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Harnessing Information for More Effective Use of Food Safety Resources

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According to recent estimates, society bears nearly $6.9 billion per year in costs related to human illness caused by foodborne pathogens. The numbers of deaths and illnesses, and the high costs of these illnesses, suggest that public and private efforts are needed to improve our response to the problem. However, because the occurrence of foodborne illness is influenced by the complex interaction of many natural phenomena and human behaviors, it is not solely a scientific, regulatory, or human behavior problem. The perspectives of diverse disciplines taken together can better view the problem across the spectrum of the food system and find cost-effective solutions.

Building a Framework
CARD led a collaboration of other university and institutional partners in the Food Safety Research Consortium to develop a conceptual framework to guide modeling and data collection efforts to improve food safety. The fundamental idea is that decisionmakers in public and private settings can improve how they set food safety priorities and allocate resources if they have quantitative risk rankings and can consider the availability, effectiveness, and cost of interventions to address these risks.

Determining the best use of food safety resources is a difficult task faced by public policymakers, regulatory agencies, state and local food safety and health agencies, as well as private firms. To be most useful, a structure for priority setting and resource allocation for food safety must take full account of the food system’s complexity and available data but at the same time be simple enough to be workable and of practical value to decisionmakers. Workshops in Iowa, Georgia, and Massachusetts and a national conference in Washington, D.C., included federal, state, and local public health and other agency representatives, commodity organizations, food and processing industry representatives, consumer representatives, and university researchers.

Two Types of Priority Setting
The project team identified two types of priority-setting decisions. Purpose 1 priority setting guides risk-based allocation of food safety resources, primarily by government food safety agencies, across a wide range of interventions and other opportunities to reduce the public health impact of foodborne illness. Purpose 2 priority setting guides the choice of risk management actions and strategies with respect to particular hazards and commodities.

Purpose 1 priority setting helps policymakers identify the risks in the food supply and the points on the farm-to-table continuum that should be targeted for reducing these risks but does not reveal the most effective risk management actions or strategies. Purpose 2 can thus be described as broad resource allocation. Purpose 2 priority setting involves more data-intensive analysis aimed at quantifying and comparing, where possible, the relative effectiveness of alternative risk management actions and strategies, so it can be described as targeted risk management. Case studies may be particularly useful for this purpose.

Typically, regulatory agencies look at Purpose 1 within their own jurisdictions or, in the case of the Centers for Disease Control (CDC) and other crosscutting agencies, across the entire food system. Purpose 2 risk management strategies typically focus on particular hazardous agents or categories of hazards such as specific agent-food combinations (for example, E. coli O157:H7 in ground beef), a grouping of foods associated with a particular pathogen or other agent (for example, Listeria monocytogenes in meat, dairy, and other commodities), or all agents associated with a particular food or food category (for example, the safety of broiler chickens as affected by Salmonella, Campylobacter and other pathogens, or the safety of produce as affected by all microbial and chemical hazards).

Purpose 2 analysis is likely to be significantly more data-intensive than is Purpose 1, both because it can be and because it often needs to be, especially if it is intended to result in government regulatory action or spending decisions by private entities. In these situations, decisionmakers may seek more detailed and case-specific information about the effectiveness and cost of proposed actions to justify their decisions.
Building Blocks of the Framework

It is essential that the framework be grounded in a multi-disciplinary approach—including in the integration of data. It must also be practical, flexible, and dynamic by including ongoing evaluation and continuous updating of risk rankings and other elements. Four analytical elements are included in the framework structure: risk ranking, intervention assessment, health impact estimation, and combined evaluation. These elements apply to both Purpose 1 and Purpose 2 priority setting, albeit to widely varying degrees.

Risk ranking efforts order the relative public health impact of the food safety risk in terms of known human health outcomes. Intervention assessment identifies potential risk reduction interventions and, when available data permit, considers their feasibility, effectiveness, and cost. Health impact estimation is used to compute, as permitted by available data, the public health effectiveness and benefits of specific interventions and intervention strategies. Finally, the combined evaluation integrates all the data—from the risk ranking, intervention assessment, and health impact estimation—to help inform the decision-making process in food safety. Each analytical element has its unique challenges in terms of methods and available data, and priority setting for food safety cannot be reduced to a formula for either purpose. Determining the resource allocations or risk management strategies that are best for public health will always require judgment calls on a wide range of values and factors—political, policy, legal, or scientific—that are not amenable to quantitative analysis. Nevertheless, basic comparisons can be made on the available scientific information.

The framework is only the starting point. The next step is the development of specific analytical tools and data systems to implement the framework and thus help achieve the ultimate goals of better resource allocation and risk management and a reduced public health burden of foodborne illness.

Background materials are available on the project Web site: http://www.card.iastate.edu/food_safety/.