

Risk Perception: A Challenge to the Development of Risk-based Food Safety Policy**

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Summary

The past two decades has seen increased progress in our striving to develop food safety policies that are science-based and risk-based. However, reaching consensus about the appropriate level of protection our food safety systems should provide is still severely hampered by the widely divergent perceptions of risk among different segments of the population and similar divergent interpretations of the supporting scientific knowledge. Without a concerted effort to better understand risk perception and de-sensationalize the science underlying food safety, we will continue to struggle in achieve food safety systems that meet the needs of both the individual consumer and society in general.

Current Realities

A hallmark of modern food safety systems in developed countries is food safety policies that are built upon a science-based, risk-based foundation of decisions concerning the “Appropriate Level of Protection” needed to safeguard their citizens. This is a key concept formalized in the World Trade Organization’s Sanitary and Phytosanitary Agreement (SPS Agreement), which the world’s nations have agreed should underpin international trade in food commodities and food products. The SPS Agreement establishes the right of a country to articulate the level of control that it expects from domestic and foreign manufacturers of foods and food ingredients, and that these requirements should be equivalent for both domestic and foreign providers. Further, if a country establishes requirements greater than those agreed upon by international standard setting bodies, then that country must be able to demonstrate via a risk evaluation that its citizenry requires a higher level of control. Many countries have procedural requirements for the detailed consideration of the science and risks associated with proposed food safety policies.

As with virtually all public health policies, food safety policies represent a combination of scientific and societal considerations. The establishment of new regulations in the United States is guided by the procedures established by the Administrative Procedure Act of 1946 (APA), which establishes steps that federal agencies must follow to develop and implement new regulations. This includes consideration of (i) the scientific evidence and rationale for a proposed regulation and (ii) public opinions through public comments and proactive outreach activities. Since the initial passage of the APA, a number of additional requirements have been added to the regulatory process. A relatively recent addition is the need for a formal risk assessment for major regulations. During the past several decades, the role and sophistication of risk assessments as the basis for developing and implementing sound risk management strategies has steadily increased to the point where food safety agencies and larger entities in the food industry have dedicated risk assessment personnel. This has led to the emergence of risk-based decision-making that takes into account the reality that while it is essentially impossible to totally eliminate foodborne hazards, it is possible to manage the risks to achieve an “appropriate level of protection.” Such decisions involve weighing food safety risks to public health burden versus competing “costs” to society. Costs to society should not be considered solely in terms of financial burden. For example, there have been calls to ban consumption of raw shellfish, a notoriously risky food. In addition to lost revenues, a clear societal cost would be limiting the dietary choices of presumably knowledgeable consumers. Thus, the articulation of a food safety policy establishes a society’s decision on how to balance public health “costs” and other societal costs.

Scientific Opportunities and Challenges

Food safety professionals view food safety systems as a continuum where decisions must be reached regarding the level of stringency that will be required. A highly stringent requirement (e.g., banning of a specific food) would emphasize reducing public health risks regardless of other societal costs, whereas developing less stringent options would potentially increase public health risks due to the need to mitigate unacceptable societal costs. Reaching national consensus about tolerable levels of risks is hampered by differing perceptions of food safety risks. While the food safety experts view risk as a relative attribute, the typical consumer views safety as a binary attribute (i.e., the food is either safe or unsafe). In part, this reflects differences in the scope of their concerns: food safety experts are typically dealing with the risk to the nation, whereas individual consumers are focused on the risks to their immediate families. In addition, consumers are often more risk adverse regarding food than many other potential risks (e.g., drugs). This is compounded by a general lack of understanding of risk and probability theory by the general public. As an example, if one asks a number of people who have just purchased a lottery ticket what their odds are of winning, a significant portion will reply 50:50, (i.e., they either do or do not have the winning numbers). This binary approach to food safety risks tends to be reinforced by the fact that the legal system under which food safety policies must be implemented is binary to achieve a clear demarcation between safe and unsafe.

A good example of how ineffective risk communications can hamper reaching consensus on appropriate levels of protection is the use of the term “zero tolerance” to articulate the expectations for the management of microbiological food safety risks. This phrase, which was originally used to describe the goal for the prevention illegal drugs sales around schools, began to be used by food safety managers to articulate their high levels of concern for the presence of infectious bacteria such as *Escherichia coli* O157:H7 and *Salmonella enterica*. Consumers take this on face value (i.e., zero means zero). However, to be implemented in a regulatory setting, zero needs to be defined in an unambiguous manner so that the actions of regulatory agencies are standardized for all food manufacturers. If not, regulatory actions could be deemed to be “arbitrary and capricious.” Establishing a standard method and sampling plan, either through an official method or an “action level,” can lead to huge differences in the stringency among requirements that are typically not transparent to the general public. For example, the routine sampling of powdered infant formula requires the absence of *Salmonella* in 60 25-gram samples, which is equivalent to being 50% confident that the level of the microorganism is less than one cell in more than 4,000 grams of product. Conversely, the sampling of raw meat is typically based on a single 25-gram sample, which provides 50% confidence that the level of *Salmonella* is less than one cell in 40 grams of product. Without this knowledge, the consumer would assume that the level is the same for both products. It is obvious that more effective means of exchanging information and understanding risk perception are critical foundations for developing risk-based food safety policies.

Traditionally both consumers and food safety experts rely on the help and advice of professional communicators (e.g., the media) to help bridge this communication gap. However, the fragmentation of the media during the past decade has made it increasingly difficult to reach anything approaching consensus. The consumers’ increasing reliance on information sources that reflect the viewpoint of the listener reinforce preconceived conclusions regarding food safety issues, thereby limiting the benefits of hearing and weighing different arguments. This is further amplified by the rush to publicize food safety related studies that identify new safety concerns without putting it into the context of the actual risk to the public. Often preliminary in nature, when such research is flawed it is almost impossible to remove its influence if the findings support the suspicions that a portion of the population has about the underlying food safety issue. At its extreme, it has led to speculation of conspiracies between the government and the food industry to suppress “the truth” about a food safety issue. A classic example has been the continuing effort to

allow the interstate shipment of raw milk for direct human consumption. Despite a long history of public health concerns associated with the consumption of unpasteurized milk, particularly by young children, raw milk advocates continue to explore ways for getting around current restrictions. Likewise, the internet is replete with Web sites touting the benefits of raw milk consumption, despite numerous studies to the contrary. This situation is not restricted to foods. The media currently is awash with news, commentary, and political debate about the public health “costs” of allowing parents to elect not to immunize their children against preventable childhood diseases, such as the measles epidemic that started in the U.S. in late 2014, despite strong recommendation by the public health community.

Policy Issues

The broad question facing the food safety community is whether a science-based, risk-based food safety system is achievable, considering the context discussed above? As inferred above, key corollary questions that impact public policy are:

- Can we more effectively exchange views and information concerning the appropriate level of protection to reach a consensus?
- How can we balance and optimize public health needs in relation to other societal mandates?
- How can food safety experts become more effective in articulating the trade-offs that have to be considered in developing and implementing practical food safety policies, particularly when it is international in scope?

A particular hurdle is that this must be done in a manner that does not imply that the general public is incapable of understanding the scientific knowledge that must be analyzed. Further, this must be done in a manner that is transparent in the broadest sense to the broadest segments of the population possible. Key challenges and possible solutions include:

- Increase the stringency of peer reviews of scientific studies that have policy implications and provide an open public, internet-based forum that allows the results, ramifications, and veracity of the studies to be debated and reinterpreted as appropriate.
- Increase the transparency regarding agencies’ consideration of public comments during the development of the final format of new food safety regulations.
- Work with major media outlets, professional organizations, public health community, and industry to de-sensationalize the reporting of new research, including de-incentivizing researchers from making speculative statements about the risk to public health as a means of enhancing funding of future research.
- Make it easier to modify regulatory requirements and guidance as a result of new scientific or technological findings.
- Find the funds and societal mandate to institutionalize these changes.

Without an ongoing effort to explain and discuss the risks associated with the food supply, we will continue to have groups of consumers who lack trust in the food industry and the public health institutions that are dedicated to safeguard the public. If we fail to attain a reasonable level of communication and trust, we will continue to see segments of the consuming population making decisions that increase their food safety risks. Given the global nature and interdependence of the modern food supply, implementation of risk-based food safety systems are critical to ensuring the safety of a food supply that is nutritious, secure, and reasonably priced.

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