use [MRA] documents in case studies in courses...furthermore we use them in our courses as background materials...if in our risk assessments dose response models are needed generally the best sources is the JEMRA documents... ”

M. Zwietering, *Wageningen University*, the Netherlands

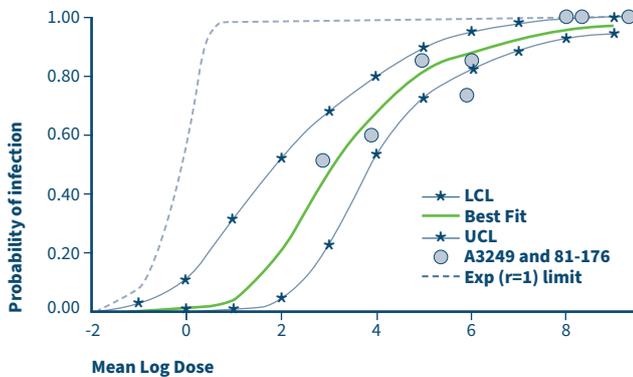
“ Earlier this month I did a Vibrio presentation...so I used the MRA series as a reference... The MRA is being used by New Zealand Competent Authority to underpin food safety policy decisions. ”

DJ. McCoubrey, New Zealand

“ As a grant reviewer, I have seen several JEMRA documents referred to in the background material sections in grant proposals...trade associations, representing various sectors of the food industry, refer to JEMRA documents in presentations at scientific meetings. ”

J. Dickson, *Iowa State University*, United States of America

There is no one correct approach that can be recommended or specified; the choice of approach depends on the risk assessment question, the data and the resources available.



An example of a dose-response curve for *C. jejuni* in broiler chickens (<http://www.fao.org/3/ae521e/ae521e00.htm#Content>)

Risk analysis

Microbiological risk assessment is one of three components of the risk analysis processes along with risk management and risk communication. This model is designed to improve food control programmes to produce safer food, reduce the incidence of foodborne illness and facilitate domestic and international food trade.



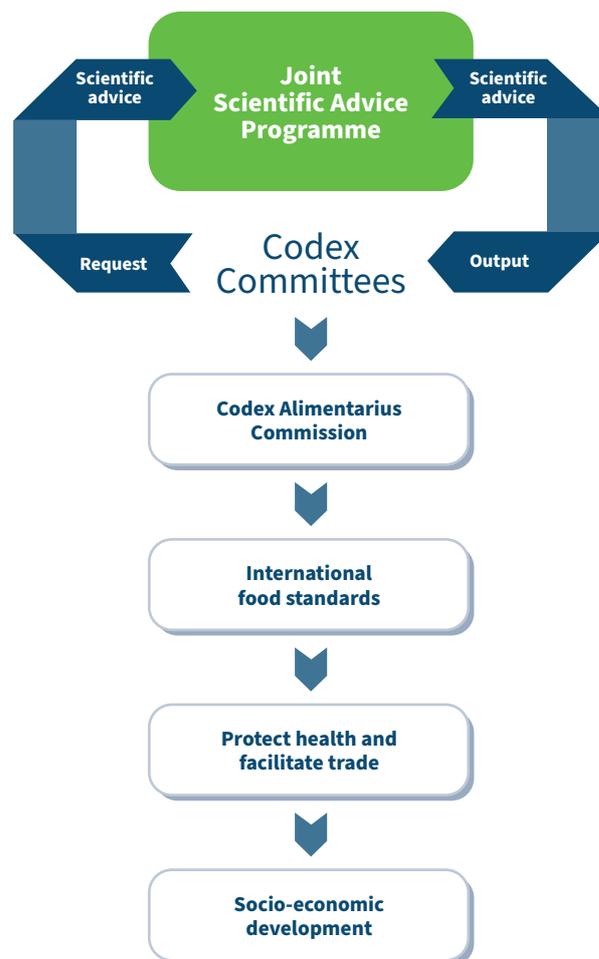
Independence and functional separation of the risk assessment from the risk management process are highly desirable. Nevertheless, interaction between managers and assessors is also essential to ensure that the risk assessment provides the best possible support for the decision(s) that the risk managers have to make. In addition, this interaction helps risk managers understand the principles and assumptions underlying the specific risk assessment.

The Joint FAO/WHO Scientific Advice Programme

FAO and WHO have jointly managed a food safety scientific advice programme since 1956. The Joint FAO/WHO Scientific Advice Programme provides scientific advice in food safety and nutrition. It hosts the FAO/WHO joint secretariats, including the Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment (JEMRA), Joint FAO/WHO Expert Committee on Food Additives (JECFA), Joint FAO/WHO Meetings on Pesticide Residues (JMPPR), the Joint FAO/WHO Expert Meetings on Nutrition (JEMNU) and Ad hoc expert meetings. It enjoys the highest reputation for inclusiveness, scientific excellence and impartiality thereby attracting top global scientists.

The Joint FAO/WHO Scientific Advice Programme provides the scientific basis for the Codex Alimentarius, the world's international food standards setting body. As the Codex committees identify needs for risk management tools, requests are made for scientific advice that leads to the development of internationally agreed upon food safety standard to protect public health through a safe and secure food supply and facilitate the fair practices in the trade of food, contributing to the development of the nation and its people.

Within the risk analysis paradigm, the joint scientific advice programme is responsible for risk assessment, while the Codex Alimentarius Commission and its members handle risk management and policy development. Risk communication is a shared responsibility between Codex, FAO and WHO.



For more information:

www.fao.org/food-safety

www.who.int/health-topics/food-safety/

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foodsafety@who.int



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