

8. Risk communication aspects of risk characterization

8.1 Introduction

The various purposes of risk communication are outlined in *The application of risk communication to food standards and safety matters* (FAO/WHO, 1988).

Risk communication is defined in the Codex Procedure Manual (CAC, 2001) as:

The interactive exchange of information and opinions throughout the risk analysis process concerning hazards and risks, risk-related factors and risk perceptions, among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions.

It is an integral and ongoing part of the risk analysis exercise, and ideally all stakeholder groups should be involved from the start. Risk communication makes stakeholders aware of the process at each stage of the MRA. This helps to ensure that the logic, outcomes, significance, and limitations of the MRA are clearly understood by all the stakeholders. Information may be available from the stakeholder. Industry stakeholders may, for example have unpublished data crucial to the risk assessors, which may be an essential part of the data needed for the risk assessment. There is also information that is typically presented to the stakeholders (both industry and consumers), as an integral part of the risk analysis process.

The identification of particular interest groups and their representatives should comprise a part of an overall risk communication strategy. This risk communication strategy should be discussed and agreed upon between risk assessors and managers early in the process to ensure two-way communication. This strategy should also cover who should present information to the public, and the manner in which it will be done.

- The risk communicators will need to identify the risk communication needs and specific strategy for each unique audience. An analysis of the level of awareness and knowledge of the issues for each audience as well as the best method for conveying information to them is critical in preparing risk communication messages, and to determine the appropriate channels of communications. Once audiences have been identified, the next step is to determine strategies for communicating that include both outward communications (messages, provision of information) and inward communication (listening to audience needs, gathering of information). It is important that the communication messages meet the specific needs of the various audiences.
- Some stakeholder groupings are relatively easily identified. In foodborne risk issues, these include such groups as risk managers and regulators, the general public, data holders, scientists, the media, consumer and industry representatives, and public health professionals. Audiences may also include consumers, especially those consumers at high risk for foodborne illness, such as the elderly, pregnant women, young children and people with weakened immune systems. As the whole population are stakeholders in food safety issues, in theory they could be involved in this information exchange. However, this would be very difficult in practice, and many individuals may be completely uninterested in taking an active part.

Risk assessors and managers will need to inform stakeholders of the intention to perform a risk analysis at the start of the project. At this stage, communication with stakeholders is an important opportunity to develop trust, political and scientific support for the MRA, as well as a data gathering exercise.

8.1.1 Information to share with stakeholders

In food safety issues, there is rarely a valid reason why the public cannot have access to all the information used in an MRA, the full MRA report, and a full report of the considerations and (apart from specific issues of commercial confidentiality) the reasoning by which the risk managers reached their decisions. Where it is necessary to maintain commercial confidentiality, sensitive information can usually be presented as part of an overall summary. Specific topics that should be included in the reports to stakeholders include:

- Information on the risk itself, including the nature of the hazards; the estimated magnitude and severity of the risk; the method used to estimate magnitude and severity; information on trends over time; and differences in population susceptibility or exposure strata.
- Information on the uncertainties in the assessment, including input (data) uncertainties; output (estimate) uncertainties; and the assumptions used.
- Risk management considerations and options, such as information received, including stakeholder concerns; actions proposed or selected (dependant upon stage of communication process); reasons or justification for those actions; expected effects; and intended follow-up, monitoring and review activities.

When technical reports are provided to the stakeholders, it is essential that information is also provided in a way that is useful and comprehensible to those receiving it. Specific suggestions as to how information can be effectively presented are discussed below.

8.1.2 Major scientific issues in risk communication

Communicating scientific information is challenging, especially when there is a great deal of uncertainty. For fear of being misunderstood or misinterpreted, scientists and risk managers may be reluctant to communicate technical scientific information when there are significant uncertainties and differences of opinion between experts. For example, this may have been the case in regard to risks associated with bovine spongiform encephalopathy (BSE) in the UK (Chartier and Gabler, 2001).

Although in the past the public perceived scientific information as authoritative, this attitude has changed with respect to risks associated with food, and the public has become increasingly critical about estimates of risk. In addition, lack of understanding of mathematical probability and the enhanced profile of uncertainty associated with MRA are two factors that make public risk communication particularly difficult. Message framing (i.e. the way message is presented) is crucial in these circumstances.

8.2 Interaction between risk managers and risk assessors

From the viewpoint of the risk assessor, the risk manager is a special category of stakeholder, with specific additional communication requirements. As presented in the FAO/WHO report on Principles and guidelines for incorporating microbiological MRA in the development of food safety standards, guidelines and related texts (FAO/WHO, 2002), the interaction between risk assessors and risk managers should be ongoing throughout the Risk Analysis procedure. Risk

communication aspects relevant to the various stages of the risk analysis procedure are highlighted below.

8.2.1 Planning and commissioning an MRA

Once the risk manager has decided to commission an MRA and selected the risk assessment provider, the planning and contracting of the work needs to take place. The planning and commissioning of the MRA procedure is probably one of the most important steps, in order to ensure the quality of the whole process, effective working relationships, and the appropriate outcomes from the MRA. Close communication between risk assessors and risk managers on the issues at this stage is crucial, and discussion should include the following:

(i) Scientific issues concerning the MRA.

- Background information, including provision of a Risk Profile.
- Initial risk management questions.
- The purpose and scope of the MRA.
- Expected outcomes of the MRA.
- The required form of the risk estimate (i.e. risk characterization measures and units).
- How it is intended that the outcome of MRA will be used in the risk management process.
- Criteria for validating the risk model and outcomes.
- Criteria to determine scientific and technical adequacy of the MRA.
- Consideration of the probable data needs.

(ii) Practical issues

- Basic and additional resources likely to be needed.
- Timelines and milestones.
- Frequency and timing of the interaction between the risk assessor and the risk manager.
- Communication strategy.

It is extremely helpful to widely publicize the intended method of assessment, and this should be done at the earliest possible opportunity (including any indications of the format and type of model most likely to be used), together with an expression of flexibility in the eventuality of any new information or ideas. The commissioning of the MRA should preferably be settled in a written contract between risk managers and risk assessors, with a clause indicating that the contract will be reviewed regularly as new information comes to light, to ensure milestones and outputs are still reasonable and appropriate.

8.2.2 During the MRA

Knowledge about data availability and understanding of the problem will usually greatly improve during the development of the MRA. The initial questions asked by the risk managers often need to be modified during the early stages of the MRA, as information and data limitations become clear. Thus decisions on the final scope of the assessment and questions to

be addressed usually require an iterative process. Throughout the MRA procedure, the risk assessors and risk managers should communicate regularly on the impact that assumptions, data gaps, data selection, interpretation and modelling will have on the procedure, methods and outputs of the MRA. Risk managers and risk assessors have a mutual responsibility to exchange information that might influence the conduct of the MRA, as well as possible management options. It is sometimes found that modelling of available data is able to provide more information than was originally anticipated at the time the MRA was commissioned. In such cases, the new possibilities for answering new questions should be discussed with the risk manager. New information and changes in procedures that would have an impact on the expected outcome, timelines, costs, etc., should be stated in a revised contract between risk managers and risk assessors.

8.3 After the completion of the MRA

Identification of the point when the MRA can be considered effectively completed, and an agreement on this, is extremely important. When risk characterization is considered, the results need to meet the scope and objectives that were agreed in the contract commissioning the MRA.

In the presentation of results, important findings from hazard identification, exposure assessment and hazard characterization should also be summarized. Examples of such information includes a summary of information on the pathogen and foods of concern, the changes in prevalence and level of the pathogen through a food chain, dose-response functions for host groups with different susceptibilities, risk estimates in targeted populations, risk ranking of foods of concern, and the effects of possible management options.

Presentation of the results to the risk managers

Risk assessors and risk managers should discuss and agree upon the format and contents of the final report of the MRA. In presenting the results of risk characterization, the following points should be taken into consideration:

- Results should be presented in a transparent, objective manner. They should be in a form that enables people with little mathematical or statistical background to understand the essential aspects of the risk characterization. For example, a ‘technical document’ with all modelling details could be paired with a less technical ‘interpretive summary’. Additionally, the use of illustrations, graphs and tables for presentation of quantitative information from the model will be more informative than giving just parameter estimates or other statistics as numerical outputs.
- Numerical estimates should be supported by qualitative information about the nature of the risk and about the weight of evidence that defines and supports it.
- All assumptions, sources of variation and uncertainty should be fully presented and acknowledged.
- All the information and data used in the MRA should be explicitly described in the report.
- To ensure transparency, the references for all sources of information or data should be given and cited at appropriate locations in the report. Any ephemeral information (e.g. from a Web site) should be printed out and attached or filed for reference.
- Any identified needs for additional data should be clearly communicated.

It should be noted that, although very necessary to undertake, a description of those aspects of risk communication that form part of the risk manager's strategy are outside the scope of this paper, and therefore excluded.

In any MRA, there will be both advantages and disadvantages to the approach taken, and these attributes should be communicated to risk managers. The following points are important aspects to consider in effectively communicating the advantages and disadvantages of the specific approach taken:

- Scenarios considered in an exposure model or in a dose-response analysis may depend on the availability of data or of expert opinions. Whatever the reasons for selecting scenarios, these should be fully discussed during the MRA and clearly documented in the report.
- Assumptions made in the MRA should be clearly documented and their impacts on the results should be evaluated.
- In quantitative assessments, uncertainty or sensitivity analysis should be used to evaluate the impact of uncertainty of input parameters on the final output, which at the same time may provide objective insights with regard to data gaps and future research needs. The risk managers can then use this information for future research fund allocation, if required.
- By documenting the points indicated above, the limitations and caveats in the interpretation and application of the MRA will be explicit for the risk managers.

8.4 Development of risk communication strategies

As indicated above, decisions on risk communication—including what, who and how—should be part of an overall risk communication strategy. Risk communication is most effective if undertaken in a systematic way, and generally starts with the gathering of information on the risk issue of concern. Therefore the risk manager and risk assessor must be able to briefly and clearly summarize at an early stage what this issue encompasses, in order to elicit interest and stakeholder input. Communication must then continue throughout the entire process. Once available information has been used to fully identify the hazards, and decide on and assess the appropriate risks, then the preparation and dissemination of this information is required. This will be followed by further discussion with stakeholders, leading to corrections, amendments and additions as appropriate, resulting in the final MRA and risk analysis reports.

A particular risk manager or risk assessor may be skilled in risk communication, but if not, it is advisable to include in the team a professional risk communicator for all but the least contentious issues. They should be trained in media skills, with established relationships with scientific journalists and other members of the media, as well as having general risk communication skills. It goes without saying that they should also work closely with the risk manager and risk assessor in order to maximize effective communication. In risk communication, three issues need consideration: channels of communication, the message, and the materials.

In order to begin any dialogue, appropriate communication channels must be identified. Frequently in foodborne risk issues the publication of scientific papers or arousal of media interest has already occurred before the risk analysis is under way. Indeed, these are often the catalysts for consideration of risk management options and commissioning of an MRA. Therefore, generally speaking, a dialogue has already begun and some communication channels are already open. Potential communication channels with the public include:

- *Articles or programmes in the general media.* These are usually written or produced by journalists, and may be useful to highlight the issue initially, and bring it to the notice of the public. However, they are often written or documented in an over-dramatic style, and may not always be factually correct.
- *Press releases.* These may get widely reported by the media if the subject has already made the headlines. Interviews may follow. This format may be useful to request participation in further dialogue or advertise meetings.
- *Articles written or programmes produced specifically for food-related or health publications or programmes.* These might be written by either scientific journalists, or possibly as paid-for articles written by specialist risk communication professionals acting as part of the risk analysis team. Development of close links between risk managers and scientific journalists may be useful in improving the usefulness of such articles or programmes. Under these circumstances quotes or interviews can usefully contribute.
- *Appropriate written communications targeted directly at identified, appropriate representatives of the public.* These could include influential individuals, consumer groups, single-topic pressure groups, medical groups, etc. Prior publicity from the media may well have alerted the risk manager to additional groups, and an annotated address list of those interested would ideally have been constructed. This particular format allows for different written documents to be used as appropriate. For example, a summary of results may be sent to all on the list with an invitation to apply for, or purchase, a full technical report. The level of detail received can therefore be self-selected. This method of communication is probably one of the most useful to the risk analysis team, as it is likely to stimulate wider media involvement, bringing the issue to those previously unaware.
- *Web sites.* These might carry summaries, with links to more detailed reports; addresses and telephone numbers to register for further information; an option to offer input into the analysis; details of any stakeholder meetings planned; or relevant interest groups. Web sites, if they are to be of any use, must be regularly updated and well designed. It is again likely that a risk analysis team would need professional input to make the best use of this resource.
- *Meetings.* These are both truly 'public' and those targeted at specific representative groups. For practical reasons, fully public meetings are likely to be used only for contentious or very high profile issues, and must have been advertised in advance using one or more of the communication channels note above. For either public or targeted meetings, it is best to plan a scene setting introduction, of appropriate technical depth, and to have effective risk communicators, as well as risk managers and technical assessors, on hand. Even for public meetings, it is desirable to have previous notification of who and how many are planning to attend for purely practical reasons, so admission by being listed, or even by ticket, may be appropriate. A written summary of the issue should be available at the meeting. Recording of such meetings is advisable for later use, incorporation, reference and reply. An open question time will help to ensure stakeholders have the opportunity for their say, although it is advisable to have an advertised closing time: exhaustion does not aid clarity. Other points can be dealt with either by a further meeting, or through written follow up.

Whatever channels of communication are chosen with respect to the public, clarity and relevance are essential. It therefore follows that all written and Web material should be thoroughly checked for accuracy and clarity, and to ensure that it is at a level of technical detail appropriate to the intended audience. Some specific features of written or presented material that may be helpful in explaining results from risk characterization include:

- *Graphs and pictures of frequency and probability distributions, etc.* If used, these must be very clear, uncluttered and well labelled.
- *Careful choice of method of presentation of numerical results.* For example the estimate of risk may be ‘one death per million of the population per year’, but this may be difficult to conceptualize. In a population of 60 million, a reported estimate of 60 deaths per year may be more easily understood.
- *Comparison of risks.* This might be useful in certain circumstances, but is a method of much controversy as it is easy to misuse. Only risks with similar characteristics should be compared. For example, an involuntary foodborne risk should not be compared with a voluntary risk, such as car driving or cigarette smoking. It might, however, be compared with other involuntary risks, such as environmental pollution, or necessary treatment requiring surgical procedures.

Successful risk communication requires an understanding of the basic principles of risk communication, and why it might fail, and there are specific issues about which those undertaking risk communication with the public (and others) should be aware. These include:

- *Differences in perception.* Different individuals may perceive the risk from the same hazard very differently. This may result either in the discounting of risk messages, or in panic. For example, where an MRA is described purely in technical terms, rather than addressing the specific concerns that a person might have, the message may be perceived as irrelevant, and hence ignored. Where the message contradicts previously held beliefs, the source may be distrusted and disbelieved, and the information discounted. Optimistic bias occurs where a person believes they are less vulnerable to a particular risk than the average member of society, in which case the risk message may again be ignored. Studies have also identified a ‘white male’ effect, whereby white males often perceive risks as less than all other groups, perhaps because they believe themselves to be more ‘in control’ of the technologies around them.
- *Lack of understanding of the scientific process.* Scientific terminology may obscure the message. Explicit and acknowledged uncertainty, or the use of assumptions and judgements, may be interpreted as meaning that the information provided by an MRA is of little value. These factors may lead to a failure to appreciate the basis of the risk manager’s decisions.
- *Conflicting agendas.* The aim of the media is to select or make items newsworthy; and relatively few have experience with complex scientific issues and uncertainties. This can lead to inaccuracies in general media reports, and in the preconceived ideas of the public. Risk managers and assessors are unlikely to be familiar enough with the media to overcome these issues, and may not have the necessary communication skills to work with journalists and reporters to ensure quality and accuracy.
- *Failure to listen.* Only by listening to what the public—and this also means individual members of any specific audience—can any communicator hope to understand how to give people information in the way they want, at a level they need, and to which they will listen in return.
- *Trust.* Trust is perhaps one of the most important issues. Studies have shown that information from trusted sources is much more likely to be believed than that from sources that are not trusted. Unfortunately, the same studies generally show that government representatives and government scientists are amongst the least trusted sources. These are, of course, those most frequently involved in MRA and risk communication. In contrast the media, at least those parts perceived as ‘quality’ newspapers or programmes, are more likely to be trusted. Government risk communicators may therefore gain some advantages by using appropriate media channels, but

the prior development of close working relationships with the media is essential. This can be maximized by regular informal meetings and discussions, i.e. 'getting to know one another'.

8.5 Public review

In addition to scientific peer review (see Section 6.10.2), providing the public with meaningful opportunities for input helps establish credibility and legitimacy in risk assessment. Seeking public input may be appropriate at various stages of risk assessment, including early problem formulation, data acquisition, and review. Routine public notice and comment procedures only at the end of the process may be inadequate to generate trust and cooperation from stakeholders. Public review of results allows all stakeholders in a risk assessment to critically evaluate the assumptions made and their effect on the risk assessment results. This action also allows stakeholders to assess how informative the risk assessment results are in the context of a specific risk management decision, and how the risk management options impinge on social, economic, religious, ethical and other concerns, so that these can be openly considered and addressed (FAO/WHO, 1998).