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Report February 2012

Improving Food Safety in Canada: Toward a More Risk-Responsive System

Centre for Food
in Canada

LEADERSHIP AND GOVERNANCE

Improving Food Safety in Canada: Toward a More Risk-Responsive System
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Preface

Given the importance of food safety and calls to improve Canada's responsiveness to food safety risks, there is a need for an informed dialogue about how well the current system performs, what could be changed to enhance performance, and which options are appropriate for achieving change. The purpose of this report is to provide a foundation for that dialogue. It examines and assesses the structure and performance of the current food safety system, provides an overview of issues and challenges to enhancing food safety in Canada, and identifies the drivers and constraints that influence industry investment in food safety and consumer behaviour. The report's final chapter identifies potential solutions and key areas for action to improve food safety in Canada.

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ABOUT THE CENTRE FOR FOOD IN CANADA
The Centre for Food in Canada is a three-year initiative of research and dialogue to help address one of the mega-issues facing our country today—food. Food impacts Canadians in an extraordinary range of ways. It affects our lives, our health, our jobs, and our economy.

The twin purposes of the Centre for Food in Canada are:
- to raise public awareness of the nature and importance of the food sector to Canada's economy and society; and
- to create a shared vision for the future of food in Canada—articulated in the Canadian Food Strategy—that will meet our country's need for a coordinated, long-term strategy for change.

The Centre is taking a holistic approach to food. It focuses on food in Canada through three interrelated but distinct lenses: safe and healthy food, food security, and food sustainability. These lenses ensure that the Centre focuses on the full range of important issues facing the food sector.

The work involves a combination of research and effective communications. The goal is to stimulate public understanding of the significance of the food sector and spur the demand for collaborative action. The Centre is working closely with leaders and partners from Canada's food sector, governments, educational institutions, and other organizations to achieve its goals.

Launched in July 2010, CFIC actively engages private and public sector leaders from the food sector in developing a framework for a Canadian food strategy. Some 25 companies and organizations have invested in the project, providing invaluable financial, leadership, and expert support.

For more information about CFIC, please visit our website at www.conferenceboard.ca/cfic.

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Improving Food Safety in Canada: Toward a More Risk-Responsive System

At a Glance

- Canada's food safety system generally does a good job protecting the health of Canadians, but improvements are needed to address existing and emerging challenges.

- Although there are close to 6.8 million cases of food-borne illness annually in Canada, it is rare for debilitating illness or death to result from the consumption of unsafe food in Canada (40 deaths in 2008).

- This report identifies the roles and performance of the food industry, governments, and consumers, and provides a foundation for dialogue about how to improve food safety.

- Potential solutions to enhance food safety in Canada include:
  - providing small and medium-sized enterprise restaurants and food service operators with management advice;
  - encouraging better behaviour among consumers;
  - harmonizing private standards to protect the public interest;
  - making greater use of technology to improve visibility and traceability; and
  - adding resources to address food safety risks due to globalization.

Everyone—including governments, the food industry, and consumers—has an abiding interest in safe food. Fortunately, Canada's food safety system does a good job generally of protecting consumers from food safety hazards. Although there are close to 6.8 million cases of food-borne illness annually in Canada, the overwhelming majority are mild and involve only minor discomfort and inconvenience.[1] Despite increasing public anxiety about food safety, it is exceptionally rare for debilitating illness or death to result from the consumption of unsafe food in Canada.

When high-profile outbreaks—or fears of outbreaks—occur, businesses can experience significantly reduced sales, high recall costs, and lower consumer confidence.

Yet there is no reason to be complacent. There is room to improve Canada's food safety performance. Although a precise figure is impossible to calculate given current data limitations, the health care costs and lost productivity attributable to food-borne illness are likely high.[2] When high-profile outbreaks—or even increased fears of outbreaks—occur, businesses can experience significantly reduced sales, high recall costs, and lower consumer confidence. All of these not only threaten Canadians'

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1 See Appendix A for calculation.

2 See Appendix A for an explanation of the challenges related to calculating the financial impact of food-borne illness in Canada.

health, but can negatively affect the economic competitiveness and viability of the food industry on which we rely to meet our nutritional and dietary needs.

Moreover, a variety of factors are creating a more challenging food safety risk environment. The increasing globalization of the food supply presents a special challenge. Products and ingredients are being imported from a wider range of countries, many of which have food safety standards that are unclear or suspect. At the same time, Canadians are eating out more often—thereby increasing their risk of contracting a food-borne illness. And a rapidly aging population means that more people will be vulnerable to the effects of unsafe food. In short, although Canada's food safety system has done a relatively good job to date, the risk environment is changing rapidly. If Canada's food safety system is to continue to be risk responsive, then industry, government, and consumers will need to develop both better understandings of, and better risk management strategies for, existing and emerging food safety risks.

WHAT'S ON YOUR PLATE?

Food is considered safe when, at the point of consumption, biological, chemical, or physical hazards have been eliminated or reduced to levels low enough that they will not cause illness or death.[3] Unfortunately, it is almost impossible for consumers to determine the safety of their food given that most biological and chemical hazards, and some allergens, are imperceptible to human senses. Food that looks, smells, and even tastes fine may contain pathogens, chemicals, or allergens that can cause illness. As a result, effective food safety systems require sophisticated approaches to hazard identification and risk management.

Biological hazards such as pathogens, viruses, and bacteria continue to pose the most direct consequences for human health and the economy. Along with allergens,

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3   This definition is adapted and modified from the definition used by the Food and Agricultural Organization of the United Nations: "Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer." Food and Agriculture Organization of the United Nations and the World Health Organization, *Assuring Food Safety and Quality*, 6.

which create risks for certain segments of the population, biological hazards, such as *E. coli*, *Listeria*, *Salmonella*, and *Campylobacter*, are the most common source of food-borne illness in Canada.

It is almost impossible for consumers to determine the safety of their food given that most biological and chemical hazards are imperceptible to human senses.

Chemical hazards are also a concern. They are increasingly used in food production and processing in the form of pesticides, agrochemicals, fertilizers, veterinary drugs, and other inputs. Environmental and industrial contaminants (such as methyl mercury), and natural toxicants and allergens (such as seafood toxins) have become part of the chemical profile of some of the foods on the plates of Canadians. Over-exposure to these and other chemical hazards can lead to acute illness or even death, although they are more likely to contribute to health impacts that occur over a longer period (such as damage to neurological or reproductive development), and chronic diseases (including cancer).

FARM-TO-FORK SOURCES OF RISK

While a majority of food-borne illnesses result from what is done, or not done, at the latter stages of the farm-to-fork continuum—at the level of food service firms and households—food safety hazards can be created at every stage of the chain. At the primary production level, for example, hazards may result from the misuse of chemicals or practices that lead to contamination of plants or animals (for example, through poor waste management practices).

Food manufacturers and processors can also introduce hazards into the food supply by inadequately addressing the risks of contaminants (for example, through inadequate hygiene or sanitation practices). Retailers and wholesalers also occupy critical points in the food supply chain. As gatekeepers to the food supply for most Canadians, their storage, packaging, and processing practices are significant determinants of food safety outcomes.

RISK MANAGEMENT: A SHARED RESPONSIBILITY

Managing food safety risks in Canada is the shared responsibility of governments, food industries (including producers, processors, retailers, and food service establishments), and consumers. Improving Canada's food system to address current and emerging food safety risks requires maximizing the contributions of each of these actors, and improving their interactions in the areas of risk assessment, risk management, and risk communication.

Fortunately, the management of food safety risks is generally high in Canada, although performance is uneven and there is room for improvement. According to a 2010 ranking of food safety performance in 17 countries, while Canada ranked fourth overall, it is a "middle of the pack" finisher in terms of incidence rates related to selected biological hazards.[4] Improving performance will require efforts on the part of government, industry, and consumers.

GOVERNMENT

Canada's public food safety system is strong in many respects; much of its strength is the result of concerted government action. However, there is room for improvement. Some aspects of the food regulatory system have been slow to adapt to certain features of the modern food economy. In particular, the system of pre-market approvals, which grants market access for new food products and food processing technologies, lacks both the transparency and capacity necessary to optimize the fruits of global food innovation—to the detriment of Canadian consumers. In addition, the measurable contribution made by government inspection activities in minimizing food safety risks is unclear.

INDUSTRY

Food safety depends on what industry does on a day-to-day basis to minimize risks. Market forces provide strong incentives for industry to take great care in preventing food safety lapses as these can result in loss of brand reputation, costly recalls, and lower sales. Market forces, however, do not provide equal incentive to all firms to implement adequate food safety measures. Small and medium-sized enterprises (SMEs) and food service companies face unique challenges to improving food safety, including costs, lack of expertise, time, low awareness, and workplace culture. The food service subsector, in particular, shows higher food safety risks compared with food prepared in the home.

Consumers often underestimate the likelihood of food safety incidents—resulting from household practices—and fail to adopt appropriate risk management strategies.

Many firms are adopting and implementing private standard systems, such as the CanadaGAP program or those under the Global Food Safety Initiative, to formalize and recognize additional aspects of food production control, to meet the demands of buyers (both institutional and consumer), or to improve compliance with public regulations. But private standards may be insufficient to address the risks and challenges faced by many SMEs and food service establishments.

CONSUMERS

Even when governments and industry perform their food safety functions well, consumers can create new risks by failing to practice good food safety in food storage, handling, preparation, and cooking behaviours that would minimize risks. Unfortunately, consumers generally underestimate the likelihood of food safety incidents occurring as a result of household practices and therefore frequently fail to adopt appropriate risk management strategies. Improving consumers' risk perceptions—and, in turn, their food safety behaviour—will be challenging, but essential to reduce food safety risks in Canada.

IMPROVING FOOD SAFETY IN CANADA: POTENTIAL SOLUTIONS

Food safety is achieved through both formal and informal processes. While the formal elements of the system— for example, the policies and programs of governments and many food industries—perform well generally, there is a need and opportunity to improve practices in areas

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4   Charlebois and MacKay, *World Ranking*, 21.

with limited or no formal food safety control—for example, among SMEs, food service companies, and households.

In light of our analysis of the sources of food safety risk and effectiveness of the risk management activities of government, industry, and consumers, we offer the following potential government, industry, and consumer actions that may help improve food safety outcomes in Canada:

1. PROVIDE SME RESTAURANTS AND FOOD SERVICE OPERATORS WITH MANAGEMENT ADVICE

Given the relatively high rates of food-borne illness that are attributable to the food service subsector, there is a need to improve the voluntary adoption and application of good food safety practices among the country's food service establishments. One possibility for achieving this is for governments and sector groups to assist by providing timely management advice and information to SME restaurant and food service operators on how they can minimize food safety risks and take rapid effective action in the case of outbreaks.

2. ENCOURAGE BETTER BEHAVIOUR AMONG CONSUMERS

Although consumers appear to know what they should be doing in their own homes to protect themselves from food-borne illness, many fail to put that knowledge to use. It is important to encourage consumers to practice what they know. There is an opportunity for governments to build on current consumer awareness initiatives to better engage consumers in their part of food safety risk management.

3. HARMONIZE PRIVATE STANDARDS TO PROTECT THE PUBLIC INTEREST

There is an alphabet soup of private food safety standards that, theoretically, make an important contribution to enhanced food safety. However, little is known empirically about how well they achieve food safety objectives. More clarity is needed on what private standards are contributing, and how they might be further harmonized to foster wider, and more efficient, uptake among industry participants.

4. MAKE GREATER USE OF TECHNOLOGY TO IMPROVE VISIBILITY AND TRACEABILITY

Technology has a substantial role to play in reducing food safety risks through innovations in manufacturing processes, better machinery, food additives, and/or in information technologies that can improve the visibility and traceability of product and ingredient origins. Yet, Canadians appear to be conservative and sceptical about innovation, especially as it relates to products they ingest. This is reflected in regulatory approaches to new technology approval that are slow and hamper much-needed innovation in the sector. Canadians would benefit from an open debate on the regulatory process, and a deeper understanding of how the system makes its judgements regarding risks.

5. ADD RESOURCES TO ADDRESS FOOD SAFETY RISKS DUE TO GLOBALIZATION

Canadians get more of their food from international sources than ever before. The volume of imports makes it difficult for Canada's import control system to ensure that imported foods meet the same standards as domestic foods. To reduce food safety risks as trade increases and proliferates, Canada could consider adding resources for risk management of international sources while maintaining current domestic resourcing levels. Government and industry could discuss jointly how industry involvement in food safety assurance in the international arena could be increased to complement government efforts. One possible strategy would be to explore how international industry standards for food safety processes could be harmonized to a high standard.

Developing the Canadian Food Strategy

The principal goal of the Centre for Food in Canada (CFIC) is to engage stakeholders from business, government, academia, associations, and communities in creating a framework for the Canadian Food Strategy to meet the country's need for a coordinated long-term strategy.

The Strategy will take a comprehensive approach to food; it will cover the full range of themes relating to healthy and safe food, food security, and food sustainability, encompassing both social and economic dimensions.

The completed Strategy will comprise a framework of workable solutions and actions that will address the challenges facing the food sector. It will identify food sector businesses, governments, communities, and other groups to lead on implementing them.

The process for creating, disseminating, and implementing the Strategy involves research, analysis, and synthesis; consultation and a high level of collaboration; the development of a shared understanding and shared objectives among stakeholders; broad dissemination through many communication channels; and the commitment of key players to take action.

THE ROLE OF RESEARCH

Twenty research projects are being undertaken by CFIC. The process to develop the Strategy starts with conducting research that develops empirical findings and potential solutions to the challenges and issues facing the food sector. These research findings will be used as the basis for dialogue and consultation with CFIC investors and other major food stakeholders, the results of which will inform the final report.

CFIC research aims to:

- understand the current reality of Canada's food system, including its impact on health, environment, trade, and other major economic and social factors;
- define a future desired state for the food system; and
- suggest workable solutions for moving Canada from its current reality to the desired state.

The workable solutions will take into consideration the realities of economic activity, market forces, environment, policies, laws and regulations, and the social conditions and health needs of Canadians.

KEY STEPS AND TIMELINE

1. Begin CFIC research studies—July 2010
2. Develop initial draft of the Canadian Food Strategy—April 2012
3. Begin dialogue and consultations—May 2012
4. Release the Canadian Food Strategy—October 2013

CANADIAN FOOD SUMMIT EVENTS—LAUNCHING THE CANADIAN FOOD STRATEGY

The CFIC will host two major food summits. The first—the Canadian Food Summit 2012 (February 2012)—will bring together more than 600 of Canada's food system leaders and practitioners from business, government, academia, and communities to discuss the latest research, share insights, and discuss how best to address Canada's major food challenges and opportunities. The second summit, in October 2013, will launch the Canadian Food Strategy.

The Need to Improve Canada's Food Safety System

Chapter Summary

◆ Canada's food safety system generally does a good job of protecting the health of Canadians, but improvements are needed to address existing and emerging challenges.

◆ This report takes a "farm to fork" view of the food safety system, identifying the roles and performance of the food industry, governments at all levels, and consumers.

◆ The report provides a foundation for dialogue about the food safety system, including how well it performs and what could be changed to improve performance.

Everyone—including governments, the food industry, and consumers—has an abiding interest in safe food. For some, this is not only an interest, but also a legal responsibility. Fortunately, Canada's food safety system generally does a good job of protecting consumers from food safety hazards. Although there are close to 6.8 million cases of food-borne illness annually in Canada, the overwhelming majority are mild and involve minor discomfort and inconvenience.[1] Despite

increasing public anxiety about food safety, it is exceptionally rare for debilitating illness or death to result from the consumption of unsafe food in Canada.

Although there are close to 6.8 million cases of food-borne illness annually in Canada, most of them are mild and involve minor discomfort and inconvenience.

Yet there is no reason to be complacent. There is room to improve Canada's food safety performance. Although a precise figure is impossible to calculate given current data limitations, the health care costs and lost productivity attributable to food-borne illness are likely high.[2] When high-profile outbreaks—or even increased fears of outbreaks—occur, businesses can experience significantly reduced sales, high recall costs, and lower consumer confidence. All of these things not only threaten Canadians' health, but can negatively affect the economic competitiveness and viability of the food industry, which we rely on to meet our nutritional and dietary needs.

The increasing globalization of food production and trade presents a special challenge to Canada's food safety system. Products and ingredients are being imported from

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1   See Appendix A for calculation.

2   See Appendix A for an explanation of the challenges related to calculating the financial impact of food-borne illness in Canada.

a wide range of countries, some with lower food safety standards than Canada's. As a result, there is increasing pressure to ensure that what enters Canada's food supply meets the safety expectations of Canadian consumers.

Finally, food safety is a large and growing concern among consumers, and responding to their concerns will be critical in maintaining their trust and confidence in the food supply. In its report, *Benchmarking for Success*, Deloitte found that "83 per cent of consumers can name a product that was recalled in the last two years because of safety concerns"; 76 per cent report being "more concerned today than they were five years ago about the food they eat"; and 57 per cent "have stopped eating—either temporarily or permanently—a particular food because of a recall."[3]

The food safety system depends on all actors along the farm-to-fork supply chain. As a result, our analysis of the system considers the roles and performance of the food industry, governments at all levels, and consumers.

A common assumption is that under government regulatory standards, food processing companies and farms hold the most responsibility for ensuring safe food. There is no doubt that producers, processors, and their government regulators do play a very important role in ensuring food safety. However, less well recognized by the public is the reality that the actions of consumers and food service establishments are also very important to food safety. In fact, today, most food-borne illnesses are attributable to the preparation and storage practices of restaurants and consumers themselves.

PURPOSE OF THE REPORT

Given the importance of food safety in Canada and calls to improve the system's responsiveness to food safety risks, there is a need for an informed dialogue about how well the current system performs, what should be changed to enhance performance, and which options are appropriate for achieving change. The purpose of this report is to provide a foundation for that dialogue

and to contribute empirical findings to support and inform the development of the Canadian Food Strategy. (See box "Developing the Canadian Food Strategy.") In particular, the report:

- examines and assesses the structure and performance of the current food safety system;
- provides an overview of issues and challenges related to improving food safety in Canada;
- identifies the drivers and constraints that influence industry investment in food safety and consumer behaviour; and
- identifies key areas for action and reform options to further enhance food safety in Canada.

FRAMING THE ANALYSIS

SCOPE
Unlike other goods, food is ingested. It is subject to microbial, chemical, and physical contamination, and certain ingredients may induce allergic reactions among some consumers. When people eat contaminated food they become sick, usually soon after ingestion. In rare cases, this may lead to death. This report considers food safety mostly in terms of contamination leading to immediate illness. While poor dietary habits can also lead to illness—because diet is related to the development of various chronic diseases—we address this important long-term food safety issue in a companion Centre for Food in Canada (CFIC) report on food and chronic disease.[4]

Food safety and chronic disease are also distinguished by the nature of the underlying risk. As discussed later in the report, consumer choice plays a different role in food safety than in chronic disease. Consumers can choose healthy foods like vegetables and still be at risk of ingesting food-borne pathogens. Their food safety risk is associated less with their actual food choices, than with the way food is produced, processed, and distributed before it reaches them, and with the way they themselves store and prepare food. So, consumer food choice plays a less important role in food safety than it does in chronic disease. At the same time, because half or more of food

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3   Deloitte, *Benchmarking for Success*, 20.

4   The report on food and health will be released in Spring 2012.

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safety incidents are associated with restaurants and other food service establishments, consumer choices about where to eat can play a role in determining the level of risk to which they are exposed.

There are, of course, other sources of food contamination—including those occurring at the agricultural and processing stages. Yet, given the prevalence of risk and the weakness of risk management at the food service and consumer stages, the report pays particular attention to these areas, while simultaneously encouraging continuous improvement in food safety risk management to further reduce risks at the agriculture, processing, and retail stages of the supply chain.

At the same time, a focus on the domestic food system alone is not enough. Risks in the food supply are also emerging from imported products and ingredients. This means that food safety in Canada is not simply an outcome of a nationally bound system, but depends also on how well Canada's food safety system interacts with global institutions and systems. For this reason, our analysis includes challenges, agreements, and institutions at the international level that can affect the safety of food consumed by Canadians.

FRAMEWORK

Whether food is safe or not ultimately depends on how well the system as a whole governs risk. Food safety risk governance frameworks typically include three components:

1. assessment
2. management
3. communication

When the system performs well, the likelihood that consumers will be exposed to a biological, chemical, or physical hazard in their food, or exposed to an ingredient to which they are allergic, is substantially reduced. But good system performance depends on everyone in the farm-to-fork supply chain. Most do a good job, as evidenced by low rates of food-borne illness. However, there are gaps in the system and emerging challenges that must be addressed to improve Canada's food safety system's performance. This report asks four questions related to four issues:

1. **How do we know the risks?** Surveillance, measurement, and monitoring across the food supply chain are challenging tasks and limited data may leave us with an imprecise picture of food safety risks and burdens and thus make it difficult to identify areas that need more attention. Consequently, actors along the supply chain are managing risk under conditions of some uncertainty and may have little direct feedback about the effectiveness of risk management initiatives on food safety outcomes.

2. **What is the role of consumers?** Consumers are undoubtedly worried about food safety, but are they aware of the sources of the food safety risks they actually face and do they appreciate their own role?

3. **How do private and public safety systems interact?** Many private firms have implemented food safety initiatives that go beyond regulatory requirements, while others face challenges in meeting even minimal regulatory standards. In this context, how well do the regulatory and industry elements of the food safety system complement each other regarding risk assessment and management?

4. **Should we worry about globalization?** Industry, government, and consumers appear to be struggling to find ways to engage with other jurisdictions on food safety, assess the safety of imports, and maintain confidence in the food system as a whole in light of global risks—both real and perceived.

Exploring these four questions prompts us to ask not only how well the system currently performs, but also how *responsive* it is to a risk environment of constant change and some uncertainty.

We should ask whether the food safety system should be more flexible in supporting innovation, recognizing that innovation creates both opportunity and risk.

In examining the food safety system's performance, we need to consider whether it should *expand* to better govern emerging and existing risks—including risks created by consumers and the food service industry, as well as challenges emerging from globalization. We also need to consider whether it should *contract*, or *redirect* efforts and resources, if some risks prove to be over-governed—such as risks that are already being well managed through private systems. Finally, we should ask whether the system should be more *flexible* in supporting innovation, recognizing that innovation creates both opportunities and risks.

METHODOLOGY

The research for this report involved a multi-faceted methodology, including:

- an extensive review of relevant food safety literature;
- insights obtained from analysis of data gathered through the CFIC Industry Survey and Household Survey (see box "About the Centre for Food in Canada's Surveys"); and
- interviews with 24 experts in industry, government, academia, and other stakeholder organizations.

About the Centre for Food in Canada's Surveys

A key mandate of the Centre for Food in Canada is to generate insights about the food system from the perspective of both industry and households. The achievement of this mandate requires the Centre to gather proprietary data on the specific challenges facing Canada's food industry and Canadian households' food-related skills, attitudes, and behaviours. To this end, we designed and executed two surveys: a business survey of the Canadian food industry and a survey of Canadian households. These surveys were conducted by Forum Research, a Toronto-based survey company.

For the industry survey, Forum Research randomly surveyed 1,186 food companies between June 23 and July 22, 2011, using questions prepared by The Conference Board of Canada. Companies were sampled using the following 3-digit North

American Industrial Classification System (NAICS) codes: 445 (retail food distribution), 311 (food processing), 111 (crop production), and 112 (animal production). The majority of surveys—1,177—were telephone surveys conducted by trained interviewers, and nine were filled in by hand and submitted in hard copy form. Aggregate survey findings are considered accurate +/- 2.85 per cent, 19 times out of 20.

For the household survey, Forum Research randomly surveyed 1,056 Canadian households between September 8 and September 11, 2011, using questions prepared by The Conference Board of Canada. In this case, aggregate survey findings are considered accurate +/- 3.02 per cent, 19 times out of 20. Subsample results have wider margins of error for both surveys.

Understanding and Characterizing Food Safety Risks

Chapter Summary

- ◆ Food is considered safe when—at the point of consumption—biological, chemical, or physical hazards have been eliminated or reduced to levels low enough that they will not cause illness or death.

- ◆ Approximately 6.8 million cases of food-borne illness are reported in Canada each year, but deaths from food poisoning are extremely rare.

- ◆ Food safety hazards can be introduced at each stage of the farm-to-fork supply chain, including the primary production, manufacturing and processing, retail and wholesale, and final preparation and consumption stages.

- ◆ Factors that influence food safety include the health and age of the population, the challenges and opportunities of new technologies, and food globalization.

F ood is considered safe when—at the point of consumption—biological, chemical, or physical hazards have been eliminated or reduced to

levels low enough that they will not cause illness or death.[1] Unfortunately, it is almost impossible for consumers to determine the safety of their food because most biological and chemical hazards are imperceptible to human senses. Food that looks, smells, and even tastes fine may contain pathogens or chemicals that can cause illness. As a result, effective food safety systems require sophisticated approaches to hazard identification and risk management.

To assess the effectiveness of the Canadian food safety system, it is necessary to identify the hazards that pose the greatest risks, where those hazards are most likely to emerge along the food supply chain, and how other external factors exacerbate or diminish those risks. This chapter presents a risk governance framework and identifies the greatest risks to food safety in Canada, which together provide a foundation for analyzing the effectiveness of the Canadian food safety system—a task taken up in chapters 3 through 5.

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1 This definition is adapted and modified from the definition used by the Food and Agricultural Organization of the United Nations and the World Health Organization: "Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer." Food and Agriculture Organization of the United Nations and the World Health Organization, *Assuring Food Safety and Quality*, 6.

FOOD SAFETY RISK GOVERNANCE

The primary strategic goals of risk governance in a food safety system are to:

- reduce the overall incidence of illness caused by food-borne hazards; and
- minimize and, ideally, eliminate deaths caused by food-borne hazards.

This report focuses on food safety. It should be understood, however, that food safety is intertwined with competitiveness and performance. Fortunately, the goals of industry competitiveness and performance usually align with those of food safety. When company, industry, or country food safety reputations are damaged, it is normally reflected in lower consumer demand. Although most food companies in Canada and other developed countries have good food safety practices, a handful of unscrupulous or incompetent food companies can have potentially devastating effects on the food economy of an entire nation—or even on the global food system.

Whether or not something constitutes a risk—and its extent—depends on the likelihood of exposure to a given hazard and the severity of the consequences of exposure.

Given the damaging impacts of food safety breakdowns both for health and the viability of the industry, it is important to think critically about food safety risk governance. Food safety risk governance involves:

- **assessment**—recognizing who is at risk and where risk originates;
- **management**—employing techniques to address risks in ways that would reduce illness and reduce or eliminate mortality; and
- **communication**—informing stakeholders to take appropriate action in emergency and day-to-day situations in ways that would reduce illness and reduce or eliminate mortality.

With this risk governance framework in mind, our first step is to carry out a high-level assessment of risk in the Canadian food system. Understanding the extent of food safety risks requires that we ask and answer the following key questions:

- What are the severity and incidence of food hazards in Canada?
- Where along the food supply chain are these hazards most likely to emerge, and under which conditions?
- How do public and private systems manage these hazards?
- Where are there potential gaps or systemic failings that lead to poor risk management?
- Which existing strengths in risk management systems could be leveraged to improve food safety outcomes?

WHAT ARE THE HAZARDS?

A *hazard* is a thing or an event that could cause harm to individuals, organizations, or environments. In the case of food, the main hazards of concern are biological (e.g., *Salmonella*, *E. coli*, *Listeria*, *Campylobacter, Chlostridium botulinum*); chemical (e.g., concentrations of pesticides above safe limits); and allergens.[2] But a hazard is not an actual risk until one takes into account other factors. Whether something constitutes a risk—and the extent of the risk—depends on both the likelihood of exposure to a given hazard and the severity of the consequences of exposure. Thus, in addition to identifying and discussing the main hazards in the food supply chain, this chapter will also analyze the extent to which, and exactly how, these hazards constitute actual risks.

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2   Although physical hazards (e.g., shards of glass or plastic) are a potential concern, these are more easily detectable and rare enough that we can set them aside for the purposes of this report. Similarly, while there is reason to be concerned about possible nutritional hazards (e.g., high levels of sodium or trans fats that contribute to chronic disease), these are more appropriately addressed in the context of research focused on the impact of food and diet on health—issues we examine in a forthcoming report on nutritional and dietary risks.

BIOLOGICAL HAZARDS

Biological hazards refer to a range of pathogens, viruses, and bacteria that can end up on or in the food we eat, even in the course of normal production and preparation. Although consumers are most often aware of biological hazards such as *E. coli*, *Listeria*, and *Salmonella*, in fact *Campylobacter* is by far the most common food-borne hazard in Canada. Illnesses attributed to *Campylobacter* are almost twice as high as those attributed to *Salmonella* (the second-leading illness-causing pathogen), higher than *Giardia* (the third-leading illness-causing pathogen), and nine times as high as those resulting from *E. coli*.[3]

Mislabelling of products and accidental cross-contamination related to allergens make up a large share of the Canadian Food Inspection Agency's recall alerts.

While biological hazards can be fatal—especially for vulnerable populations—the overwhelming majority of illnesses caused by these hazards are mild and entail only minor inconvenience.

CHEMICAL AND ALLERGEN HAZARDS

Chemicals used in food production, processing, and packaging are hazards that have the potential to make food unsafe for consumption. Indeed, some chemicals that come into contact with food, if ingested in high doses and/or over long periods of time, increase the likelihood of acute and chronic illness. At the same time, some chemicals used in food production actually contribute to food safety by reducing exposure to biological hazards.

Chemicals may be intentionally placed in contact with food through conventional production processes, or unintentionally come into contact through contaminated water or cross-contamination in food preparation and consumption. Additionally, some people have food preferences or constraints that expose them to chemicals more often than others, such as people who, by choice or necessity, eat types of fish with high levels of mercury. Chemicals that have raised concerns include:

- pesticides, agrochemicals, fertilizers, and other primary or processing inputs;
- veterinary drugs;
- environmental and industrial contaminants (e.g., methyl mercury, PCBs, dioxins, trace elements, radio-nucleides); and
- natural toxicants and allergens (e.g., seafood toxins, mycotoxins, phytotoxins).

Allergens, in particular, have played a prominent role in much activity related to food safety. Mislabelling of products and accidental cross-contamination related to allergens are ongoing concerns and make up a large share of the recall alerts issued by the Canadian Food Inspection Agency (CFIA). Beyond these chemicals, consideration is also given to the chemical composition of foods themselves, as well as to chemicals that are added to food, or processes that change the food's composition. These are not traditionally seen as food "hazards," but are also assessed for their safety through pre-market approvals.

One ongoing task for the food safety system, then, is to identify appropriate uses, and limits, of chemicals in food production. Another is to identify environmental measures and food handling and preparation practices that can help to reduce chemical residues prior to consumption. The pre-market approval system for food—affecting novel foods, novel fibres, food additives, and infant formula—assesses the chemical composition of foods to determine whether they are safe. (See Chapter 3.)

INCIDENCE

BIOLOGICAL HAZARDS

Table 1 provides data on the incidence of illness due to four key biological hazards for Canada, the United States, and Australia. The data reveal that the reported rates of illness attributable to these four biological hazards

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3 Another less prominent pathogen is the parasite *Toxoplasma gondii*, which can cause serious illness among susceptible populations (particularly infants and foetuses—through the mother). See Phillips, "Toxoplasmosis." Although some sources suggest that up to 25 per cent of fresh commercial pork and lamb may be contaminated by *Toxoplasma gondii*, because Canada does not track this pathogen, the prevalence is unknown—although in the U.S., 327 deaths per year are attributed to food-borne *Toxoplasma gondii*. See Batz, Hoffmann, and Morris, *Ranking the Risks.*

Table 1
Rates of Food-Borne Illness, by Pathogen, in Canada, the United States, and Australia
(rate per 100,000 population)

	2000	2002	2004	2006	2008	2009
Campylobacter						
Canada	39.10	36.70	29.90	n.a.	n.a.	n.a.
United States	15.37	13.34	12.79	12.70	12.68	n.a.
Australia	108.00	113.00	116.20	111.10	107.50	n.a.
E. coli						
Canada	9.78	3.95	3.43	3.20	n.a.	1.80
United States	2.03	1.69	0.90	1.30	1.12	1.53
Australia	0.10	0.10	0.10	0.10	0.20	n.a.
Salmonella						
Canada	20.50	20.70	17.20	18.00	n.a.	18.03
United States	14.08	16.20	14.61	14.72	16.20	16.18
Australia	32.30	40.00	39.00	39.90	38.40	n.a.
Yersinia						
Canada	2.60	2.30	1.90	1.80	n.a.	n.a.
United States	0.43	0.45	0.40	0.36	0.36	n.a.
Australia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

n.a. = not available
Sources: Charlebois and MacKay, *World Ranking*; PHAC; CDC.

have declined in Canada over the past decade.[4] Although Canada's rates of *Campylobacter* and *Salmonella* are below those of Australia, the incidence rates for all four hazards in Canada are above the rates recorded by our largest trading partner, the United States. According to a 2010 ranking of food safety performance in 17 peer countries, Canada ranked fourth overall, but is considered a "middle of the pack" finisher with respect to incidence rates of illnesses attributable to selected biological hazards.[5]

That said, rates reveal that illnesses caused by many food-borne pathogens are rare events in Canada. While 6.8 million cases of food-borne illness are recorded in Canada each year, Canadians consume roughly 37.8 billion meals each year. In other words, if

each food-borne illness episode is triggered by a single meal, only 1 meal out of 5,563 would trigger such an illness.[6]

Most infections for most individuals are relatively mild. Almost all food-borne illness incidents result in very little harm. However, some incidents do cause a great deal of both health-related and business-related harm. The CFIC Household Survey found that about 8.5 per cent of Canadians adults have experienced a food-borne illness in the last year severe enough to cause them either to miss work or to make alternative child care arrangements.[7] Based on this, we calculate that Canadians may miss up to 3 million days per year due to self-diagnosed

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4   It should be noted that higher rates may be associated with better detection as opposed to increased illness.

5   Charlebois and MacKay, *World Ranking*, 21.

6   See Appendix A for the methodology used to make these calculations.

7   This is based on self-diagnosis, the veracity of which may be questioned (e.g., "food-borne illness" may actually be stomach influenza). Yet the virtue of self-diagnostic incidence is that it is more likely to be related to consumers' assessment of food-borne illness risk, even if misdiagnosed.

food-borne illnesses. At the extreme, some Canadians—about 40 annually—will die from a food-borne illness. (See Chart 1 and Appendix A.) And, on occasion, a major outbreak involving multiple deaths and severe illness does occur. Moreover, when such events occur—or even when there is a *fear* of such an event—companies and whole industries can experience catastrophic losses.
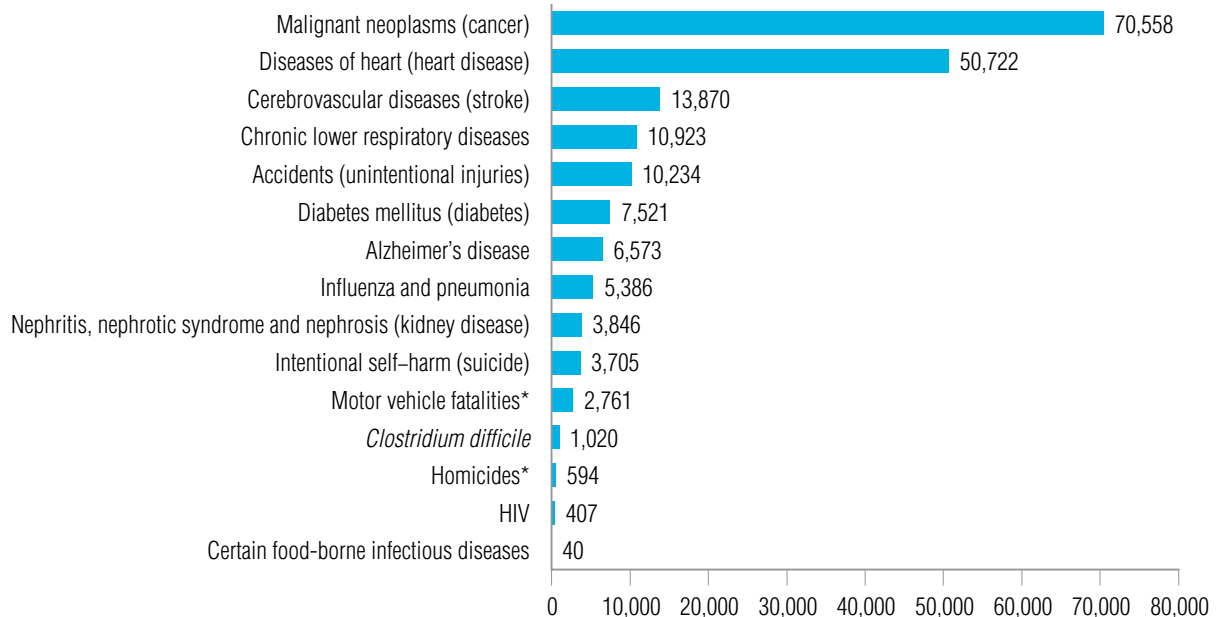
Compared with other mortality risks, death from food poisoning is extremely rare. (See Chart 1.) Indeed, Canadians are 15 times more likely to be murdered, 70 times more likely to die in a traffic accident, and 135 times more likely to die from influenza or pneumonia than from food-borne illness. When compared with chronic diseases, death from food-borne illness is an almost imperceptible risk. Cancer and heart disease are, respectively, over 1,760 and 1,260 times more likely to be the cause of a Canadian's death than is food-borne illness.

CHEMICAL HAZARDS

The incidence rates of illness due to chemical hazards in food are difficult to determine because the health effects from exposure to chemicals are more often chronic than they are acute, and it is difficult to link chronic disease to a single cause. Certainly, ingesting excessive amounts of certain chemicals can cause acute illness or death. But in most cases, the negative health effects only emerge after multiple exposures to these chemicals accumulating over many years.

In Canada, the chemicals intentionally used in and/or to treat food require pre-market approval and are subject to legislated limits designed to protect the health of Canadians. Indeed, "chemical residue and food additive standards are set with substantial margins of safety

Chart 1
Leading Causes of Death in Canada, 2008
(number of deaths)

Cause	Deaths
Malignant neoplasms (cancer)	70,558
Diseases of heart (heart disease)	50,722
Cerebrovascular diseases (stroke)	13,870
Chronic lower respiratory diseases	10,923
Accidents (unintentional injuries)	10,234
Diabetes mellitus (diabetes)	7,521
Alzheimer's disease	6,573
Influenza and pneumonia	5,386
Nephritis, nephrotic syndrome and nephrosis (kidney disease)	3,846
Intentional self–harm (suicide)	3,705
Motor vehicle fatalities*	2,761
Clostridium difficile	1,020
Homicides*	594
HIV	407
Certain food-borne infectious diseases	40

*Data from 2007.
Note: The number of deaths related to certain food-borne infectious diseases, estimated at 40 above, is based on selected CANSIM Table 102-0521 figures for 2008, including Listeriosis (17), Salmonellosis (7), other intestinal *Escherichia coli* infections (4), other specified bacterial intestinal infections (5), acute hepatitis A (1), Campylobacter enteritis (3), bacterial intestinal infection, unspecified (2), and bacterial food-borne intoxication, unspecified (1). Excluded are Creutzfeldt-Jakob disease (58), diarrhoea/gastroenteritis of presumed infectious origin (14), and viral and other specified intestinal infections (46). No deaths were reported for toxoplasmosis nor enterotoxigenic *Escherichia coli* infections.
Sources: Statistics Canada; Transport Canada.

based on the best available scientific models."[8] As a result, Canadians normally face a low risk of exposure to chemicals in doses that could cause illness. Of the 263 food safety recalls executed in Canada from April 2010 to March 2011, only 19 (or 7 per cent) were due to chemical hazards.[9] Notably, none of these were Class I (i.e., high-risk) recalls.[10] Rather, all were either Class II recalls (i.e., moderate risk, in which consuming the product could lead to "short-term or non-life threatening health problems" and where the risk is low in healthy populations), or Class III recalls (i.e., products that "pose no health and safety risk, but do not follow federal food regulations.")[11]

Although compliance with legislated limits is high, chemical contaminants have been linked to several negative health impacts on neurological and reproductive development, as well as birth defects, thyroid and hormone imbalance, cancers, and other diseases.[12] Such evidence has prompted many consumers—sometimes encouraged by the media and advocates—to perceive the risks of chemical hazards to be high and to take steps to avoid exposure wherever possible. The growth of the organic food market—which is approaching 5 per cent of the total food sold in industrialized countries[13]—is driven in part (though not entirely) by these risk perceptions.

At the same time, avoiding certain products because of perceived chemical risks may, in fact, elevate other health risks. For example, "the cardiovascular benefit from omega-3 fatty acids in salmon outweighs the cancer risk from PCBs" [14] for the average adult. One study showed that "if 100,000 people ate one serving of farmed salmon per week, one person would develop cancer, but 1,500 people would be spared death from cardiac arrest."[15]

HAZARDS IN THE FARM-TO-FORK SUPPLY CHAIN

The nature of the risks posed by biological and chemical hazards is affected by what happens to food along the farm-to-fork supply chain. That is, what all actors in the system do, or fail to do, can have a sizable impact on the safety of food that we consume.

The overwhelming majority of food-borne illnesses occur as a result of what is done, or not done, by food service firms and consumers in the home.

Although the food supply chain naturally flows from production to consumption, understanding the main sources of risk is made easier by working backwards from incident to origin. Thus, if we begin with the incidence of illness and work back through the supply chain to determine causes, we get a clearer picture of food safety risks along the supply chain. That said, a major challenge in identifying food safety risks along the supply chain is the lack of comprehensive data about where risks originate—a challenge that is a function both of gaps in traceability initiatives[16] as well as the reality that illnesses often do not produce symptoms until three or four days after the moment of consumption. Nevertheless, existing evidence suggests that certain points in the supply chain present higher risks.

FINAL PREPARATION AND CONSUMPTION

The overwhelming majority of food-borne illnesses occur as a result of what is done, or not done, by food service firms and consumers in the home. Seventy to 80 per cent of illness outbreaks are associated with mistakes in final preparation and handling—including heating and reheating, and cross-contamination—which frequently occur in food service establishments.[17] Studies consistently show that food safety risks are high for foods prepared outside the home. Numerous studies reveal that when the source of contamination or the location of consumption is known, half or more of all cases of

8   van Eck, "International Standards."

9   Canadian Food Inspection Agency, *Food Recalls and Allergy Alerts*.

10   CFIA, *Food Recall Report*.

11   CFIA, *Food Recall Fact Sheet*.

12   F/P/T Food Safety Committee 2008, *National Strategy for Safe Food*.

13   The Conference Board of Canada, *Valuing Food*, 13.

14   Schardt, "Farmed Salmon Under Fire," 9.

15   Schardt, "Farmed Salmon Under Fire," 9.

16   A CFIC report that focuses on traceability will be published in Spring 2012.

17   Batz, Hoffmann, and Morris, *Ranking the Risks*, 51.

food-borne illness are acquired in restaurants and other food service establishments, while a sizable proportion of the remaining cases are linked to food that is stored and prepared in consumers' homes. [18]

Proper handling, preparation, and cooking significantly reduce the likelihood of exposure and the severity of consequences in many cases. For example, if a processing firm fails to sufficiently minimize *E. coli* in a batch of meat, the likelihood and severity of illness can still be minimized if restaurants or consumers preparing the food for final consumption cook the meat properly. This highlights one of the challenges of Canada's food safety system: consumers and food service workers often fail to handle, prepare, and cook food properly, thus increasing the likelihood of exposure to biological hazards that could have been avoided. Still, most illnesses caused by behaviour in food service establishments or homes are mild.

RETAILERS AND WHOLESALERS

For many consumers, retailers are the most visible face of the food industry. Retailers are often the first point of contact for consumers who have concerns about the food they purchase. When an issue with food arises, retailers are frequently the first to hear from consumers about those issues. Consequently, retailers—especially large retailers with many customers—are usually very concerned not only about the food safety practices in their own stores, but also the food safety practices of those food manufacturers and suppliers whose products they sell.

Retailers' and wholesalers' operations can significantly affect food safety. For example, retailers and wholesalers—as well as distributors—must be attentive to the shelf lives and storage conditions of food. Leaving food on the shelves too long and/or in inappropriate conditions (e.g., without refrigeration) can accelerate the growth of biological hazards. Moreover, many retailers play a role in food processing and packaging (e.g., slicing and packaging deli meats and cheeses at point of purchase) which has an impact on food safety. While most recall alerts issued by the Canadian Food Inspection Agency relate

to issues that emerge at the production or processing stages,[19] retailers play a very prominent role in executing recalls by removing products from their shelves and acting as a key contact point for consumers returning and/or inquiring about recalled products.

Additionally, many retail grocery stores are expanding their in-store delis and ready-to-eat meals introducing food service elements into the retail environment. There is insufficient evidence to reach firm conclusions about the incidence of illness owing to the hybrid retail-food service point in the supply chain, although the kinds of risks that could emerge are likely similar to those in conventional food service establishments.

Consumers and food service workers often fail to handle, prepare, and cook food properly, increasing the likelihood of exposure to biological hazards.

MANUFACTURERS AND PROCESSORS

Many of the more severe food-related illnesses and deaths result from failures earlier in the supply chain, at the primary production, or manufacturing and processing stage. Occasional lapses or mistakes in chemical use or insufficient cleaning of machines, for example, can elevate food safety risks for consumers. Given the large scale of production, manufacturing, and distribution of products in the current food system, a single mistake at this stage can affect many more people than would a mistake in a home or restaurant. For that reason, continuous improvement in the food safety systems of all food businesses, including large firms, is necessary.

In some cases, we are faced with a choice between relying on consumers to protect themselves, knowing that they will often fail, or imposing more stringent and costly requirements on industry to compensate as much as possible for potential safety failures further down the chain. Complicating matters even further is the fact that some steps that industry can take to minimize risks are perceived by some consumers as hazardous interventions.

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18 Centers for Disease Control and Prevention, *Surveillance*, Table 8; Chapman and others, "Assessment of Food Safety Practices"; Powell, *Food Safety Claims*; Jones and Angulo, "Eating in Restaurants."

19 Based on an analysis of 2011 recall alerts, available at www.inspection.gc.ca/english/corpaffr/recarapp/recaltoce.shtml.

Moreover, it is at the manufacturing and processing stage that concerns about additions to food arise. Food manufacturers seek to add value to food by adding ingredients or changing products to add nutritional and other health-promoting or disease-preventing qualities. Yet, these additions and changes raise concerns about the safety of these foods. Consequently, manufacturers' attempts to add value in these ways are subject to regulatory scrutiny—usually in the form of pre-market assessment focused on consumer protection. We examine these issues further in Chapter 3.

PRIMARY PRODUCTION

At the beginning of the farm-to-fork supply chain—primary production—the biggest issues are the use of chemicals in food production (e.g., fertilizers, pesticides), the integrity of primary inputs (e.g., quality of water and food for plants and animals), and the possibility of contamination of plants and animals (e.g., contamination of animals' food supply through poor waste management practices).

The likelihood that consumers will be exposed to biological and chemical hazards depends on the behaviours of actors throughout the food supply chain.

In many respects, on-farm food safety risks are well managed. Limits on pesticide use and other inputs are set with sufficiently wide margins of error that food contamination appears to be very infrequent and health impacts minimal or nonexistent. To be sure, there are concerns about prolonged or accumulated exposure and the possibility of increased incidents of certain chronic conditions. But the system appears to have the possibility of more acute health impacts under control, while addressing concerns about chronic impacts in a prudent fashion.

At the same time, concerns about microbial contamination of produce and meat are elevated, especially in light of a number of high-profile instances of contamination that have led to outbreaks in recent years and decades. Moreover, although the frequency of outbreaks caused by on-farm contamination is low relative to the

risks that emerge especially at the food service and consumer stages of the supply chain, the severity of illness can be high. So, while most additional attention should be focused on the greatest areas of risk—namely food service and consumers—there are indications that on-farm food safety may require some additional attention as well.

OTHER FACTORS INFLUENCING FOOD SAFETY RISKS

The likelihood that consumers will be exposed to biological and chemical hazards depends on the behaviours of actors throughout the food supply chain. When everyone in the system fulfills their responsibilities, the risk to Canadians is low. However, there are a number of macro-level trends that have implications for risks and how well they can be managed.

POPULATION IMMUNITY

Many biological hazards that produce only mild illness and inconvenience for healthy adults pose a greater risk for individuals who have compromised or underdeveloped immune systems.[20] Normally, healthy adults who are exposed to biological hazards in low levels can easily fight off any resulting illness. In fact, they may not even know that they have been exposed because their symptoms are so mild. However, those with compromised or underdeveloped immune systems—such as the elderly, very young children, and those with certain underlying conditions—are less able to tolerate biological hazards even at levels considered low for most healthy adults.

For example, there is a moderate to high probability that each Canadian will eventually be exposed to *Salmonella*. For most individuals, the consequences will be mild or even unnoticeable and we might therefore say that *Salmonella* as a food safety risk is, for them, low or moderate. However, for those with underdeveloped or compromised immune systems—such as the very young and very old—the consequences of exposure to *Salmonella* may be more severe, so that *Salmonella* is considered a high food safety risk for these vulnerable populations.

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20   CFIA, *Canada's 10 Least Wanted Foodborne Pathogens*.

As the Canadian population ages, more people will become vulnerable to food-borne hazards, and incidences of serious illness and death may increase. Attending to this demographic change—given its implications for population immunity—will be a key challenge for Canada's food safety system. Indeed, attending to differences in vulnerabilities, such as age, may require initiatives focused on the parts of the supply chain where differentiation occurs, such as when food is prepared and served in long-term care facilities.

TECHNOLOGY

New and emerging technologies add both challenges and opportunities for the food safety system. Some technological developments—such as nanotechnologies and biotechnologies—appear to be safe, but are so new that long-term consequences for human health are unknown. At the same time, technological developments, such as irradiation and enhanced testing technologies, may help reduce risks and improve food safety, but are frequently delayed or abandoned in the face of regulatory hurdles and public fears. (See box "Adopting New Food Safety Technology: Irradiation.") Finally, technology is being used increasingly to change the nature of food itself, through novel foods or food additives.

GLOBALIZATION

The globalization of food has dramatically changed food production, distribution, and consumption patterns. Global trade in food gives consumers access to an unprecedented variety and choice of foods, and the global sourcing of food production and raw materials provides cost benefits for consumers and industry. At the same time, however, globalization also compounds the challenges of food safety control in a number of ways.

- **New Risk Pathways.** The lengthening and increasing complexity of supply chains makes it more difficult for industry, government, and consumers to monitor the source and safety of food, including food coming from other countries, and raises the likelihood that food safety hazards will creep in from new pathways. Moreover, not only are there new pathways, but the pathways themselves are increasingly complex. In some cases, packaged foods that reach consumers will have passed through multiple facilities and include

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Adopting New Food Safety Technology: Irradiation

Irradiation is a well-established practice that could reduce food safety risks, but whose widespread adoption has faced obstacles in Canada because of questions about the potential negative health impacts. In some estimates, as much as one-quarter of the volume of harmful pathogens—such as *Campylobacter*— could be eliminated from various foods, such as poultry, through irradiation.[1] In fact, irradiation is used in the food systems of more than 40 countries, including Canada—where it is permitted for use on potatoes, onions, wheat, flour, and spices.

Yet consumers have been wary of irradiation and many are concerned that it introduces a new, unnecessary hazard into food production. In particular, consumers have been concerned about the possibility that vitamins and other nutrients may be eliminated through irradiation and many believe that there is a risk of radiation poisoning from foods that have undergone the process. Health Canada is considering proposals to extend irradiation to ground beef, poultry, shrimp, prawns, and mangoes.

It is very rare for a new technology to be all benefit and no cost. New technologies often introduce new risks in the course of reducing a specific risk. The challenge for the food safety system is to balance these risks in a sensible way so that technologies that yield a demonstrable net benefit and avoid unacceptably harmful negative impacts can be approved in a timely fashion and put to use, while others that do not can be rejected.

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1   Hein, "Irradiating Food."

Source: The Conference Board of Canada.

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dozens of ingredients from distinct sources. When food-borne illness outbreaks occur, this complexity makes it increasingly difficult to identify and address the source of contamination.

- **Food Crisis Spillover.** Food hazards will emerge in one location and spread to others as the increasingly complex flow of food products and ingredients across national boundaries means that local food safety events can quickly become global. This has been demonstrated by several high-profile outbreaks, including tainted spinach from California (which resulted in 3 deaths and 247 illnesses in the U.S. and Canada) and tainted tomatoes from Florida

(which resulted in at least 228 illnesses).[21] In addition to creating costly human and economic impacts, these crises have raised public awareness and concern about imported foods (and food inputs), and helped to make food safety a greater public priority.

◆ **Regulatory Capacity and Response.** National systems of food safety and health governance are confronted by a proliferation of new food inputs, products, and processing technologies that challenge their capacity to conduct pre-market approval assessments and regulatory amendments at the pace of global innovation. Health Canada's Food Directorate, for example, faces many decisions about how to set food-related regulations, policies, and standards to achieve health objectives without creating unnecessary industry burdens.[22]

While attending to these issues and challenges, it is important to keep the risks of a globalized food supply chain in perspective. Although the globalization of the food industry has increased the challenges of testing and tracing, the current reality is that most cases of food-borne illness in Canada appear to be caused by domestically produced food, not imports.[23] Still, food globalization implies that less of the production and distribution process will be under the direct control of Canadian regulations and industry practice. This, in

turn, means that meeting the food safety expectations of Canadian consumers must involve new strategies and approaches by industry and government.

RISKS AND RISK GOVERNANCE IN CANADA'S FOOD SAFETY SYSTEM

The overwhelming majority of food consumed by Canadians is safe. The biological and chemical hazards that render food unsafe emerge infrequently and, in most cases, produce only mild illness and inconvenience. Unfortunately, not everyone in the food supply chain always takes appropriate action to ensure food safety and this can result in food poisoning leading, in rare cases, to serious illness or death. In production and manufacturing, occasional lapses or mistakes in chemical use or insufficient cleaning of machines, for example, can elevate food safety risks for consumers. Given the large scale of production, manufacturing, and distribution in today's food system, mistakes can affect many people and receive enormous media coverage. At the same time, the behaviour of consumers and food service establishments appears to cause a substantial proportion of food-borne illnesses.

Even a very well-designed and well-functioning system will experience mistakes or omissions that result in contaminated food reaching consumers' plates. There is no way to guarantee that food will be perfectly safe; consumers will always face risks. The question is how are the risks being managed to minimize incidence of illness and death from consuming unsafe food? Chapters 3, 4, and 5 examine the roles and performance of government, industry, and consumers in managing food safety risks, and identify what is working and what else can be done to enhance food safety in Canada.

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21 See CBC News, "Spinach Recalled," and NewsHerald.com, "228 Tomato Illnesses Now Reported."

22 As Health Canada's Food Directorate puts it: "Globalization of the food supply and rapid advances in food science and technology have translated to an increase in the pace at which new food products are being introduced into the Canadian marketplace. Accordingly, the Directorate must devote a significant share of its human resources to complete evaluations of a growing number of increasingly complex submissions." Health Canada, *Final Audit Report*, 6.

23 Holley, "Food Safety Challenges," 132.

Food Safety Risk Governance: Government

Chapter Summary

- Governments at the federal, provincial, and municipal levels play several roles in managing food safety risks, including setting standards, monitoring compliance, coordinating emergency response to outbreaks, and communicating risk-reduction strategies.

- Although the government system makes critical contributions to Canada's generally good management of key food safety risks, there are outstanding challenges related to regulation, inspections, emergency response, organizational culture, and other areas.

- As the government's response to the Weatherill report reveals, significant efforts are being made to address these and other challenges to further improve the responsiveness of the government management system to food safety risks.

C anada's food safety system is a risk-responsive, science-based system that relies on the actions of government, industry, and consumers to ensure that biological and chemical hazards are minimized at the point of consumption. Taking a broad perspective, government sets and enforces standards while the food industry adopts a variety of measures and, increasingly, its own private standards to meet the food safety expectations of governments and consumers. Consumers contribute by communicating their expectations about food safety and by properly handling and preparing food to minimize consumption risks. (See box "Who Is Responsible for Food Safety in Canada?")

Governments at the federal, provincial, and municipal levels play several roles in managing food safety risks.

Ultimately, food safety depends on how well everyone responds to genuine risks and challenges. The next three chapters explore and assess the respective contributions of government, industry, and consumers to food safety risk governance.

ORGANIZATIONS AND FUNCTIONS

Governments at the federal, provincial, and municipal levels play several roles in managing food safety risks, including setting standards; monitoring compliance (through inspections and surveillance); coordinating emergency responses to outbreaks; and communicating with industry, consumers, and other governments about how to reduce and manage food safety risks. At the federal level, Health Canada, the Canadian Food Inspection

Who Is Responsible for Food Safety in Canada?

FEDERAL GOVERNMENT
Health Canada
◆ Sets food safety standards/policies.
◆ Conducts research and undertakes monitoring activities.
◆ Makes health risk assessments for foods on the market.
◆ Undertakes consumer outreach.
◆ Develops guidance for industry on policies, standards, and regulations.

Canadian Food Inspection Agency
◆ Enforces federal laws and regulations dealing with food.
◆ Ensures industry compliance with food safety regulations through inspection/compliance verification.
◆ Investigates (with other agencies) food responsible for food-borne illness outbreaks.
◆ Initiates food recalls (with industry).

Public Health Agency of Canada
◆ Acts as first point of contact for the federal government for human health impact of food-borne outbreak.
◆ Conducts public health surveillance.
◆ Leads epidemiological investigations for interprovincial investigations and investigations involving other countries, as well as Canada.

Canadian Border Services Agency
◆ Inspects food and ingredients imported into Canada.

PROVINCIAL AND TERRITORIAL GOVERNMENTS
◆ Regulate food processing within their jurisdiction for consumption within their jurisdiction.
◆ Implement food safety programs.
◆ Conduct public health surveillance.
◆ Lead outbreak investigations within their jurisdiction.
◆ Communicate food safety issues to their populations.

LOCAL AND REGIONAL PUBLIC HEALTH AUTHORITIES
◆ Inspect food establishments.
◆ Investigate and report cases of food-borne illness to provincial authorities.
◆ Conduct public health surveillance.

INDUSTRY
◆ Establishes and conducts food safety programs in accordance with regulatory requirements and industry practices.
◆ Verifies effectiveness of food safety systems and ensures safe production and distribution of food.

CONSUMER
◆ Cleans, washes hands with soap.
◆ Handles, prepares, and cooks food safely.
◆ Consumes food with caution.

Sources: Weatherill, *Report of the Independent Investigator Into the 2008 Listeriosis Outbreak*, 15; The Conference Board of Canada.

Agency (CFIA), and the Public Health Agency of Canada (PHAC) are the main federal organizations responsible for various aspects of ensuring food safety and responding to hazards.

Health Canada's primary responsibilities for food safety are risk assessment and standard setting, outreach work, and research and monitoring activities. It reviews the science relevant to biological and chemical hazards; establishes standards that, when met, would reduce food safety risks to consumers; and takes a lead role in evaluating new technologies and processes that have the potential to enhance food safety. For example, Health Canada will carry out health risk assessments on novel foods (e.g., foods made from genetically modified organisms) and, based on the conclusions, determine whether certain products will be allowed to enter the market. Similarly, it conducts tests on various pesticides and sets acceptable

levels of pesticide use. Additionally, Health Canada bears responsibility for evaluating the effectiveness of the CFIA's enforcement programs.

The CFIA's mandate is to enforce the food safety and nutritional quality standards established by Health Canada. It conducts a range of activities, including inspection and enforcement, compliance verification, export certification for various products, laboratory and diagnostic support, crisis management, product recalls, and plant and animal quarantine.[1] Through the Minister of Agriculture and Agri-Food Canada, the CFIA also has the power to initiate mandatory recalls to respond to food safety failures in the market. Although it is seldom used, some view this power as an incentive for industry to cooperate with government on food safety incidents.

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1 CFIA, *2011–2012 Report on Plans and Priorities*, 2.

PHAC is primarily responsible for the surveillance and monitoring of illness. PHAC provides assistance in the event of a local or provincial outbreak of food-borne illness and it leads and coordinates the investigation of outbreaks occurring in more than one province or territory, or involving Canada and another country or countries. The Agency also conducts a range of educational and other initiatives designed to prevent disease.

CONTRIBUTIONS AND GAPS

Within this institutional architecture, what is the contribution of each of the main government functions to food safety risk governance in Canada? How much of the variability in the main outcomes—deaths and illnesses attributable to unsafe food—can be explained by each of the main government food safety functions? And where are there gaps in the government system that, if addressed, might improve food safety outcomes?

In many respects, rules and regulations motivate and guide the behaviour of regulators and firms, and provide the foundation on which a food safety regime is built.

RULES AND REGULATIONS

Food safety at the federal level is covered primarily by the *Food and Drugs Act*—which prohibits the manufacture and sale of all dangerous or adulterated food products—although there are a total of 13 federal statutes and 38 regulations that govern the safety and labelling of food sold in Canada. Together, these policies, laws, and regulations are intended to provide the minimum food safety expectations that industry is required to meet or exceed. Moreover, they establish the parameters of other functions—such as inspection frequency and methods, new product assessment processes, and recall powers and procedures.

In many respects, the rules and regulations motivate and guide the behaviour of both regulators and firms and provide the foundation on which a food safety regime is built. But when we ask a direct question—namely, to what extent do government rules and regulations related to food safety actually reduce deaths or illnesses caused by unsafe food?—the picture blurs. Certainly, government rules and regulations have served a very important function in virtually eliminating the century-old phenomenon of firms and individuals intentionally adulterating food. Yet, given that firms are now much more concerned with food safety, government rules and regulations appear to establish a minimal threshold that most firms are already motivated to exceed for reasons of self-interest—a development explored further in Chapter 4.

The main issue with government regulation, as we explore in a companion report on food regulation and industry performance,[2] is that it is a slow-moving system that is difficult to reform. For conventional standards, the system works quite well. Those parts of the system are designed to effectively manage well-known biological and chemical risks that arise in the food supply chain.

The challenge is that an increasing number food innovations require a different approach because of the concern that the products include chemicals or other ingredients that may pose a risk to human health. The system has to respond to new products and processes through a pre-market approval process, but that part of the system lacks transparency. To be sure, it is science-based in that it uses scientific assessment techniques and the results of assessments are published in the *Canada Gazette*. Yet it is not clear how the scientific results and the judgments made about the science relate to the actual minimization of risks. Beyond general principles, it is difficult for the public and industry to know how risk assessments actually work.

INSPECTIONS

Inspection of farms, plants, retailers, and restaurants is important to food safety. Essentially, an inspection regime aims to ensure that firms comply with standards and processes that contribute to food safety. In Canada, much of the inspection function is executed by the CFIA; however, provincial regulators also play a key role, as do municipalities and regional health authorities (especially with respect to food service establishments).

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2   The Conference Board of Canada, *All Together Now*.

The frequency and extent of inspections by CFIA and other relevant agencies and authorities depends on the kind of establishment in question, what it produces, and level of risk. CFIA has primary responsibility for inspecting federally registered plants. Some facilities—usually those involved in meat processing—are subject to daily, monthly, and annual inspections focused on different elements of their food safety performance.[3] This can include daily monitoring of the production process and quality of final products, monthly verification of adherence to sanitation programs, and annual or bi-annual audits of food safety control systems and plans.

The possibility of government inspection may induce firms to improve their private management systems which, ultimately, are the main determinants of food safety.

Inspection in the non-federally registered sector and of restaurants and food service establishments is conducted by the provinces and territories, and local public health units. Again, frequency of such inspections depends on location, kind of establishment, volume of sales, and other factors. In Toronto, for example, "food premises" are subject to between one and three inspections annually that focus on whether the business is in "substantial compliance" with food safety regulations and for evidence of conditions "that may result in food-borne illness."[4]

What contribution to food safety goals is made by inspection and enforcement? Comparing data on rates of inspections and incidences of reported illness in Canada and 13 peer countries, as reported in *World Ranking: 2010 Food Safety Performance*, we see mixed results. (See Table 2.) While countries listed as having the highest inspection rates (i.e., Canada, Japan, and the United States) tend to have lower rates of illness attributed to *Campylobacter* and *Salmonella* than countries with lower inspection rates, the opposite is true of *E. coli* illness rates.

In fact, up to 2008, Canada had the second highest rate of illness attributable to *E. coli*. By 2009, that rate had dropped from 3.20 to 1.80 per 100,000 population,[5] but this still leaves Canada among the countries with higher rates of *E. coli* illness—this despite being regarded as a country with a "progressive" inspection regime. Moreover, although Canada's rate of illness attributable to *Salmonella* is below the average for the peer countries, we nevertheless only rank fifth, behind some countries whose inspection regimes are graded as "moderate" (Ireland and the Netherlands) and even "regressive" (United Kingdom).

Setting the international comparisons aside, the infrequency of inspections in even the best inspection regimes, and the fact that the method of many inspections entails only audits of plans and records, rather than direct assessments of facilities and products, suggests that the safety of food is more a consequence of firms' own commitment to food safety than of the inspection regime.

This is not to say that the inspection regimes at the federal, provincial, and municipal levels are not necessary features of the food safety system. Indeed, the public may well have greater confidence in the food system knowing that there is an inspection regime in place that intends to maintain food safety. And, critically, the *possibility* of government inspection—even if infrequent—may induce firms to improve their private management systems which, ultimately, are the main determinants of food safety. However, it is hard to say exactly how robust a government inspection system must be to have that effect, although there is currently a move to blend a combination of audit of systems and inspection approaches.

EMERGENCY RESPONSE AND RECALLS

Health Canada, CFIA, and PHAC each have responsibilities related to food safety emergency response and recall activities. For example, PHAC operates a number of surveillance and testing systems to identify and track food-borne illness,[6] and CFIA conducts an average of 3,088 food safety investigations and manages around

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3   Weatherill, *Report of the Independent Investigator*, 36.

4   City of Toronto, *Frequently Asked Questions.*

5   Public Health Agency of Canada, *National Enteric Surveillance Program*, Table 3.

6   Weatherill, *Report of the Independent Investigator*, 26.

Table 2
International Comparison of Inspection Rates and Incidence of Food-Borne Illness, by Pathogen, 2008
(per 100,000 population; rank in parentheses)

Grade for rate of inspections	Campylobacter	Salmonella	E. coli
Progressive			
Canada	29.70 (2)	19.60 (5)	3.20 (12)
Japan	n.a.	n.a.	n.a.
United States	12.68 (1)	16.20 (3)	1.12 (9)
Progressive average	*21.19*	*17.90*	*2.16*
Moderate			
Belgium	47.90 (5)	39.50 (8)	1.0 (6)
Denmark	63.34 (8)	67.01 (13)	2.95 (11)
Germany	78.70 (10)	52.20 (11)	1.10 (8)
Ireland	40.11 (4)	10.25 (1)	5.46 (13)
Netherlands	39.20 (3)	15.50 (2)	0.86 (5)
Moderate average	*53.85*	*36.89*	*2.27*
Regressive			
Australia	72.50 (9)	43.60 (10)	0.20 (2)
Austria	51.22 (6)	27.74 (7)	0.82 (4)
Finland	84.14 (11)	59.12 (12)	0.15 (1)
Norway	60.82 (7)	41.06 (9)	0.47 (3)
Switzerland	104.06 (13)	27.30 (6)	1.08 (7)
United Kingdom	91.23 (12)	18.85 (4)	2.05 (10)
Regressive average	*77.33*	*36.28*	*0.80*

n.a. = not available
Source: Charlebois and MacKay, *World Ranking*.

235 recalls annually.[7] Additionally, all three organizations play key roles in communicating risks to the public and in advising on how best to respond. Their activities reduce the number and severity of food-borne illnesses each year, and may help to minimize the number of deaths. However, certain features of the emergency response and recall system do not function as effectively as they could.

For example, one of the key challenges is that surveillance systems are generally not very good at identifying most food-borne illness because these illnesses are usually "individual or 'sporadic' cases."[8] And even when illnesses and outbreaks are detected, the likelihood of identifying the source of an outbreak is not especially high. One study of outbreak data from 1975 to 2005 found that of 6,908 food-borne outbreaks documented, the "agent and the food vehicle were identified in only 2,107 [or 30.5 per cent] of these outbreaks."[9] This inability to identify the sources of outbreaks in more than two-thirds of cases weakens the efficacy of emergency

7   CFIA, *Statistics: Food Recalls*. Five year average from 2006–11.

8   Weatherill, *Report of the Independent Investigator*, 25.

9   Ravel and others, "Exploring Historical Canadian Foodborne Outbreak Data."

Table 3
Pre-Market Approval Pipeline, March 2007
(number of submissions in pipeline)

	Standard notification interval	<1 year	1 year	2 years	3 or more years	Total	Submissions in pipeline for 1 year or longer (per cent)
Food additives	90 days	23	9	10	12	54	57.4
Infant formulas	45 days	19	3	1	0	23	17.4
Novel foods	90 days	11	4	3	3	21	47.6
Total		53	16	14	15	98	45.9

Sources: Health Canada, *Final Audit Report*, 6; The Conference Board of Canada.

response and recall measures. Part of the challenge is a result of the lack of sufficient traceability systems that would cover the entire farm-to-fork supply chain.[10]

Additionally, emergency response and recall activities are slow, relative to the speed with which outbreaks occur and spread. To be sure, the recalls initiated as a result of industry self-identifying a risk through consumer complaints or through government identification of a labelling error, for example, tend to move more quickly. But for those that are triggered by identification of an outbreak of illness, it can take weeks before the public receives notification of a serious problem and instruction about how to manage risks. This is partly due to the nature of food-borne illness—that is, it may take days or weeks before symptoms begin to emerge in the population— but also, at least until recently, due to the fact that the response system is "unusually complex because there are many organizations involved at three levels of government."[11]

ASSESSMENTS AND APPROVALS

The federal government plays a gatekeeper function with respect to new foods or food additives in an effort to protect public health from exposure to potentially harmful products. In particular, Health Canada will conduct pre-market assessments of some products before they are permitted to be sold on the market. Although the aim of the pre-market approvals process is sound, its execution is weak in critical areas. In particular, the process is slow and rules and conventions about what constitutes admissible evidence are restrictive. And, because of the lack of clarity and transparency regarding the application of the precautionary approach, some conclude that the process overemphasizes potential health harms and discounts demonstrated and potential health benefits.

A Slow Process

Interviews with food business executives revealed a perception that the approvals processes for food safety innovations and interventions in Canada—such as rapid testing technologies—have historically been rather slow, with the result that enhancements to food safety are delayed. Health Canada's own data reveal substantial delays (see Table 3). Health Canada recognizes the problem and has made efforts to prioritize certain applications for approval of interventions and additives with proven health benefits, but notes that there is still room for improvement.[12]

Another review of the approval systems of major developed countries concludes that Canada's slower approvals process results in Canadian consumers facing delays in having access to products that could improve their health.[13]

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10 Recognizing the importance of traceability to food safety, the Conference Board's Centre for Food in Canada is completeing a study of the need for, value of, and challenges related to food traceability systems. That report will be released in Spring 2012.

11 Weatherill, *Report of the Independent Investigator*, 28.

12 Agriculture and Agri-Food Canada and others, *Progress on Food Safety*.

13 George Morris Centre, *Food Regulatory Systems*, 27.

The Burden of Proof and Rules About Evidence

In most pre-market risk assessments, the onus is on the producer to make the case that there are no, or only minimal, health hazards before approval for sale will be granted.[14] In each case, the collection and assessment of scientific evidence must proceed as if there were no precedents—that is, each assessment process begins virtually *de novo*. This contrasts with the Generally Recognized as Safe (GRAS) process employed in the United States "which allows food additives with a history of safe use to be used without regulatory approval."[15]

Canada's government has long had a commitment to a precautionary approach for assessing risks related to health, the environment, and natural resources conservation.

For example, in 1999, Health Canada notified Minute Maid Company Canada Inc., that the calcium-fortified orange juice it introduced to the marketplace was not compliant with the *Food and Drugs Act* and Food and Drug Regulations.[16] The product is intended to provide non-milk drinkers with an alternative source of calcium—a clear health benefit. Under the provisions of a Temporary Marketing Authorization Letter produced by Health Canada, which allowed Minute Maid to sell the product under certain conditions, the company was required to conduct "post-market research regarding consumers' understanding of the label statement and the product benefits."[17] Even though Minute Maid had been selling a very similar product in the U.S. for nearly 10 years, consumers had requested the product, and the company made a conscious effort to formulate the product in a way that was consistent with the *Food and Drugs Act*,

this requirement was imposed to assess the differences between consumption behaviour of consumers in Canada and the United States.

Unclear and Non-Transparent Application of the Precautionary Approach to Risk Assessment

The Government of Canada has long had a commitment to a precautionary approach to assessing risks related to health, the environment, and natural resources conservation. This approach entails that, in the absence of full scientific information about risk, decisions be made with a view to minimizing potential harms.[18] Yet, in the case of pre-market assessment of food products and ingredients, exactly how that principle is interpreted and applied by assessors is unclear, leading some in industry to conclude that government agencies appear to overemphasize potential harms while discounting not only potential, but demonstrated benefits.

For example, Health Canada initially defended its decision to have Unilever withdraw its Becel Pro.Activ margarine from the market using a study that showed that "0.0001 per cent of the population would experience red blood cell issues if they consumed plant sterols."[19] That small potential harm was seen to outweigh a significant demonstrated health benefit—namely lower cholesterol—that could be achieved via consumption of plant sterols. Ultimately, the product was approved, but the nearly decade-long delay cost Unilever millions in lost revenues—a delay that seems to have been caused, in part, by considerations about how to apply precaution in this case.

In some respects, such outcomes are surprising, given that the government has indicated that, when taking a precautionary approach, "ultimately, the level of protection should be set in the public interest by weighing potential (or perceived) costs and benefits of assuming the risk in a manner that is consistent overall with societal values."[20] But unless the government is more transparent about how that principle is interpreted and applied in

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14 The government acknowledges that exceptions to this burden of proof may be prudent: "[W]hen faced with a concrete scenario, there should be an assessment of who would be in the best position to provide the information base [for risk assessment]. This could depend upon which party holds the responsibility of authority, and could also be informed by such criteria as who has the capacity to produce timely and credible information." Government of Canada, *A Framework for the Application of Precaution*, 8.

15 George Morris Centre, *Food Regulatory Systems*, 17.

16 For the full case study, see George Morris Centre, *Food Regulatory Systems*, 52–54.

17 George Morris Centre, *Food Regulatory Systems*, 53.

18 Government of Canada, *A Framework for the Application of Precaution*.

19 George Morris Centre, *Food Regulatory Systems*, 41.

20 Government of Canada, *A Framework for the Application of Precaution*.

these cases, a perception that the benefits side of the scale seems to be discounted in food-related assessments may persist. As the George Morris Centre notes, the imbalance may be due to the "criminal law focus" of the *Food and Drugs Act* and the Food and Drug Regulations, which drives Health Canada toward a mandate that focuses only on "safety and health protection" rather than one that also includes examining "the opportunity to enhance the overall health and well-being of Canadians."[21]

An Exacerbating Challenge: Estimating Exposure

It is important to note one additional challenge related to the pre-market approvals process. Food safety—as well as nutritional and dietary—risk assessment is especially complex because it requires an assessment of the candidate product itself, as well as "exposure simulations" that attempt to predict consumers' "potential dietary exposure." This involves estimates of how often a product will be consumed, in what quantities, in combination with which other foods, and by which kinds of consumers.[22] In short, the process requires the introduction of many assumptions and additional variables, which can exacerbate the three basic challenges related to the approvals process.[23]

IMPORT CONTROL AND GLOBAL COORDINATION

Thirty per cent of the total food consumed in Canada is now imported.[24] These imports come from almost 200 different countries,[25] with the U.S. and a few other major trading partners providing the overwhelming

majority. As with most domestically produced food, the majority of food imports are safe.[26] Moreover, although the list of countries exporting to Canada continues to grow, the U.S., with its largely equivalent food safety system, still provides over half of Canada's total food imports. Still, a number of developing countries with questionable or relatively unknown food safety systems are now found among Canada's top sources of imported food. (See Table 4.)

Table 4

Snapshot of Canadian Imports, 2010
(exporting value, C$ millions)

United States	11,154.6
China	721.7
Brazil	636.8
Thailand	571.2
Italy	356.3
New Zealand	209.8
United Kingdom	208.4
Chile	199.2
India	196.3
France	193.3

Source: Industry Canada, *Trade Data Online*, 2010.

Import Control

CFIA and the Canadian Border Services Agency are the federal bodies responsible for verifying that imported food complies with domestic safety standards and regulations. As with domestic inspections, the existence of an import inspection regime may induce firms to make additional efforts to meet or exceed Canadian food safety standards. Although the fact that only a very small proportion of imported products are inspected implies that the *direct* contribution of the import control system to food safety—and thus to the goals of minimizing death

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21 George Morris Centre, *Food Regulatory Systems*, 42.

22 Health Canada's *Guidelines for the Safety Assessment of Novel Foods*, for example, requires predictive modeling on "how much of the food is likely to be consumed and at what frequency and what role it is likely to play in the diet." This may involve an "exposure simulation" that is "based on current dietary intake databases, preferably using data from Canadian subjects, in which the novel food has been incorporated by substituting it for a food or foods it might be expected to replace in the diet. These intake estimates may then be used to calculate the potential dietary exposure to specific components of the novel food that will be the subject of the safety assessment." Health Canada, *Guidelines*, 22.

23 We will examine nutritional and dietary risk governance more fully in a forthcoming report on food and chronic diseases.

24 The Conference Board of Canada, *Valuing Food*, 39.

25 CFIA, *Audit of the Management of Imported Food Safety*.

26 As Holley notes in "Food Safety Challenges Within North American Free Trade Agreement (NAFTA) Partners," "most cases of food-borne illness are caused by domestically produced food rather than imported products, although until recently, food-borne disease outbreak investigations by Centers for Disease Control and Prevention (CDC) were not designed to differentiate imported from domestically produced foods as vehicles of food-borne illness." 132.

and illness—is minimal, the *indirect* contribution through oversight is likely greater. Although, as with other aspects of the government's risk management approach to food safety, the failure to collect, analyze, and/or publish data makes it difficult to identify the magnitude of contribution.

Confidence in the food supply is affected by perceptions about the strength of the import control system and there are definite concerns in this area. For example, an audit of CFIA's management of imported food safety, covering the period of April 2005 to March 2008, revealed several potential weaknesses and risks, including:

◆ insufficient information available to properly monitor and inspect many food commodity groups;

◆ the absence in some food programs of systems to adequately track compliance and verification; and

◆ the fact that foreign country equivalency audits were only "partially delivered," with no equivalency controls in place for foreign food commodities other than meat, fish and seafood, and eggs.[27]

Moreover, the audit revealed that Canada's food safety system has struggled to adapt to the rapid increase and change in the profile of food imports. Indeed, traditional approaches to import control, such as inspection of only 2 per cent of food shipments at the border,[28] are regarded by some as insufficient to mitigate the possible risks posed by the current volume of food imports.[29]

Ultimately, while imports do not appear to have increased food safety risks, rapid changes in the global food system and rising import volumes from many countries provide good reason to remain vigilant and to consider additional import control measures to cope with the changes. At the same time, ensuring that imported food is safe is a task for industry as well as government. Large buyers play an important role in ensuring that their suppliers comply with food safety standards—both public and private. (See Chapter 4.)

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27 CFIA, *Audit of the Management of Imported Food Safety*.

28 Hoffmann and Harder, *Food Safety and Risk Governance in Globalized Markets*, 34.

29 Holley, "Food Safety Challenges," 139.

Global Coordination

A major contribution to the safety of imported food stems from federal agencies' efforts to work with international counterparts to identify and respond to risks, and to shape agreements on global food safety standards. Canada has worked with many countries to establish a global science-based framework of food safety standards and protocols as reflected in the Codex Alimentarius (Codex). (See box "The Codex.") Although it is non-binding, the Codex has emerged as part of an international legal framework to become what some have called a "quasi-legislator" of food safety.[30]

Rapid changes in the global food system and rising import volumes from many countries provide good reason to remain vigilant and to consider additional import control measures to cope with the changes.

Although the Codex has helped to improve global coordination of food safety policy—and thereby diminish the challenges of importing more food from a growing list of countries—it has its shortcomings. For example, Codex standards are often broad and leave much room for national differences in interpretation and application; while more countries are adopting Codex standards, many are hamstrung by legal or political constraints that prevent their uptake.[31] In addition, because of the clear trade-implications of the standards, some degree of politicization influences the Codex standard-setting process[32] and the body's diverse and growing international membership[33] frequently engages in heated and divisive disputes over issues such as genetically modified foods and the use of bovine growth hormones for beef production.[34] For these reasons, Codex standard-setting processes often cannot address new challenges

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30 See, for example, Lin, "Global Food Safety," 670.

31 Joint FAO/WHO Food Standards Program, *Understanding the Codex*, 20.

32 See, for example, Lin, "Global Food Safety," 668.

33 Lin, "Global Food Safety," 672.

34 See, for example, Smythe, *Food Sovereignty*, 9.

and concerns swiftly. As a result, although Codex standards are not mandatory in Canada, Canada complements its Codex-related activities with other multilateral and international activities.

In the end, however, the safety of imported food and the overall safety of the global food supply are not achieved solely with such international agreements and arrangements. Although they are important, and create shared expectations, the safety of imports ultimately depends on the quality standards set by exporting and importing firms, and what these firms do to ensure those standards are met. We examine the performance of firms in the next chapter.

CONCLUSION

Although there is a range of outstanding challenges related to government's role in managing food safety risks, its contribution is important. As noted, Canada generally has a good food safety system and government activities certainly contribute to this reality. Moreover, as the government's response to the Weatherill report[35] reveals, efforts are being made to address outstanding challenges in legislation, inspections, emergency response, organizational culture, and other areas, to further improve the responsiveness of the government management system to food safety risks.[36] What impact these changes will ultimately have on reducing risks remains to be seen.

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35   The Weatherill report refers to Weatherill, *Report of the Independent Investigator Into the 2008 Listeriosis Outbreak*.

36   Government of Canada, *Action on Weatherill Report*.

Food Safety Risk Governance: Industry

Chapter Summary

- Industry has a central role in food safety risk governance. Food safety depends on what industry does on a regular, on-going basis to minimize risks.

- Food safety is good for business. There are strong market incentives for most firms to make food safety a top priority—including protecting brand reputation, maintaining sales, and avoiding costly recalls.

- Some firms—particularly small and medium-sized enterprises—face challenges in improving their food safety performance, including cost, lack of expertise and time, low awareness of and misperceptions about food safety, and organizational culture.

- Food service establishments pose greater food safety risks than other food subsectors.

The food industry plays a central role in food safety risk governance. Although governments set standards and carry out a range of inspection, enforcement, and educational activities, the safety of food depends primarily on what industry—and consumers—do, or fail to do, on a regular, ongoing basis to minimize risks. Although many still believe that industry will do only the bare minimum with respect to food safety and that firms respond only to legislation and regulation, in reality, most firms are highly attentive to food safety. Firms not only take steps to comply with government standards and regulations, many also seize opportunities to enhance food safety by adopting voluntary standards, processes, and technologies.

The safety of food depends primarily on what industry— and consumers—do, or fail to do, on a regular, ongoing basis to minimize risks.

Market forces—even more than the regulatory environment—drive firms to invest in food safety. At the same time, market incentives do not provide equally strong motives for all firms. Small and medium-sized enterprises (SMEs) and, in particular, many food service companies are less responsive to market-based drivers of food safety investment; partly because they face unique challenges and barriers that are difficult for them to address on their own.

This chapter examines the drivers and motives of industry behaviour, as well as the challenges of improving safety at the firm level. It also explores how firm characteristics— such as size, subsector, and export orientation—influence the particular motivations and challenges of each firm. What emerges is a profile of the industry that could help governments target their efforts to improve firm-level food safety performance.

FIRM-LEVEL FOOD SAFETY DRIVERS

Firms invest, or fail to invest, in enhanced food safety systems, technologies, and processes for a number of reasons. The key drivers of firm-level food safety behaviour fall into two broad categories—market drivers and government drivers. Market drivers include sales and firm reputation, while government drivers include incentives (such as tax credits and research and development assistance) and requirements (such as process regulations and performance standards). Of course, some firms enhance their food safety control measures simply because they feel that it is good practice or the right thing to do. But "moral" or "good practice" drivers of behaviour appear to have less weight than market and regulatory drivers.

Many firms enhance their food safety processes, technologies, and performance beyond regulatory requirements in response to their customers' requirements.

Firm-specific drivers and constraints are affected strongly by firm characteristics—including size, subsector, and competitive exposure. Policies to enhance firms' food safety performance must be sensitive to the significance of these differences. A more effective and efficient food safety system will respond to firms' differences and will focus more attention on firms with weaker market incentives and those that face strong barriers to improving food safety.
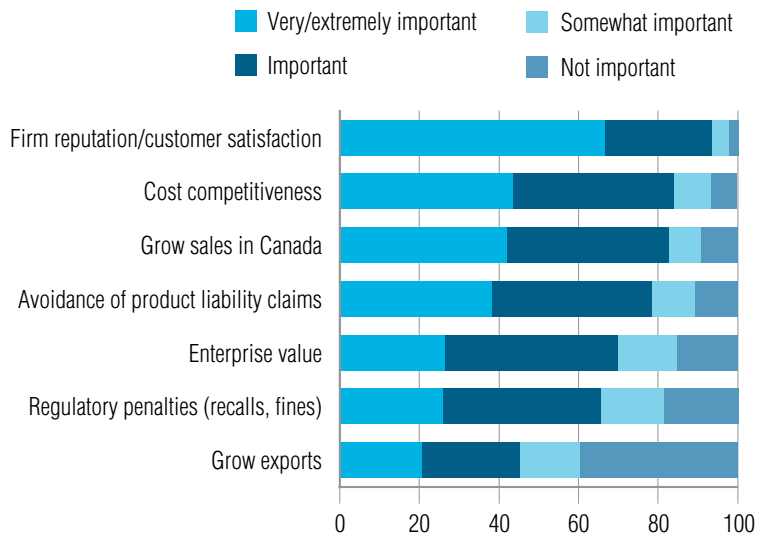
CUSTOMER REQUIREMENTS

Many firms—notably large supermarkets and food service chains—enhance their food safety processes, technologies, and performance beyond regulatory requirements in response to their customers' requirements. U.S. researchers, for example, have discovered that some large-scale buyers "have successfully created markets for food safety through their ability to enforce safety standards with testing and process audits, and to reward suppliers who meet safety standards and punish those who do not." These "channel captains," as they are sometimes called, are "savvy buyers who monitor food safety up and down their supply chain."[1]

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1 Golan, Roberts, and Ollinger, "Savvy Buyers."

Chart 2
Drivers of Industry Attention to Food Safety
(per cent)

Legend: Very/extremely important; Somewhat important; Important; Not important

Categories (top to bottom):
- Firm reputation/customer satisfaction
- Cost competitiveness
- Grow sales in Canada
- Avoidance of product liability claims
- Enterprise value
- Regulatory penalties (recalls, fines)
- Grow exports

Source: The Conference Board of Canada.

The strategy is also prompting food safety enhancements by suppliers in many subsectors in Canada and the United Kingdom. Suppliers are introducing new food safety technologies and procedures—including Hazard Analysis Critical Control Points (HACCP), Good Agricultural Practice (GAP), and Good Manufacturing Practice (GMP)—even when not required by law, in response to existing and anticipated customer requirements.[2] Indeed, responding to customer requirements often figures among the top drivers of firms' decisions to take action.

In the Centre for Food in Canada (CFIC) Industry Survey, 93.5 per cent of firms said that firm reputation/customer satisfaction is an "important," "very important," or "extremely important" consideration in their approach to producing safe food. Indeed, fully 66 per cent indicated that it is "very" or "extremely important"—by far the strongest motivator for firms. (See Chart 2.)

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2 Mensah and Julien, "Implementation"; Herath and Henson, "Does Canada Need Mandatory HACCP?"; Herath, Hassan, and Henson, "Adoption of Food Safety and Quality Controls"; Henson and Holt, "Exploring Incentives"; Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives"; Hobbs, Fearne, and Spriggs, "Incentive Structures."

At the same time, some smaller firms in Canada appear to be less motivated than others by customer requirements in their approach to the production of safe food. In the CFIC Industry Survey, every one of the 6.5 per cent of all firms reporting that firm reputation/customer satisfaction was "not important" or only "somewhat important" in their approach to food safety had fewer than 250 employees, and all but one had fewer than 100 employees.[3] No firm with 250 or more employees said that firm reputation/customer satisfaction was "not important" or "somewhat important": all large firms said that it was at least "important." Many smaller firms that do not view customer requirements as important may think that the "adoption of food safety controls beyond the regulatory requirements would not enhance their competitiveness on the market, particularly in the context of a customer base that was considered 'fixed' and 'known.'"[4]

Motivating smaller firms to improve their food safety systems, going above and beyond regulatory requirements, will require other drivers and incentives.

The weight of the "channel captain" driver appears to depend on how frequently a firm's facilities are inspected by the firm's customers, which also varies according to firm characteristics. In their study of the Ontario food processing sector, Herath and Henson found that the "rate of customer inspection . . . was significantly lower for smaller establishments (35.1 per cent) than medium (55 per cent) and large facilities (92 per cent), and was lower in the dairy processing sector (46 per cent) than in the meat (55 per cent) and fruit and vegetable (85.7 per cent) processing sectors."[5]

A further challenge arises when there is a lack of coordination and agreement on standards among multiple buyers. Suppliers with many customers may be overwhelmed by "multiple (competing) private standards" that can increase compliance costs.[6] A solution—which appears to be more prevalent in the U.K. than in Canada and other jurisdictions thus far—"is the development of industry standards, with which all buyers comply."[7] The British Retail Consortium (BRC), for example, "has reduced the food safety monitoring costs in supermarket supply chains whilst maintaining food safety standards" by getting supermarkets to agree "to replace their individual food safety audits processes by a single audit procedure accredited by the [BRC]."[8]

International efforts related to the development of the Global Food Safety Initiative (GFSI)[9] are beginning to facilitate the recognition of equivalence and convergence between effective food safety risk management systems, although the extent of Canadian industry participation in GFSI is not entirely clear.[10]

In the end, customer pressure can do much to drive improvements to Canada's food safety system, especially among larger suppliers. However, motivating smaller firms to improve their food safety systems, going above and beyond regulatory requirements, will require other drivers and incentives.

CORPORATE IMAGE AND REPUTATION

Another potential driver of firm-level food safety improvements is the expectation that enhanced food safety can improve corporate image or at least protect a brand against negative publicity from food safety crises. For many firms, this is motive enough to improve food safety procedures and practices. A recent study of U.K. firms found that 54 per cent were driven to implement

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3   In fact, 57 of the 60 firms that said that this consideration was not, or only somewhat, important, had fewer than 50 employees.

4   Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives," 1369.

5   Herath and Henson, "Does Canada Need Mandatory HACCP?" 448.

6   Martinez and others, "Co-Regulation," 304.

7   Martinez and others, "Co-Regulation," 304.

8   Martinez and others, "Co-Regulation," 304.

9   The Global Food Safety Initiative is a non-profit foundation that "benchmarks existing food standards against food safety criteria, and also looks to develop mechanisms to exchange information in the supply chain, to raise consumer awareness and to review existing good retail practices." See its website at www.mygfsi.com/about-gfsi.html.

10   The Conference Board is conducting research on private standards and will produce a report in Spring 2012 that will address this and other issues.

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enhanced food safety standards based on the "potential for improved corporate image."[11] In some subsectors of the Canadian food industry—particularly red meat and poultry processors—reputation appears to be an even stronger driver. Reputation was found to be one of the two "predominant drivers behind the food safety responsiveness of plants."[12]

However, certain factors can diminish the strength of this driver for some firms. For example, the extent to which firms' activities and products are branded, and their place in the supply chain relative to consumers, influences their responsiveness to reputational drivers.[13] In the red meat and poultry processing sector study, Jayasinghe-Mudalige and Henson found that "plants with significant sales to walk-in customers and manufactured products that were sold under another firm's brand name were less food safety responsive."[14] Another study of this subsector found that firms believed that adopting enhanced food safety measures "supports the development and maintenance of reputation through branding and product promotion," but thought that this advantage would be diminished as *more* firms adopt the same of controls.[15]

SALES, PROFITS, MARKETS

The evidence about whether expectations of higher sales, prices, and expanded markets drive firms to invest in enhanced food safety measures is mixed. Two Canadian studies found that expectations of higher sales and prices were weak motivators of firm behaviour related to food safety.[16] In one case, the "expected ability to get a higher price" for products subject to enhanced food safety controls was ranked the third weakest of 22 possible drivers of firms' food safety investments.[17] By contrast, another study (of the red meat and poultry subsector) found that the anticipated impact on sales was one of the two "predominant drivers behind the food safety responsiveness of plants."[18] These results suggest that the expected impact of domestic sales and prices is a motivating factor, but perhaps a top driver in only a subset of cases. This is consistent with responses in the CFIC Industry Survey, where only 40.3 per cent said that growing sales is a very or extremely important motivator, compared with the 66 per cent who said this about firm reputation/customer satisfaction and the 42.9 per cent who said this about cost competitiveness.

For international sales and markets, the expectation of higher sales and prices as a driver of food safety investment is not a primary motivator of firm behaviour. While it is fair to suggest that "compliance with food safety regulation has become a ticket for accessing the global food value chain,"[19] it is not clear that firms are motivated to invest in additional food safety controls out of an expectation of *higher* international sales and prices. Only 18.1 per cent of respondents to the CFIC Industry Survey noted that growing exports was a very or extremely important consideration in their food safety investments. Often, this is simply because firms do not export or plan to export.

Although expected impacts on sales, prices, and markets are not *predominant* motivators, these do have some influence on food safety decisions. Even when they do not expect to *improve* sales, prices, or markets by adopting enhanced food safety controls, many recognize that failing to keep up with industry food safety norms could harm their ability to protect sales, prices, and markets. Indeed, Jayasinghe-Mudalige and Henson's survey of firms found that very few "identified any benefits in terms of, for example, increased market share, access to new national and/or international markets, higher prices, and increased profitability . . . in

11 Mensah and Julien, "Implementation," 1221.

12 Jayasinghe-Mudalige and Henson, "Economic Incentives for Firms," 511.

13 Martinez and others, "Co-Regulation," 302.

14 Jayasinghe-Mudalige and Henson, "Economic Incentives for Firms," 511.

15 Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives," 1369.

16 Herath and Henson, "Does Canada Need Mandatory HACCP?"; Henson and Holt, "Exploring Incentives."

17 Herath and Henson, "Does Canada Need Mandatory HACCP?" 452.

18 Jayasinghe-Mudalige and Henson, "Economic Incentives for Firms," 511.

19 Mensah and Julien, "Implementation," 1219.

most cases the implementation of HACCP and other food safety controls was seen as *essential to protect the existing customer base*."[20]

REGULATION

Regulatory concerns are an important driver, but they are far from being the primary driver. Although 63.8 per cent of firms in the CFIC Industry Survey said that regulatory penalties (such as recall orders and fines) are "important," "very important," or "extremely important" considerations in their approach to producing safe food, only 24.9 per cent said they were "very" or "extremely" important. This is much lower than the rates for other drivers listed as "very" or "extemely" important by respondents, such as firm reputation/customer satisfaction (66 per cent), cost competitiveness (42.9 per cent), and growing sales in Canada (40.3 per cent).

The approvals processes for food safety innovations and interventions have been rather slow, resulting in delays to measures that could enhance food safety in Canada.

Interestingly, although larger firms (with 100 or more employees) were more likely than smaller firms (with fewer than 100 employees) to say that regulatory penalties were "very" or "extremely important" (33 and 25 per cent, respectively), there was little difference between large and small firms when the responses "important," "very important," and "extremely important" were combined (61 and 64 per cent respectively). Notably, one-fifth (19.6 per cent) of all respondents said that regulatory penalties are "not important" to their approach to food safety.

Still, the vast majority of firms comply directly with what they are required to do, and many will make investments, innovate, and adopt voluntary food safety controls that make compliance easier and/or allow them to exceed minimum requirements. Indeed, the evidence that Canadian firms will make investments to improve

their ability to comply with food safety regulations is strong.[21] Herath and Henson found, for example, that the "expected ability to meet anticipated regulatory requirements" and the "expected ability to meet existing regulatory requirements" were the top two drivers (of 22 possible drivers) cited by Canadian firms for their implementation of HACCP—a tool not itself required by the regulatory regime, but which can facilitate compliance with that regime.[22]

In some cases, the regulatory environment can act as a disincentive to technological or process innovation that could further enhance food safety. Historically, the approvals processes for food safety innovations and interventions have been rather slow, resulting in delays to measures that could enhance food safety in Canada. While Health Canada has made noticeable efforts to prioritize certain applications for approval of interventions and additives with proven health benefits, there is still room for improvement.[23]

Sometimes, regulations may even discourage a firm from adopting mandatory controls.[24] Jayasinghe-Mudalige and Henson reported that "where changes in legislation are anticipated, firms may actually delay implementing new food safety controls in case they conflict with regulatory requirements in the future."[25] More troubling is a finding that 83 per cent of food SMEs surveyed in the U.K. "demonstrated an 'active' lack of trust in both the EHP [environmental health practitioner] and in legislative requirements," which led some to make "a conscious decision not to comply with food safety legislation."[26] Notably, a shift in enforcement officers' practices away

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20 Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives," 1369. Emphasis added.

21 Mensah and Julien, "Implementation"; Herath and Henson, "Does Canada Need Mandatory HACCP?"; Henson and Holt, "Exploring Incentives"; Herath, Hassan, and Henson, "Adoption of Food Safety and Quality Controls"; Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives."

22 Herath and Henson, "Does Canada Need Mandatory HACCP?" 452.

23 AAFC and others, *Progress on Food Safety*.

24 Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives"; Martinez and others, 'Co-Regulation."

25 Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives," 1370.

26 Yapp and Fairman, "Factors Affecting Food Safety," 45.

from a "policing" function, toward a more advisory function—offering advice, education, and encouragement—had strong positive effects on inspection scores and compliance levels.[27]

While active or intentional noncompliance does not appear to be a significant issue in Canada, many firms—especially SMEs—will nevertheless have trouble complying even when they want to. Overall, while the regulatory system is a key driver of food safety in Canada, there appears to be a need and opportunity for improvement. (See box "Can Private Standards Improve Food Safety?" for a discussion of the challenges related to regulatory compliance and responding to market drivers.)

FIRM-LEVEL FOOD SAFETY CONSTRAINTS

Although the drivers of food safety investment and innovation are strong in Canada, firms face multiple challenges that act as barriers or constraints to change. These constraints on action result in a food safety system that is weaker than it might otherwise be. Recognizing and addressing them is necessary to enhance food safety results.

COST

The cost of implementing new and improved food safety controls at the firm level is perhaps the biggest barrier to improving the food safety system as a whole. This can include costs of new technologies; experts to assist with new technologies or processes, guides, and instructions to implement new processes; training; certification fees; employee time related to operating and monitoring new systems; and regulatory compliance. The high cost of development and implementation of food safety controls and internal budget constraints frequently rank as the top challenge in surveys and studies of firm behaviour.[28]

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27 Yapp and Fairman as cited in Martinez and others, "Co-Regulation," 308, 313.

28 Herath and Henson, "Does Canada Need Mandatory HACCP?" 454; Herath, Hassan, and Henson, "Adoption of Food Safety and Quality Controls," 311–312; Mensah and Julien, "Implementation," 1222.


Can Private Standards Improve Food Safety?

Over the past 20 years, private standards have emerged in the food industry to provide risk management for some issues (e.g., food safety) and as a basis for competitive market differentiation for others (e.g., environmental performance). Private standards have risen in response to increased demands from buyers—institutional as well as consumer—for formal quality assurance, and to protect against loss and liability. While private standards are generally viewed as contributing to public policy objectives, there remains a need to better understand the efficiency and effectiveness of private standards in the food system, and their interactions with the public regulatory environment. These questions are more fully addressed in an upcoming CFIC report that focuses on private standards (to be released in Spring 2012).

Private standards take two forms: company-specific and industry-wide. Company-specific standards are used to control a company's supply chain. This is especially feasible for large companies that need to manage reputational risk. A good example is McDonald's Supplier Quality Management System (SQMS). These are complemented by industry-wide standard systems such as industry-appropriate food safety enhancement programs and Hazard Analysis Critical Control Point (HACCP) plans.

We asked respondents to the Centre for Food in Canada's Industry Survey to tell us whether they take part in these programs. We found very high rates of adoption for key quality control programs that relate directly to food safety. (See chart.) The public regulatory system already incorporates some of these private regimes into its regulatory methods, such as changing the inspection regime based on whether a processing plant is HACCP-compliant. As private standard systems develop, there should be room to move further toward co-regulatory models that would help rationalize Canada's approach to food safety.

Food Safety and Quality Programs Adoption Rates
(per cent; n=1,186)
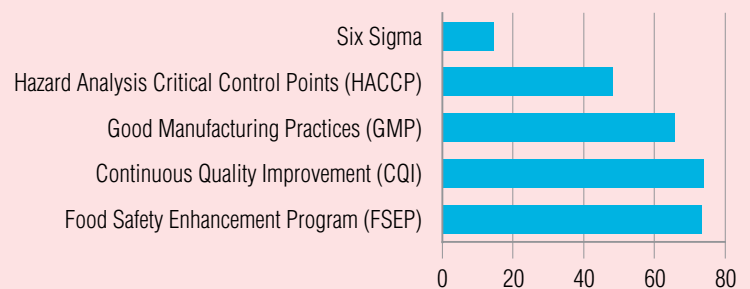
Source: The Conference Board of Canada, CFIC Industry Survey.

Source: The Conference Board of Canada.

Cost is especially constraining for SMEs, which lack the operational scale to absorb them, or the short-term capital to make investments whose returns may be more long term. A study of Canadian firms' decision-making with respect to implementing HACCP, found that "many small firms . . . perceived the costs to outweigh the benefits, in some cases significantly so."[29] If SMEs and other firms believe that high costs pose a threat to their competitiveness, there is a risk that they will not adopt measures that would enhance food safety.[30]

LACK OF EXPERTISE

Implementing and operating many food safety control measures—including technologies and processes—requires technical and management expertise. While large firms usually can afford to hire people with the necessary expertise—frequently as part of dedicated food safety teams—SMEs often must rely on consultants and/or additional training for existing staff to deal with technical issues. With either approach, the lack of on-site technical expertise impairs a firm's capacity to identify and respond to risks with enhanced food safety protocols.[31]

In fact, some SMEs may be unaware of many food safety challenges and opportunities altogether because they have no one on staff with expertise to identify those challenges and opportunities. One study found that "businesses with technical or quality staff were significantly more likely to correctly identify chemical, physical, and microbiological hazards (85 per cent, 94 per cent, and 83 per cent, respectively). Corresponding figures for businesses without technically trained staff were 50 per cent, 65 per cent, and 30 per cent."[32] Given that smaller firms are much less likely to employ technically trained staff, small firms are clearly at the greatest risk of not recognizing or responding to hazards.

TIME

Another constraint is the time cost of investigating, assessing, and implementing new food safety controls.[33] While this challenge is managed relatively well by larger firms, smaller firms can feel overwhelmed by the time requirements of maintaining, let alone improving, food safety in their operations. As one U.K. researcher explained, small businesses tend to have "a busy, day-to-day existence," which means that "even if owner-managers can be convinced of the necessity for [food safety controls, such as HACCP], the allocation of sufficient 'time' for its development becomes a major constraining factor."[34]

LOW AWARENESS AND MISPERCEPTIONS

Some firms do not enhance their food safety measures because they are unaware of what they can do or are required to do. For example, in a survey of U.K. food firms, 40 per cent of respondents said that they were hindered in their compliance with food safety regulations due to "lack of awareness of the requirement,"[35] while another study found that 25 per cent of firms surveyed "had not heard of the concept" of "hazard analysis."[36] It is clear that food safety may be compromised if some firms remain ignorant.

Even if firms have sound knowledge and awareness of regulatory requirements and are motivated to ensure that their products are safe, some believe, often erroneously, that their current practice is sufficient to meet food safety goals and therefore see no need to make improvements.[37] Of 22 possible barriers to enhanced food safety controls presented to industry survey respondents, Herath and Henson found that firms' own "perception that current food safety controls are sufficient" was the third most frequently cited reason for lack of more action on food safety at those firms.[38]

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29   Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives," 1368.

30   Martinez and others, "Co-Regulation," 302.

31   Taylor, "HACCP," 218; Yapp and Fairman, "Factors Affecting Food Safety," 46; Fielding and others, "An Evaluation of HACCP Implementation," 121; Mensah and Julien, "Implementation," 1222, 1224.

32   Fielding and others, "An Evaluation of HACCP Implementation," 121.

33   Yapp and Fairman, "Factors Affecting Food Safety"; Taylor, "HACCP."

34   Taylor, "HACCP."

35   Mensah and Julien, "Implementation," 1222.

36   Yapp and Fairman, "Factors Affecting Food Safety," 49.

37   Taylor, "HACCP"; Fielding and others, "An Evaluation of HACCP Implementation"; Herath and Henson, "Does Canada Need Mandatory HACCP?"; Jayasinghe-Mudalige and Henson, "Identifying Economic Incentives."

38   Herath and Henson, "Does Canada Need Mandatory HACCP?" 454.

It is especially troubling that many firms that believe they are doing well, in fact are not doing well. This was certainly the case in the U.K. within the last decade. One study found that most survey respondents reported having "no problems with . . . the implementation of HACCP," yet audits revealed that "businesses from all sectors [in the U.K. food industry] were unsure about specific hazards that should be controlled."[39] In short, "the self-reporting from the majority of companies regarding hazard analysis implementation is clearly inaccurate and the people responsible for food safety within these businesses must be made aware that their current practices do not constitute hazard analysis."[40]

The vast majority of food produced on Canadian farms is safe, and contamination leading to illness is rare.

CULTURE

Some firms may not have an organizational culture that supports good food safety systems and, consequently, are less inclined to enhance their systems and ensure that the current system is operating effectively.[41] It appears that organizations that are less receptive and attentive to food safety issues are less likely than those with stronger food safety cultures to adopt enhanced food safety controls. Indeed, it would appear to be self-evidently true that no matter how much a firm introduces formal plans, processes, and requirements to improve food safety, food will not actually be safer unless the people who must implement and meet those plans, processes, and requirements exhibit the right attitudes and behaviour in their day-to-day activities. Logically, firms that lack food safety cultures may be less likely to produce safe food than firms with positive food safety cultures. Still, beyond this logical conceptualization of the role of culture, the available evidence about the impact of culture on food safety outcomes tends to be selective and anecdotal, and so does not provide clear direction on this potential barrier.

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39 Fielding and others, "An Evaluation of HACCP Implementation," 125.

40 Fielding and others, "An Evaluation of HACCP Implementation," 125.

41 Deloitte, *Food Safety*; Deloitte, *Safe to Move*; Powell, Jacob, and Chapman, "Enhancing Food Safety Culture."

ON-FARM FOOD SAFETY

As noted in Chapter 2 on risk assessment, although data on the sources of food-borne illness often point toward food services and consumers, many actors point to on-farm food safety as an area in need of attention. A number of high-profile outbreaks, some of which have led to deaths, have been attributed to on-farm food safety failures. Although there are a number of points further down the supply chain at which various "kill steps" can be implemented to better protect consumers, the need for some of these "kill steps" could be reduced through improvements in on-farm food safety.

To be sure, the vast majority of food produced on Canadian farms is safe. Contamination leading to illness is rare. Moreover, there are a number of programs that help to enhance on-farm food safety, including the adoption of programs based on HACCP principles and GAP or Good Production Practices (GPP).[42] Yet, the CFIC's Industry Survey reveals that food businesses in crop and animal production are less likely than food processing and retail businesses to say that improving food safety is a very or extremely important driver of their firm's success. Whereas 62 per cent of processors and 58 per cent of retailers noted that food safety is a very or extremely important driver of their firm's success, only 42 per cent of crop producers and 47 per cent of animal producers said the same. Therefore, the continuous improvement imperative may be weaker on-farm and, consequently, there may be reason to devote additional attention to on-farm food safety risk management.

FOOD SERVICES: A TROUBLING EXCEPTION

The vast majority of food firms take steps to maintain and enhance food safety. Although SMEs face unique challenges, most are motivated to do what they can to ensure that food is safe. However, one subsector in the food industry has a food safety track record that is poorer than the rest: firms in the food service subsector, which includes restaurants; catering businesses; and schools, hospitals, and long-term care dining facilities. Studies

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42 Canadian On Farm Food Safety Working Group, "On Farm Food Safety in Canada."

consistently show that safety risks are much higher for foods prepared outside the home. One study concluded that up to 70 per cent of food-borne illnesses are acquired outside consumers' homes—in restaurants, and other food service establishments.[43]

Most firms maintain a very high level of food safety because they face an array of strong market-based and regulatory incentives to produce safe food.

It is not entirely clear why food service establishments are the cause of so much of the food-borne illness burden, though one possibility may be that most are so small that they find formal food safety systems too costly or time consuming to implement and maintain. Additionally, they employ more low-wage workers and experience high rates of turnover, which may make it difficult to maintain strong food safety programs. In effect, food safety at this end of the supply chain appears to depend more on the discretion and behaviour of individuals than on systems and technology. For that reason, the risks are much harder to manage.

A 2006 study found that the presence of certified kitchen managers was associated with a decreased risk of illness outbreaks. Fully 71 per cent of the restaurants without outbreaks had certified managers on staff, compared with only 32 per cent of restaurants that had an outbreak.[44] Although having a certified manager is no guarantee of avoiding an outbreak, the data suggest that the likelihood of an outbreak decreases in facilities that have a trained staff member whose responsibilities include food safety.

RETHINKING INDUSTRY AND GOVERNMENT ROLES

How can we achieve the primary goal of reducing the incidence of death and illness caused by food-borne hazards? Government must play an important role in setting standards, monitoring compliance, and responding to food safety emergencies. But food safety results ultimately are determined by the day-to-day activities of firms in the food industry, and the investments and innovations they make to support food safety. Maintaining and improving food safety, then, should begin by understanding what industry is doing and then considering how government efforts can best support industry activity.

There are occasions when firms' mistakes or omissions lead to serious illness or even death. A fast-acting and effective recall and emergency system is critical to managing these risks. This must include very swift communication with the public as soon as an outbreak is identified. Still, outbreaks are rare. Most firms maintain a very high level of food safety because they face an array of strong market-based and regulatory incentives to produce safe food. Put simply, food safety is good for business. As a result, many firms are adopting private standards—some of which exceed government standards—that help them produce even safer food.

Unfortunately, some firms—especially SMEs—face unique challenges in improving food safety. Challenges related to cost, time, lack of expertise, and culture result in some firms investing less than they should in the resources and actions needed to improve food safety. The food safety performance of food service firms appears to lag behind firms in the primary production, processing, and retail subsectors. Although the incidence of severe illness and death is still low in food services, it is significantly higher than in other parts of the supply chain. Indeed, most food-borne illnesses whose origins can be traced, are usually traced to food service establishments.

Notably, there are some government programs that have the potential to assist SMEs and other firms with some of their challenges. The Canadian Integrated Food Safety Initiative (CIFSI), for example, supports businesses to improve food safety practices through two program components. The Food Safety Systems Development program supports the industry's development of government-recognized food safety practices based on HACCP

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43   Chapman and others, "Assessment of Food Safety Practices," 1101.

44   Hedberg and others, "Systematic Environmental Evaluations."

principles;[45] the Canadian Industry Traceability Infrastructure program helps firms develop food traceability systems to track products along the food supply chain.[46] Each program is industry-led, with government support in planning and implementation. CIFSI's main objectives are to help industry proactively manage risk and demonstrate higher food safety performance.[47] Although these programs could help to meet some of the identified governance gaps, evidence of their effectiveness is not available.

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45   AAFC, *Canadian Integrated Food Safety Initiative: Food Safety Systems Development, Program Guide*, 2.

46   AAFC, *Canadian Industry Traceability Infrastructure Program*.

47   AAFC, *Canadian Integrated Food Safety Initiative*.

Given the suboptimal performance of food service firms, the time is ripe to consider the allocation of government resources and attention to food safety. If the food safety system as a whole—and the government apparatus in particular—is to be more risk responsive, greater attention should be paid to SMEs, especially in the food service area, while maintaining appropriate levels of attention to the larger firms further upstream in the food supply chain. As food service firms tend to fall more frequently under provincial and municipal than federal jurisdiction, the former levels of government should play prominent roles in discussions about how to address food service risks.

Food Safety Risk Governance: Consumers

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Chapter Summary

- A large share of food-borne illness is a consequence of practices and behaviours at the household level.

- Consumers may be knowledgeable about good food safety practices but often underestimate the risks they face. As a result, many fail to practice good food safety behaviour in the home.

- Encouraging consumers to recognize the risks and to improve their food safety behaviour could significantly reduce the incidence of food-borne illness in Canada.

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Consumers also play an important role in ensuring that food is safe at the point of consumption. No matter how safe food is when bought—however well industry and government perform their roles in ensuring that purchased food is safe food—what consumers do, or fail to do, has major implications for food safety risks. Indeed, a large share of food-borne illness is a consequence of consumers' poor storage, handling, preparation, and/or cooking practices.[1]

Consequently, it is important to understand what drives and constrains consumers' behaviour with respect to food safety. Why do consumers so often fail to practice appropriate food safety behaviours? What, if anything, can be done to improve behaviour and reduce the risk of illness? As this chapter reveals, the fundamental challenge with consumer behaviour is risk misperception. Although many consumers have good *knowledge* of appropriate food safety behaviour, many fail to *apply* that knowledge because they simply do not recognize the risks they actually face.

DETERMINANTS OF CONSUMERS' FOOD SAFETY BEHAVIOUR

KNOWLEDGE

While consumers' knowledge of proper food storage, handling, preparation, and cooking is an important factor in consumer food safety, knowledge alone does not lead to safer behaviour. A large majority of people *know* what they should be doing in the kitchen, but the number of people who actually *do* what they should be doing is much lower.[2] One study that surveyed consumers about their knowledge, and then observed their food preparation behaviour in a real kitchen environment, found a "striking discrepancy" between knowledge and behaviour.

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1   Milton and Mullan, "Consumer Food Safety Education," provides an overview of the literature on household and consumer behaviour and risks, especially in the United Kingdom.

2   Milton and Mullan, "Consumer Food Safety Education"; Clayton, Griffith, and Price, "An Investigation"; McCarthy and others, "Who Is at Risk and What Do They Know?"

For example, "100 per cent of participants answered questions on hand washing correctly and yet not a single participant implemented the correct behaviour on all appropriate occasions."[3]

At the same time, knowledge is a necessary condition for safe food behaviour. While many knowledgeable people are not as safe as they know they should be, those who lack knowledge of safe food behaviour are much less likely than the knowledgeable to store, handle, prepare, and cook food safely.[4] Moreover, levels of knowledge appear to track certain demographic characteristics—with lower levels of knowledge found especially among young males and those with lower educational attainment.[5] Consequently, there are segments of the population whose lower levels of food safety knowledge make them more susceptible to food safety risks.

SOCIAL EXPECTATIONS

Perceived expectations of family and friends and the desire to satisfy those expectations is another factor that may have some influence over consumers' adherence to safe food behaviours. Many consumers recognize that their family and friends have expectations about proper food storage, handling, preparation, and cooking which they try to meet. However, a sizable minority do not try to meet these expectations.[6] And, even among those who *attempt* to meet the expectations, many still fail to carry out appropriate actions.[7]

RISK PERCEPTION

Perhaps the most important driver of consumer behaviour is risk perception. Unfortunately, when it comes to food safety, consumer *perceptions* of risk are sometimes poorly aligned with the *actual* risks people face. So even as risk perceptions drive consumer behaviour, they may be driving them in the wrong direction.

Although consumers often correctly identify restaurants and other food service establishments as primary sources of food-borne illness, they appear to underestimate both the likelihood of getting, and the severity of, food poisoning from food prepared at home. For example, in one study, 65 per cent of consumers indicated that restaurants are the primary culprits in incidents of food-borne illness—a figure which is generally consistent with data on the actual sources of illness. But only 17 per cent of respondents in that study attributed food-borne illness to what occurs in the home.[8]

Consumers who believe that exposure to food-related hazards in the home is minimal are not strongly motivated to take the necessary steps to reduce food safety risks.

In another study, almost all respondents said that it was "very unlikely" that they would "suffer from food poisoning from food prepared in [their] home in the next year." The remaining respondents either said that it was "unlikely" or did not answer. Moreover, the vast majority of respondents "strongly disagreed" (62 per cent) or "disagreed" (25 per cent) that "food poisoning is a disease which can result in very serious consequences."[9] Other research reveals similar trends in consumer risk perception.[10] By contrast, other studies reveal that the home is a major source of food-borne illness, and that consumers can, but often fail to, take steps to reduce home-based risks.[11]

Still, consumers' misperception of low food safety risk appears to explain much of the less-than-ideal behaviour with respect to proper food storage, handling, preparation, and cooking in the home. That is, because consumers believe (wrongly) that exposure to food-related hazards

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3   Clayton, Griffith, and Price, "An Investigation," 448.

4   Clayton, Griffith, and Price, "An Investigation," 435.

5   McCarthy and others, "Who Is at Risk and What Do They Know?" 206–7.

6   Clayton, Griffith, and Price, "An Investigation."

7   Clayton, Griffith, and Price, "An Investigation," 446.

8   Altekruse as cited in Clayton, Griffith, and Price, "An Investigation," 450–451.

9   Clayton, Griffith, and Price, "An Investigation," 445.

10   Altekruse and others, "Consumer Knowledge"; McCarthy and others, "Who Is at Risk and What Do They Know?"; Milton and Mullan, "Consumer Food Safety Education"; Williamson, Gravani, and Lawless, "Correlating Food Safety Knowledge."

11   Clayton, Griffith, and Price, "An Investigation," 434.

in the home is minimal, and believe (correctly) that the severity of illness from such hazards is usually low, they are not strongly motivated to take all necessary steps to reduce food safety risks. Even when they know what they should do, and face social expectations to do those things, the perception of low risk leads many to perform safe behaviours infrequently and improperly, or to eschew them altogether.

OTHER FACTORS

Even when a consumer is knowledgeable and motivated to act, there are barriers or distractions to safe food behaviours. They include lack of time, aversion to extra work, or simply forgetting to act.[12] Given underestimates of food risks in the home, it is not surprising that these barriers are enough to affect behaviour.

IMPLICATIONS

The most obvious implication of consumers' risk misperceptions and behaviour regarding food safety is that they are exposed unnecessarily to hazards that they could avoid. In many cases, this will lead to illness and, in very rare cases, death. Until consumers become aware of the risks that they actually face, they will continue to expose themselves and their families to the possibility of adverse health outcomes.

Indeed, it is important to educate consumers that food safety is a responsibility shared by all on the farm-to-fork continuum and that they have an important role to play. It is not clear how much either government or industry can do to alter perceptions and encourage consumers to take greater responsibility for the safety of the food that they prepare and consume. Certainly, there are a number of consumer initiatives intended to improve consumers' food safety awareness and their own responsibilities, such as the activities of the Canadian Partnership for Consumer Food Safety Education (and the associated Can Fight Bac and Be Food Safe initiatives), but information about how aware consumers are of these initiatives, let alone their effectiveness, is unavailable.[13] At the same time, it is clear that enhancing consumer awareness is necessary to address one of the major gaps in food safety performance.

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12 In the survey conducted by Clayton, Griffith, and Price, respondents point to "not enough time" (28 per cent), "laziness" (14 per cent), "perception of risk" (11 per cent), "lack of resources" (7 per cent), "no other food to eat" (5 per cent), "extra work" (5 per cent), "forget" (4 per cent), and "influence of others" (2 per cent), as the barriers to carrying out food safety behaviour. Forty-five per cent indicated that they faced no barriers. (Respondents were permitted to identify more than one barrier, so percentages add to more than 100). Clayton, Griffith, and Price, "An Investigation," 441.

13 For information on these initiatives, see the Can Fight Bac website at www.canfightbac.org/en/, and the Be Food Safe website at www.befoodsafe.ca/en-home.asp.

Potential Solutions

Chapter Summary

- Canada's food safety system performs well, although further action is needed to address existing and emerging challenges.

- The latter stages of the farm-to-fork continuum—food service organizations and households—are most ripe for significant improvements.

- To improve the food safety system, new ways must be found to maximize the contributions of government, industry, and consumers.

Overall, our food safety system performs well. The incidence and severity of most food-borne illness is relatively low, and cases of severe illness or death are exceptionally low—especially when compared with other mortality risks such as traffic fatalities, homicide and, above all, chronic diseases such as cancer, heart disease, and diabetes.

In addition to government activities, much of Canada's food safety performance is a result of the efforts of the food industry, which sees food safety as integral to business. Consumer expectations and market requirements are key motives for many firms to make food safety investments and innovations. The regulatory activities of government also play a significant role in encouraging firms to invest more in safety.

Although Canada's food safety system is good, it is not without real risks, as the large number of illnesses and a few tragic deaths from food safety failures attest. This report has examined Canada's food supply chain to identify the greatest risks to food safety, and has sought to assess the effectiveness of government, industry, and consumer systems in achieving key food safety goals and to identify gaps.

RISKS IN THE SUPPLY CHAIN: WORRIES ABOUT FOOD SERVICES

Although data collection and analysis is less than ideal, the evidence points to food services as a particularly troubling weak link in the food supply chain: about half or more cases of food-borne illness are attributed to the storage and preparation practices of restaurants, cafeterias, and other food service organizations. Additionally, consumers' behaviour in their own homes is a sizable source of risk. Consumers appear to know what they *should* be doing, but often fail to put that knowledge into practice. Finally, on-farm food safety and safety protocol and culture in the processing stage are continuing concerns—especially as even infrequent food safety failures at large firms can have health implications for a great number of people. Thus, while farms and processors are less often the source of food illness outbreaks than are food services and consumers' homes, there is good reason to encourage continuous improvement at this and all other stages across the supply chain.

FOOD SAFETY RISK MANAGEMENT

The Canadian food safety risk management system—which includes government, industry, and consumer systems—has, for the most part, been relatively successful in achieving key food safety goals.

In many cases, firms are implementing private standards that help them to exceed government food safety standards; in other cases, some firms find it difficult to meet minimum government standards. There is no quantitative evidence that firms of different sizes or in different parts of the supply chain have different levels of food safety performance—such data do not appear to exist. But an analysis of industry drivers reveals that some firms may be better positioned than others to address food safety.

The restaurant inspection system is too sporadic, due to limited resources, to have a decisive impact on restaurants' actual day-to-day food safety practices.

Generally, government is setting and enforcing standards that induce most firms to attend to food safety, and provides research, support, and assistance to industry and consumers. Yet there are some weaknesses in government data collection and analysis across a range of relevant issues, the pre-market approvals system lacks sufficient transparency, and there is concern that the system is hard pressed to meet the demands of an increasingly global food system. Indeed, although the government system is a necessary and relatively well-performing part of Canada's food safety governance overall, there is room and opportunity for improvement.

POTENTIAL SOLUTIONS

In some ways, because the systems are already working quite well, it is difficult to improve Canada's food safety performance. But it is increasingly difficult for the formal systems to stop outbreaks before they occur, especially through inspections. Some of the current performance is also the result of informal processes or rules of thumb.

The risks reside in the parts of the system that do not always adopt formal food safety systems—such as small and medium-sized (SME) food service companies—or that simply do not come under any formal system—such as households. So merely extending formal systems may not be sufficient to improve food safety much beyond current levels. Instead, it could be beneficial to undertake simultaneous approaches that would improve both the formal and informal food safety systems, so as to engage non-participating SME food service companies and householders.

In light of our analysis, we offer the following five potential government, industry, and consumer actions that could possibly help improve food safety outcomes in Canada:

1. PROVIDE SME RESTAURANTS AND FOOD SERVICE OPERATORS WITH MANAGEMENT ADVICE

Food service establishments are a key source of food-borne illness in Canada. If ignored, they might contribute to even higher rates of illness, as consumers' spending on restaurants continues to climb. The rise in spending has already been substantial. For example, over a six-year period, from 1997 to 2003, Canadian households increased their spending to an average of $1,487, or 30 per cent of their total food budgets, on food services—a 27 per cent increase.[1]

Regulatory approaches tend to focus on standards and enforcement—a "policing" model. These approaches need to be complemented by pro-active outreach to SME food service businesses to help them improve their food safety practices. The restaurant inspection system is helpful; enforcement should be continued. But it is too sporadic, due to limited resources for inspections, to have a decisive impact on restaurants' actual day-to-day food safety practices.

To make significant progress, an increase in the voluntary adoption of good practices and diligent application by industry is needed. One possibility is for governments and sector groups to assist by providing timely management advice and information to SME restaurant and

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1   Statistics Canada, *Canadians Spending More on Eating Out.*

food service operators on how they can minimize food safety risks and take rapid effective action in the case of outbreaks.

2. ENCOURAGE BETTER BEHAVIOUR AMONG CONSUMERS

Although consumers appear to know what they should be doing in their own homes to protect themselves from food-borne illness, many of them fail to put that knowledge to use. It is important to encourage consumers to practice what they know—to encourage them to reduce food safety risks by improving behaviour related to household food storage, handling, and preparation.

Industry should be able to design food safety systems with standards that are practical, in the public interest, and are likely to be applied consistently.

Consumer awareness of the links between food and chronic disease has improved over time, and many are putting that knowledge to use in improving their diets. Now there is a need for consumers to deploy their knowledge of household food safety to reduce their own risk. Better behaviour is especially important because Canadian consumers are aging. As they age, they become more susceptible to illness from food-borne pathogens because of a natural decline in immunity.

One possibility to improve behaviour would be for governments to build on current consumer awareness initiatives by engaging consumers directly—online or in live meetings—in discussions about food safety and their role in ensuring food safety in their households.

3. HARMONIZE PRIVATE STANDARDS TO PROTECT THE PUBLIC INTEREST

There is an alphabet soup of private food safety standards that, theoretically, make an important contribution to food safety performance. Currently, there are moves toward increasing consolidation and harmonization of various private standards—as evidenced by the increasing role being played by the Global Food Safety Initiative (GFSI) in the Canadian food industry. Yet, this process

has not reached all relevant areas of the supply chain, nor is it entirely clear how (or whether) these standards actually protect the public interest.

Industry should be able to design food safety systems with standards that are practical, in the public interest, and that have a high probability of being applied consistently. Possible ways to achieve this would be for:

- private standards organizations to demonstrate empirically how their systems achieve legitimate public food safety goals; and
- industry to continue to explore ways to harmonize private standards, using mechanisms like the GFSI.

If private standards can lower costs without compromising public safety, then they are more likely to be adopted and applied. This would likely have positive effects on food-borne illness.

4. MAKE GREATER USE OF TECHNOLOGY TO IMPROVE VISIBILITY AND TRACEABILITY

Technology has a substantial role to play in reducing food safety risks, through innovations in manufacturing processes, better machinery, food additives, and/or in information technologies that can improve visibility and traceability of product and ingredient origins. Yet Canadians appear to be conservative and sceptical about innovation, especially as it relates to products they ingest.

Canadian regulatory agencies tend to reflect the cautious Canadian approach to many food safety innovations. That approach has some merits, in that there are few technologies that offer benefits without attendant risks. The question is how these risks are balanced against the potential gains to food safety performance that may come from innovations. In other words, are attempts to prevent errors of *commission* by slowing the innovation approval process resulting in serious errors of *omission* where a lack of innovation perpetuates safety problems?

At this point, it is difficult to say whether the Canadian regulatory system provides a reasonable balance in weighing the relative risks of commission and omission, in part because the system is not transparent in its decision-making processes. Canadians would benefit from

an open debate on how food technology innovations might do more to help improve food safety as well as what harm they might do, and from understanding how the food regulatory system makes its judgments of relative risk.

5. ADD RESOURCES TO ADDRESS FOOD SAFETY RISKS DUE TO GLOBALIZATION

Canadians get more of their food from international sources than ever before. The volume of imports and the jurisdictional constraints means that Canada's inspection system for imported food is not as thorough or as rigorous as it is for domestically produced food.

To be sure, when Canada trades with countries with substantially similar food safety regimes, Canadians are probably not exposed to substantially higher risks. But increasingly, Canada trades with countries whose commitment to, and success in ensuring, food safety are suspect. To address this, there is a clear need for enhanced engagement with our food trading partners.

To reduce food safety risks as trade increases and proliferates, Canada could consider adding resources for risk management of international sources while maintaining current domestic resourcing levels.

Government and industry could jointly discuss how industry involvement in food safety assurance in the international arena could be increased to complement government efforts. One possible strategy would be to explore how international industry standards for food safety processes could be harmonized to a high standard.

CONCLUSION

Minimizing the incidence and severity of illness and minimizing (or eliminating) deaths caused by food-borne illness are strategic goals shared by everyone in the farm-to-fork supply chain, including government, the food industry, and consumers. So far, Canada has done well in meeting these goals, although there is room for improvement. As this chapter reveals, there are opportunities to improve food safety assessment, management, and communication among all actors. Indeed, when government, industry, and consumers work together, there is every reason to believe that Canada's food safety performance can move from good to world-leading.

Calculating the Incidence and Impact of Food-Borne Illness

Incidence Calculation Steps

STEP 1: EPISODES OF ACUTE GASTROINTESTINAL ILLNESS ANNUALLY IN CANADA

Drawing on studies cited by the Public Health Agency of Canada, a common estimate for the number of episodes of acute gastrointestinal illness (AGI) per Canadian, per year, is 1.27.

By multiplying this result by the population of Canada (34.55 million in 2011), we get an estimate of the total number of AGI episodes per year:

1.27 x 34,550,000 = **43,878,500 episodes of AGI per year**

STEP 2: EPISODES OF FOOD-BORNE ILLNESS ANNUALLY IN CANADA

Not all episodes of AGI, however, are attributable to food-borne causes. To determine how many are caused by food, we have to identify how many cases of AGI are related to enteric pathogens—i.e., gastrointestinal organisms that cause illness—and also what proportion of these enteric pathogens have food as their source (as opposed to human-to-human transmission).

The generally accepted rate of AGI caused by enteric pathogens is 62 per cent. And, of those, 25 per cent are thought to have food-borne causes. By multiplying the total number of AGI episodes by these two proportions, we get an estimate of the total number of food-borne illnesses in Canada annually:

43,878,500 x 0.62 x 0.25 = **6,801,167 episodes of food-borne illness in Canada annually**

STEP 3: INCIDENCE OF FOOD-BORNE ILLNESS PER MEAL IN CANADA

To get a sense of how frequently meals may cause illness, we divide the number of food-borne illnesses per year in Canada by the number of meals eaten by all Canadians in a given year (assuming three meals per person per day):

3 meals per day x 34.55 million Canadians = 103.67 million meals per day

365 days x 103.67 million meals = 37.8 billion meals per year

37.8 billion meals / 6.80 million episodes per year = 1 episode per 5,563 meals

If each episode is triggered by a single meal, then food-borne illness occurs once every 5,563 meals.

Source: The Conference Board of Canada.

The annual incidence estimate is calculated according to a formula provided by the Public Health Agency of Canada (PHAC).[1] The AGI figure is estimated based on data found in three studies cited in the same PHAC report. Both the enteric pathogens proportion (62 per cent) and food-borne cause proportion (25 per cent) were updated from 1999 figures using 2011 Centers for Disease Control and Prevention

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1   Thomas and others,"Burden of Acute Gastrointestinal Illness in Canada," Figure 3.

(CDC) food-borne illness estimates.[2] More significantly, both of these factors are lower and more accurate than the previous 1999 share factors.

The current, often-cited annual estimate of food-borne episodes in Canada is 11 to 13 million. Although the population has increased since this figure was first published, the main difference with our lower estimate of 6.8 million food-borne episodes annually in Canada can be explained by the lower share factors calculated by the CDC.

After several attempts to ascertain the economic burden from acute gastrointestinal illness in Canada from different sources, no credible estimate of the costs could be attained. Whereas the PHAC source estimates an annual *per capita* cost of $115, another source[3] reports roughly the same figure ($113.70) as a cost *per case*. The resulting estimates for the economic burden of food-borne illness from these different costs would differ by billions of dollars. As a result, with the existing paucity and variance in data, we do not believe that existing attempts to measure the economic impact are reliable.

2 CDC, "Estimates of Foodborne Illnesses."

3 Henson and others, "Corrigendum."

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Centre for Food in Canada

The Conference Board of Canada has launched a major, multi-year initiative—the Centre for Food in Canada (CFIC)—to address one of the mega-issues facing our country today. Food impacts Canadians in an extraordinary range of ways: it affects our lives, our health, our jobs, and our economy.

Key Objectives

CFIC's key objectives are to:

- raise public awareness of the nature and importance of the food sector to Canada's economy and society; and

- create a shared vision for the future of food in Canada articulated in a framework for the Canadian Food Strategy.

Achieving these purposes requires a combination of research and effective communication to stimulate public understanding of the significance of the food sector and spur the demand for collaborative action.

Who Should Invest

CFIC will appeal to investors from both the private and public sectors. Private sector firms have an interest in understanding the long-term food trends in Canada.

These firms also have experience in the operation of their businesses, and they understand the opportunities and challenges their businesses face.

Public sector organizations clearly have an interest in the operation of Canada's food sector. They are responsible for the policy and regulatory environment within which the private sector corporations operate. In addition, public sector organizations understand the interconnections between food and Canada's health care system, the nutrition of its citizens, and the health and viability of its communities. They are also familiar with the complexities and interrelationships among federal departments and, as well, among these federal departments and their provincial counterparts.

Membership from these organizations, each of which has a vested interest in the food system in Canada, will help to ensure that a balanced and holistic research approach is taken—one that reflects the priorities and concerns of Centre members.

E-MAIL contactcfic@conferenceboard.ca to receive more information.

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