CONSUMER ASSESSMENT OF THE SAFETY OF RESTAURANTS: THE ROLE OF INSPECTION NOTICES AND OTHER INFORMATION CUES

SPENCER HENSON[1,7], SHANNON MAJOWICZ[2,3], OLIVER MASAKURE[1], PAUL SOCKETT[3], ANDRIA JONES[4], ROBERT HART[5], DEBORAH CARR[5] and LEWINDA KNOWLES[6]

[1]*Department of Food, Agricultural and Resource Economics*

[2]*Department of Population Medicine*
University of Guelph
Guelph, Ontario N1G 2W1, Canada

[3]*Public Health Agency of Canada*
Guelph and Ottawa
Ontario, Canada

[4]*Division of Community Health*
Faculty of Medicine, Memorial University of Newfoundland
St. John's, Newfoundland, Canada

[5]*Public Health Services Department*
City of Hamilton
Hamilton, Ontario, Canada

[6]*Public Health Department City of Waterloo*
Waterloo, Ontario, Canada

Accepted for Publication April 4, 2006

ABSTRACT

This paper explores the ways in which consumers assess the safety of food in restaurants and other eating-out establishments, and the resulting impact on restaurant choice. The analysis builds on the existing literature on restaurant choice more generally and a growing body of studies on the impact of official inspection information on the perceived safety of restaurants. Based on a two-stage consumer study in the City of Hamilton in Ontario, Canada, involving focus groups and a postal survey, the research highlights how consumers base their assessment of food safety in restaurants using a range of visible

[7] Corresponding author. TEL: 519-824-4120 Ext. 53134; FAX: 519-767-1510; EMAIL: shenson@uoguelph.ca

Journal of Food Safety **26** (2006) 275–301. *All Rights Reserved.*

indicators of the experience and/or credence characteristics associated with foodborne illness. These include their observed judgments of restaurant hygiene, the overall quality of the restaurant, external information, including official inspection certificates, and the level of patronage. The use of these broad groups of indicators varies across consumer subgroups according to gender, age, level of education and recollections of past incidences when a restaurant was closed and/or convicted for food safety reasons.

INTRODUCTION

The social and economic costs associated with foodborne illness have become a major public policy issue in industrialized countries in recent years. Over the period 1997–2001, there were 44,451 cases of reportable enteric diseases in the province of Ontario, of which around 74% were judged to be associated with food on the basis of self-reporting (Lee and Middleton 2003). Passive reporting data of this type are known, however, to provide a gross underestimate of the total burden of illness associated with foodborne pathogens. An estimated 313 cases of infectious gastrointestinal illness occur in the community for each reported case (Majowicz *et al*. 2005), suggesting the true incidence is in the millions. Indeed, a recent population-based survey of self-reported acute gastrointestinal illness in the City of Hamilton, where the current research is based[1], indicates an annual incidence rate of 1.3 episodes per person per year (Majowicz *et al*. 2004); with a population of 490,268 in the City of Hamilton, this suggests over 637,000 cases per year. The estimated economic cost associated with health care and loss of productivity is $1089 per episode (Majowicz *et al*. 2006), with an annual cost for the City of Hamilton of around CAN$56.4 million.

The settings in which foodborne illness occur will clearly reflect changing food practices, including the specific foods that are eaten, how they are prepared and where they are consumed. In turn, the focus of efforts to reduce the incidence of foodborne illness must adjust to these changes in consumer behavior. Perhaps one of the most prominent trends is the increasing consumption of food outside of the home. In 2003, Canadian households spent CAN$1487 on food consumed outside of the home, representing 22% of their total in and out-of-home food expenditure (Statistics Canada 2004a). Overall, the value of sales by the foodservice sector, including restaurants, cafeterias and bars, across Canada was CAN$3.2 billion in 2004 (Statistics Canada 2005). Approximately 60% of expenditure on food outside the home is in table

[1] This includes gastrointestinal illness from all sources, including community-acquired infections (e.g., Norovirus), illnesses acquired while traveling, etc.

service restaurants, compared to 26% in fast-food restaurants (including take-out) and less than 10% each in cafeterias and other types of restaurants, such as snack bars and chip wagons (Statistics Canada 2003).

Reflecting the trend in increasing food consumption outside of the home, restaurants and other eating-out establishments are playing an increasing role as the risk setting for foodborne illness. On the basis of passive surveillance data, there were 3553 cases of enteric illness associated with eating at restaurants in Ontario over the period 1997–2001, accounting for 14.1% of cases where the risk setting was known (Lee and Middleton 2003). In the case of *Campylobacter* specifically, an even greater proportion of cases (16%) was associated with food consumed in restaurants.

The significant and increasing importance of food consumption outside of the home has highlighted the need to understand better the ways in which consumers make judgment about food safety in choosing where to eat. While many aspects of food safety are experience (or even credence) characteristics that can, at best, only be observed at some point following consumption (Henson and Caswell 1999), in the case of food consumption outside of the home many indicators that are used to judge the safety of food are unobservable, such as the conditions under which food is stored and where food is purchased. In such contexts, the availability of reliable and observable information cues is crucial (see e.g., Caswell *et al*. 2000). On the one hand, consumers must be able to perform their own protective behavior in choosing to not patronize establishments that are judged to pose an unacceptable food safety risk. On the other, in the context of reliable food safety information, reputational incentives can act through consumer demand to enhance food safety standards in restaurants (see e.g., Jin and Leslie 2003, 2005).

The research reported here aims to identify the information cues used by consumers in judging the safety of restaurants and other eating-out establishments. It builds on the existing literature that explores official inspection of restaurants and the utility of inspection notices and scoring schemes as a means of signaling to consumers the potential food safety risks associated with particular establishments (see e.g., Fielding *et al*. 1999; Jin and Leslie 2003, 2005; Jones *et al*. 2004; Simon *et al*. 2005). This research suggests that consumers utilize a range of safety indicators when making judgments on where to eat, of which inspection notices form only part. Previous studies on restaurant choice more generally provide some initial indications of the range of types of information that are utilized by consumers (see e.g., Auty 1992; Olsen *et al*. 2000; Cheang 2002; Gregory and Kim 2004).

The paper starts by bringing together the literature on restaurant choice and the role of inspection notices as sources of food safety-specific information in restaurant choice. The specific context of the study is then described, namely the regulation and inspection regime for restaurants and other eating-

out establishments in the City of Hamilton in Ontario, Canada. Results from the analysis of survey data on concerns about food safety in restaurants, information cues used to assess food safety and impacts on establishment choice, and the potential impacts of changes to the inspection regime in the City of Hamilton are reported. Finally, the implications for efforts to enhance food safety outside of the home are explored.

Consumer Judgments of Food Safety in Restaurants

The existing literature consists of two quite separate collections of studies that examine restaurant choice on the one hand, and the role of food safety inspection notices as a means to communicate food safety information on the other. Previous research has explored consumer preferences for restaurants (Auty 1992; Olsen *et al*. 2000; Cheang 2002; Gregory and Kim 2004), highlighting the role of food type and quality in determining the choice set of establishments considered on a particular occasion. Image, atmosphere, location, past experience and reputation act as decision variables in the selection of a specific restaurant from within this choice set (Auty 1992; Gregory and Kim 2004). The role of particular factors in restaurant choice has been shown to vary by the eating-out situation and dining occasion, and between individual consumers (Olsen *et al*. 2000; Johns and Pine 2002). While this literature does not shed light on the role of safety perceptions in restaurant choice *per se*, Tse *et al*. (2002) provide evidence that consumers associate crowded restaurants with high food quality and a good reputation, among other things, and lack of customers to poor-quality food and a poor reputation. This suggests that perceptions of food safety may be inherent in a broader set of cues that influence restaurant selection.

The safety of food served in restaurants is an experience characteristic, at least in the case of microbiological safety that is the focus here, in that the consumer makes an assessment postconsumption. At the same time, standards of hygiene in restaurants have been shown to vary significantly, e.g., by ownership and establishment type as indicated by the results of official food hygiene inspections (see e.g., Seiver and Hatfield 2000; Burkink *et al*. 2004; Jin and Leslie 2005). Thus, restaurant choice takes place within the context of imperfect and asymmetric information, with many of the key elements of a restaurant's operations that influence standards of hygiene being unobservable to the consumer. Under such contexts, consumers will look to observable information cues that they perceive to be associated with the restaurant's reputation for supplying safe food, in a similar manner to product choices under the same information conditions (see e.g., Nelson 1970). The key concern is that consumer demand in this context will not create sufficient incentives for restaurants to maintain acceptable levels of hygiene.

The economics literature provides some, although perhaps contradictory, insight into the role of information on consumer demand and the consequent reputational incentives for a firm to maintain minimum but unobservable levels of safety (Jin and Leslie 2003, 2005). For example, Borenstein and Zimmerman (1988) suggest that there are relatively weak reputational incentives for airlines to maintain safety on the basis of the demand effects of aircraft accidents, although the responsiveness of demand to such new information is dependent on the consumer's prior beliefs about safety. Likewise, Chipty and Witte (1998) find the quality of childcare services to be insensitive to information on the quality and price of firms providing childcare services. Conversely, Mathios (2000) provides evidence that the mandatory disclosure of fat content in salad dressings in the U.S.A. generated significant shifts in consumer demand toward lower fat products, in the context of a market where fat content varied widely among products that had not previously provided a nutrition label. A growing body of literature also illustrates the importance of information in establishing the reputation of buyers and sellers in Internet-based auctions (see e.g., Resnick and Zeckhauser 2002; Bajari and Hortacsu 2003).

In the specific context of restaurants and other eating-out establishments, a growing body of literature suggests that the provision of food safety-specific information in the form of inspection notices can have both a significant impact on establishment choice and resulting incentives for establishments to enhance their hygiene standards (Fielding *et al*. 1999; Jin and Leslie 2003, 2005; Jones *et al*. 2004; Simon *et al*. 2005). Inspection notices are issued on the basis of the outcome of official inspection, and vary with respect to the requirement that these notices be posted and in the level of information provided. At one extreme, inspection notices simply confirm that the establishment was inspected on a certain date and that the inspection was satisfactory. At the other, a letter grade and/or percentage score is provided, which indicates the performance of the establishment relative to some standard inspection schedule. For example, Jin and Leslie (2003) show how the mandatory posting of inspection score cards in restaurants both shifts consumer demand toward establishments with higher hygiene standards and induces the enhancements of hygiene standards in lower scoring establishments.

The use of inspection notices, and in particular notices based on scoring systems, as a mechanism to provide food safety-related information is controversial (Wiant 1999; Koeune *et al*. 2000; Seiver and Hatfield 2000). In particular, there are concerns that consumers may misinterpret inspection scores and/or be uncertain about their meaning. For example, Dundes and Rajapaksa (2001) illustrate how individual consumers have varying perceptions of the meaning of a particular grade or score on an inspection notice that they find difficult to relate to deficiencies in specific food safety practices. Further, the

use of a letter grade rather than a percentage score is revealed to have a different impact on the declared propensity of consumers to eat at a particular restaurant.

Bringing these two strands of literature together, the study reported here is based on the premise that consumers assess the safety of a particular restaurant on the basis of multiple information cues, some of which are only indirectly related to food safety *per se*, such as the number of customers and/or type of cuisine. Thus, food safety-specific information, while perhaps playing an important role in the overall information set of the consumer, is only one of a number of multiple cues (see e.g., Gregory and Kim 2004). At the same time, the impact of food safety-specific information will reflect the prior beliefs of the consumer regarding the safety of a particular establishment, perhaps on the basis of their past patronage or the experiences of friends and family (Olsen *et al*. 2000; Cheang 2002).

Restaurant Inspection in the City of Hamilton

In order to explore the ways in which consumers assess the safety of restaurants and other eating-out establishments, a study was undertaken of restaurant choice and the role of food safety information in the City of Hamilton, Ontario, Canada. As a starting point for this study, it was important to understand the prevailing regulatory regime in which restaurants operate in Hamilton, the degree to which the results of inspection are communicated to consumers and the manner in which this is undertaken. In turn, the availability of such food safety-specific information can be examined alongside the other information cues potentially used by food consumers in assessing restaurant safety.

In the province of Ontario, hygiene standards for food premises are established by the Ontario Ministry of Health and Long-Term Care (OMHLTC) under the Ontario Food Premises Regulation. Responsibility for implementing and enforcing this regulation, however, is delegated to local boards of health, in this case, the City of Hamilton. In order to ensure a common minimum standard of implementation and enforcement across the province, the OMHLTC has established Mandatory Program and Service Guidelines for food safety that require food premises to be inspected at least once annually and more frequently for premises that are judged to be of medium (every 6 months) or high risk (every 4 months) under a specified risk-based hazard analysis and critical control point protocol (OMHLTC 1998).

In 2003, the City of Hamilton was responsible for inspecting 2778 eating establishments (City of Hamilton 2004). A certificate of inspection is issued to each establishment that is deemed to comply with the requirements of the

Ontario Food Premises Regulation at the time of inspection. This certificate details the date of inspection and the fact that the establishment passed, and must be displayed at the entrance to the establishment. No indication is given of the performance of the establishment through a letter grade or percentage score. In the event that a serious food safety violation is identified, a certificate is not issued and the establishment is subject to reinspection. Establishments that are subject to an improvement order or conviction are posted on the City of Hamilton website for a period of 3 months and an advertisement is published in the local newspaper.

At the time of the study, the City of Hamilton was considering the introduction of a scorecard system broadly comparable to the Food Premises Inspection and Disclosure System operated by the City of Toronto (City of Toronto 2003). Under this system, three categories of inspection certificate are issued on the basis of the inspection: (1) pass certificate (colored green) with substantial compliance or minor infractions; (2) conditional pass certificate (colored yellow) with significant infractions; and (3) closed certificate (colored red) with crucial infractions and where an order to close the establishment has been issued. Since January 2001, all food establishments in the City of Toronto have been required to display one of these three certificates (City of Toronto 2003). The potentially controversial element of this system is the yellow certificate, with particular concerns about the scope for consumer misunderstanding. Indeed, consumer research in the City of Toronto has shown that 35.5% of consumers are not aware of the meaning of the yellow certificate (City of Toronto 2003). One of the aims of the current study was to assess how consumers would be likely to respond to the use of yellow cards in the City of Hamilton.

MATERIALS AND METHODS

The overall objective of the study was to ascertain the manner in which food consumers assess the safety of restaurants and other eating-out establishments and the impact on their restaurant choices. More specifically, the aim was to determine:

(1) the sources of information used to assess the safety of restaurants;
(2) the influence that the assessment of restaurant safety has on restaurant choice; and
(3) the perceptions of the nature of official inspection and control of restaurants.

The study involved two stages of data collection that progressed from qualitative to quantitative over the period of September to December 2003. In

the first stage, two focus groups were undertaken with food consumers residing in the City of Hamilton who were recruited by telephone. Participants had to be able to communicate in English, not be employed in the food sector and not have participated in a focus group during the previous 12 months. The two groups were stratified by age, namely 20 to 35 years and 36 to 65 years. The focus groups followed a semistructured guide designed on the basis of a review of the literature and consultation with inspection officials and academic researchers. The focus group discussions were audio-recorded and transcribed for analysis using N-VIVO (Henson *et al*. 2005).

On the basis of the analysis of the focus groups, a structured postal questionnaire was designed. The questionnaire was pretested using a convenience sample of 10 food consumers and revised according to the feedback obtained. A sampling frame of names linked to residential addresses in the City of Hamilton was obtained from the Ontario Property Assessment System database, provided by the Municipal Property Assessment Corporation. This database uses occupant information to create municipal and school board voter lists, juror lists and population counts for each municipality in Ontario. Using a random number generator, a sample of 1000 households was obtained.

From the sample of 1000 recipients, 321 valid responses were obtained, representing a response rate of 32.1%. Of the respondents, 66.5% were female. The age distribution of respondents was approximately in accordance with the 2001 census for the City of Hamilton, although with slight over-representation of individuals in the 60 years and older age group. Among the respondents, 75.3% had access to the Internet, a potentially important source of food safety-specific information relating to restaurants (see earlier discussion), compared to 46.5% of households in the City Hamilton according to a survey by Statistics Canada (2004b).

To assess the possibility of nonresponse bias, an extrapolation method was employed based on the notion that persons responding later are likely to be similar to nonrespondents (Armstrong and Overton 1977). On the basis of *t*-tests for independent samples, there was no significant difference (at the 5% level) between late and early survey respondents in terms of gender, age and age when left full-time education. This suggests that nonresponse bias was not a problem in the sample.

RESULTS

Eating-out Behavior

Among respondents to the survey, 76.2% consumed food outside of the home at least once per week, and of these, 36.3% consumed food outside the

home several times per week. The most popular establishment types were coffee bars and take-outs, which were patronized at least once per week by 52.2 and 45.3% of respondents, respectively (Table 1). At the same time, however, 10.1 and 14.1% of respondents respectively never consumed food outside of the home in take-out restaurants or coffee bars. Around 61% of respondents patronized sit-down restaurants less than once per week, although only 8% never ate at a sit-down restaurant.

Concerns about Restaurant Safety and Impact on Restaurant Choice

To provide an indicator of the extent to which consumers are concerned about the safety of food in restaurants, respondents indicated how sure they were that the food they ate at restaurants in the City of Hamilton was safe, using a 5-point Likert scale from 5 = "very sure" to 1 = "very unsure." A relatively small proportion (14.9%) was unsure or very unsure about the safety of food in restaurants, while 46.2% were sure or very sure. However, there was a significant middle ground of respondents (38.9%) who were neither sure nor unsure about the safety of food in restaurants, indicating a degree of ambiguity. This was confirmed by the mean scale score across the sample as a whole, which at 3.35 appears to indicate some degree of uncertainty over the safety of restaurant food. These results differ quite markedly from the data provided by an ongoing telephone survey on public health issues among a random sample of adults across public health units in Ontario (RRFSS 2003, 2004). These data suggest that over 60% of adults in the City of Hamilton consider the food in restaurants to be safe to eat. This suggests, perhaps, that the study sample consists of a greater proportion of more concerned consumers with respect to restaurant food safety.

Among respondents, 38.7% reported having been ill after eating at a restaurant. Of these, only 17.2% had consulted their family practitioner, while an even smaller proportion (7.4%) had reported the illness to the public health department. It should be noted, however, that these results reflect the perceptions of consumers regarding the cause(s) of foodborne illness they have suffered, rather than the frequency with which food eaten at a restaurant is the actual vehicle of infection. In view of the variable and sometimes quite long incubation periods for the various causes of gastrointestinal illness, consumers may misperceive the frequency with which episodes of foodborne illness are actually caused by food eaten in restaurants. Indeed, analysis of the focus group data suggests a tendency for consumers to relate episodes of foodborne illness to the last food they had eaten and/or food over which they had little or no role in preparation (Henson *et al*. 2005).

Of salience to the current research is the extent to which concerns about food safety influence restaurant choice. Among respondents to the survey,

TABLE 1.
FREQUENCY OF EATING OUTSIDE THE HOME BY LOCATION ($n = 314$)

Frequency	Sit-down restaurant	Take-out	Coffee bar	Bakeries	Bar/Pub	Other
Never	25 (8.0%)	28 (10.1%)	43 (14.1%)	120 (39.9%)	141 (47.0%)	313 (97.2%)
Less once per week	191 (60.8%)	124 (44.6%)	103 (33.8%)	139 (46.2%)	130 (43.3%)	2 (0.6%)
Once per week	80 (25.5%)	84 (30.2%)	53 (17.4%)	33 (11.0%)	24 (8.0%)	1 (0.3%)
Several times per week	18 (5.7%)	41 (14.7%)	67 (22.0%)	7 (2.3%)	4 (1.3%)	0 (0.0%)
Once per day	0 (0.0%)	1 (0.4%)	39 (12.8%)	2 (0.7%)	1 (0.3%)	0 (0.0%)

TABLE 2.
UNPROMPTED MENTIONS OF RESTAURANT TYPES AND FOODS ABOUT WHICH RESPONDENTS HAD PARTICULAR FOOD SAFETY CONCERNS ($n = 322$)

Establishment/food type	Number of mentions	Proportion of respondents (%)
Fast food	70	19.5
Chinese	64	17.8
East Indian	39	10.9
Barbeque/outdoor	27	7.5
Seafood	25	7.0
Buffet-type	20	5.6
Japanese	19	5.3
Chicken/poultry	19	5.3
Family-owned	19	5.3
Salads and cold foods	16	4.5
Bars/pubs	13	3.6
Steakhouses	10	2.8
Coffee shops	9	2.5
Supermarket meals	9	2.5

56.4% indicated that they had stopped eating at a restaurant they had previously frequented because of concerns about food safety. Further, 47.6% had chosen to not eat at a restaurant that they had never patronized previously because of food safety concerns. It was evident from the focus groups that perceptions of the safety of food in restaurants vary according to establishment type and cuisine. In order to capture this, survey respondents were asked to list up to three particular types of restaurant or food eaten outside the home over which they had particular food safety concerns. The most frequently cited restaurant types and foods were fast food, Chinese and East Indian (Table 2). At the other extreme, bars/pubs, steakhouses, coffee shops and supermarket meals were mentioned by only a small number of respondents.

Awareness of Restaurant Closures/Violations

Perhaps the most explicit indicator of restaurant safety is the level of establishment closure and/or conviction because of food safety reasons. On the one hand, high rates of closure/conviction could be used as an indicator of low food safety standards. On the other, the fact that violative establishments had been closed or convicted could signify that official control and enforcement systems are working effectively. Analysis of the focus group data suggests that the former of these interpretations tends to predominate among consumers, especially in the case of restaurants or foods for which consumers have particular concerns, e.g., fast-food and Chinese restaurants (see earlier discussion) (Henson *et al*. 2005).

TABLE 3.
IMPORTANCE SCORES FOR SOURCES OF INFORMATION ON RESTAURANTS CLOSED OR SUBJECT TO CONVICTION FOR HEALTH/SAFETY REASONS ($n = 305$)

Source of information	Mean
Inspection certificate posting at restaurant	4.57 (0.234)
Newspapers	4.43 (0.345)
Television	4.34 (0.331)
Radio	4.22 (0.381)
Friends/relatives	4.04[a] (0.370)
City of Hamilton website	3.99[a] (0.370)
City of Hamilton telephone help-line	3.65 (0.418)
Internet search	3.44 (0.458)

Importance scores were on a 5-point Likert scale from 5 = "very important" to 1 = "very unimportant".
Mean scores not significantly different at 5% level denoted by the same letter.
SD is in parentheses.

Among survey respondents, 59.3% could remember having heard about a restaurant in the City of Hamilton being closed and/or convicted for food safety reasons in the last 5 years. Respondents were asked how they had heard about this particular instance of a restaurant closure and/or conviction. By far the most frequently cited sources of information were local newspapers (48.4%) and radio or television news reports (21.8%). Only 13.8% of respondents that could recollect hearing of a restaurant closure and/or conviction for food safety reasons had heard about this instance through word of mouth, e.g., from friends or work colleagues.

More generally, respondents were asked the importance of particular sources of information in identifying whether a restaurant had been closed and/or convicted on a 5-point Likert scale from 5 = "very important" to 1 = "very unimportant." Again, newspapers, television and radio were considered important sources of information (Table 3), although more important was the inspection certificate posted at the establishment. This suggests that, while the media may be predominant sources of information on restaurant closure and/or conviction for high-profile cases, on a day-to-day basis when choosing where to eat, inspection certificates are a more prominent source of information. Indeed, this is supported by the analysis of the focus group data, which suggests that participants recognized that they could probably only recollect "extreme" cases of restaurant closure and/or conviction through the media and relied on inspection certificates to identify "problem cases" more generally (Henson *et al*. 2005). At the same time, however, they rarely took the time and

effort to consult information on the City of Hamilton's website or by contacting the public health department. This was corroborated by the survey results (Table 3).

Assessing the Safety of Restaurants

One of the key objectives of the current research was to identify the ways in which consumers assess the safety of restaurants in making choices as to which establishments to patronize. More specifically, given that food safety is predominantly an experience characteristic associated with eating outside the home (see earlier discussion), what observable indicators do consumers use to assess the safety of food in restaurants? Respondents were presented with a series of observable indicators that were identified through analysis of the focus groups and, using a 5-point Likert scale from 5 = "very important" to 1 = "very unimportant", were asked to indicate the importance of each in determining if a restaurant was a safe place to eat. Overall, the most important indicators related to observed cleanliness, of the kitchen, cutlery and dishes, eating area and bathrooms (Table 4). Other important factors included the quality of food, appearance and/or attitude of staff, inspection notice in the window of the establishment and the general appearance of the restaurant.

TABLE 4.
IMPORTANCE SCORES FOR ATTRIBUTES USED IN DETERMINING SAFETY OF A RESTAURANT ($n = 319$)

Attribute	Mean
Cleanliness of kitchen	4.93[a] (0.209)
Cleanliness of cutlery, dishes, etc.	4.92[a] (0.213)
Cleanliness of eating area	4.88 (0.208)
Cleanliness of bathrooms	4.79 (0.302)
Quality of food	4.69 (0.318)
Appearance and/or attitude of staff	4.47[b] (0.505)
Inspection notice in window	4.44[b] (0.564)
General appearance	4.42[b] (0.539)
Reviews in newspapers, radio, etc.	4.14 (0.322)
Views of friends and/or family	4.04 (0.354)
Type of food served	3.79[c] (0.643)
Cost/price of restaurant	3.74[c] (0.629)
Length of time restaurant has been open	3.32[d] (0.703)
Number of people eating in restaurant	3.31[d] (0.752)

Importance scores were on a 5-point Likert scale from 5 = "very important" to 1 = "very unimportant."
Mean scores not significantly different at 5% level denoted by the same letter.
SD is in parentheses.

Contrary to previous research (see e.g., Tse *et al*. 2002), however, the number of people eating in the restaurant and the length of the time the establishment had been open were relatively unimportant indicators of food safety.

In order to make better sense of the importance scores for indicators of restaurant safety and identify underlying broad constructs, the scores were subjected to principle components analysis, using a varimax rotation with Kaiser normalization (Harman 1976; Kim and Mueller 1978; Dunteman 1989). Sampling adequacy as measured using the Kaiser–Meyer–Olkin was 7.83. Four principal components with Eigenvalues greater than one were retained, accounting for 79.6% of the variance in importance scores across the sample (Table 5).

The first factor, accounting for 36.4% of variation across the sample loaded most strongly onto "cleanliness of eating area," "cleanliness of kitchen," "cleanliness of bathroom" and "cleanliness of cutlery/dishes," suggesting a strong association with the *observed standard of hygiene* in the establishment. Indicators loading most heavily onto the second factor were "cost/price of restaurant," "quality of food," "appearance and/or attitude of staff," "type of food served" and "general appearance of restaurant." This factor would appear to represent the *overall quality of the restaurant* and accounted for 19.8% of the variation across the sample. The third factor accounted for 12.7% of variation and was associated with the *level of patronage* in the restaurant, with heavy loadings for "number of people eating in the restaurant" and "length of time the restaurant has been open." Finally, the fourth factor loaded most heavily onto "reviews in newspapers, radio etc.," "inspection notices in window" and "views of friends and/or family" and accounted for 10.7% of the variation across the sample. This factor would appear to be associated with *external information* on restaurant safety.

These results suggest that there are four distinct categories of indicators used by consumers to assess the safety of restaurants as places to eat, of which the most important is the consumer's own assessment of the standards of hygiene in the establishment based on visible cues, alongside the overall quality of the restaurant, including food, staff and general appearance. External sources of information, including inspection notices and information from the media, friends and relatives, appear to have been of lesser importance. Overall, this suggests that respondents relied more heavily on their own assessment of the safety of a restaurant as a place to eat on the basis of a series of observable indicators, rather than the views of others and official controls. It is in this context that the role of inspection as a means of communicating information to consumers on hygiene in restaurants needs to be examined.

In order to identify whether particular subsets of consumers make more or less use of these four distinct indicators when assessing the safety of restaurants, the factor scores were subjected to cluster analysis with squared

TABLE 5.
FACTOR LOADINGS FOR IMPORTANCE SCORES FOR ATTRIBUTES USED IN DETERMINING SAFETY OF A PLACE TO EAT

	Observed standard of hygiene	Overall quality of restaurant	Level of patronage	External information
Attribute				
Cleanliness of eating area	0.796	0.284	0.002	0.056
Cleanliness of bathrooms	0.709	0.107	0.089	0.097
Cleanliness of cutlery, dishes, etc.	0.705	0.201	0.046	0.012
Cleanliness of kitchen	0.645	0.012	0.007	0.250
Cost/price of restaurant	0.003	0.726	0.200	0.116
Quality of food	0.293	0.718	0.009	0.120
Appearance and/or attitude of staff	0.239	0.663	0.067	0.150
Type of food served	0.013	0.640	0.472	0.120
General appearance	0.351	0.602	0.114	0.064
Number of people eating in restaurant	0.124	0.140	0.883	0.152
Length of time restaurant has been open	0.009	0.092	0.873	0.193
Reviews in newspapers, radio, etc.	0.047	0.233	0.045	0.753
Inspection notice in window	0.100	0.131	0.091	0.693
Views of friends and/or family	0.058	0.031	0.270	0.663
Proportion of variation (%)	36.4	19.8	12.7	10.7

Euclidian distance using the Ward algorithm (Aldenderfer and Blashfield 1984). The four-cluster solution was chosen as the best fit to the survey data (Table 6). Cluster 1, accounting for 43.1% of respondents, utilized both the observed standard of hygiene and overall quality of the restaurant to assess food safety, suggesting a reliance on *self-assessment of hygiene and quality*. Clusters 2 and 3 based their assessment on the overall quality of the restaurant and external information, suggesting that they were reliant on *self-assessment of quality* and *advice from others*, respectively. These two clusters accounted for 26.6 and 24.8% of respondents, respectively. The final cluster, accounting for only 5.5% of respondents, assessed the food safety in restaurants on *previous and existing customers*; specifically, how long a restaurant had been open and the number of diners.

In order to explore the ways in which use of the four identified indicators of food safety in restaurants differed by socioeconomic characteristics, the demographic composition of the four clusters was explored (Table 7). Membership of cluster 1, which predominantly compared the safety of restaurants on the basis of observed standards of hygiene and the overall quality of the restaurant, had over-representation of respondents in older age groups, most notably 60 to 69 years and over 70 years, respondents with an undergraduate or postgraduate degree and individuals that could recollect the closure and/or conviction of a restaurant for food safety reasons compared to the study sample as a whole. The gender balance of cluster 1 was approximately in accordance with the sample as a whole. Cluster 2, which predominantly assessed restaurant safety on the basis of the overall quality of the restaurant, had over-representation of females and respondents that had only completed high school education or less, and that had no recollection of the closure and/or conviction of a restaurant for food safety reasons.

Cluster 3 is of particular interest because it relates to the use of external information, including reference to certification certificates in the window of restaurants. This cluster had over-representation of men, respondents in younger age groups and with an undergraduate or postgraduate degree. There was also over-representation of respondents that could recollect the closure and/or prosecution of a restaurant for reasons related to food safety. Arguably, these respondents were both more aware of and were concerned about food safety when eating outside of the home and the existence and purpose of official inspection certificates as indicators of standards of hygiene. Credence was given to this assertion by analysis of the focus groups.

Finally, cluster 4, to which only a small proportion of respondents belonged and which predominantly based their assessment of food safety in restaurants on the level of patronage, had over-representation of the youngest (aged 18 to 30 years) and oldest (70 years and over) age groups, respondents that had only completed high school or less, and had no recollection of the

TABLE 6.
CLUSTERS OF FACTOR LOADINGS FOR ATTRIBUTES USED IN DETERMINING RESTAURANT SAFETY

Factor	Cluster			
	Self-assessment of hygiene and quality	Self-assessment of quality	Advice from others	Previous and existing customers
Standard of hygiene	0.85126	0.27079	0.11395	–3.13280
Overall quality of restaurant	0.61345	0.96801	–1.05287	–0.13642
Level of patronage	0.12396	–0.30432	–0.32016	0.59524
External information	0.21073	–1.18934	0.68454	–0.52430
Number of cases	125 (43.1%)	77 (26.6%)	72 (24.8%)	16 (5.5%)

TABLE 7.
CLUSTER MEMBERSHIP BY RESPONDENT CHARACTERISTICS

Characteristic	Self-assessment of hygiene and quality	Self-assessment of quality	Advice from others	Previous and existing customers	Total sample
Sex					
Male	42 (30.9%)	10 (11.9%)	44 (56.4%)	5 (29.4%)	101 (32.1%)
Female	94 (69.1%)	74 (88.1%)	34 (43.6%)	12 (70.6%)	214 (67.9%)
Age (years)					
18 to 30	4 (2.9%)	18 (21.4%)	4 (5.1%)	6 (35.3%)	32 (10.1%)
31 to 39	17 (12.4%)	16 (19.0%)	22 (28.3%)	2 (11.8%)	57 (18.0%)
41 to 49	40 (29.2%)	14 (16.7%)	28 (35.9%)	2 (11.8%)	84 (26.6%)
50 to 59	28 (20.4%)	14 (16.7%)	18 (23.1%)	2 (11.8%)	62 (19.6%)
60 to 69	25 (18.2%)	10 (11.9%)	3 (3.8%)	2 (11.8%)	40 (12.7%)
70+	23 (16.9%)	12 (14.3%)	3 (3.8%)	3 (17.5%)	41 (13.0%)
Highest level of education obtained					
High school or less	28 (21.5%)	55 (68.7%)	8 (10.7%)	11 (64.7%)	102 (33.8%)
Undergraduate degree	53 (40.8%)	20 (25.0%)	40 (53.3%)	4 (23.5%)	117 (38.7%)
Postgraduate degree/training	49 (37.7%)	5 (6.3%)	27 (36.0%)	2 (11.8%)	83 (27.5%)
Recollect closure and/or conviction of restaurant in the City of Hamilton for food safety reasons					
Yes	101 (71.7%)	24 (28.2%)	60 (76.9%)	3 (17.6%)	188 (59.7%)
No	36 (26.3%)	61 (71.8%)	18 (23.1%)	14 (82.4%)	129 (40.1%)

closure and/or conviction of a restaurant for food safety reasons. Arguably, these respondents were less well informed about food safety in restaurants and/or less concerned, perhaps making little distinction between other expectations of a restaurant (e.g., the quality of the food) and food safety issues. Credence was given to this assertion by analysis of the focus group data (Henson *et al*. 2005).

Official Inspection of Restaurants

Having identified the role of official inspection certificates alongside other indicators of food safety in selecting a restaurant, the research proceeded to explore consumer perceptions of restaurant inspection in the City of Hamilton. As discussed earlier, in principle, restaurant inspection has a dual role; on the one hand aiming to guarantee a *de minimus* standard of hygiene in eating establishments, while on the other signaling to consumers the relative food safety standards of particular establishments. The results discussed so far indicate that official inspection certificates are an important source of food safety information, particularly within the subgroup of consumers that put most reliance on external information sources in making judgments of restaurant food safety. Presumably, consumers use such information on the basis of their beliefs regarding the level and nature of restaurant inspection, which may or may not bear much resemblance to the current system of inspection in place in the City of Hamilton.

As a first step in understanding consumer perceptions of official restaurant inspection in the City of Hamilton, respondents were presented with a series of agencies – City of Hamilton, Province of Ontario, Federal Government and private inspectors – and were asked to indicate which they considered undertook food safety inspections of restaurants. They were provided with an opportunity to add further agencies to this list if they so wished. The City of Hamilton was correctly identified as undertaking food safety inspections of restaurants by 83% of respondents (Table 8). However, 32.5 and 10.9% of respondents incorrectly believed that the province of Ontario and the Federal Government, respectively, were involved in restaurant inspection. More generally, 42.3% of respondents mistakenly understood that multiple agencies undertook food safety inspection of restaurants; restaurant inspection for the City of Hamilton is the sole responsibility of the municipal government, as described earlier.

Respondents were asked how they were aware if and when a restaurant had been inspected, being presented with a series of potential information sources and also being provided with the opportunity to add further sources. The vast majority (81%) of respondents indicated that they were informed about the inspection of an establishment through the certificate posted on the

TABLE 8.
PARTICIPANT PERCEIVED RESPONSIBILITY FOR MONITORING RESTAURANT HYGIENE IN THE CITY OF HAMILTON

Inspection authority	Frequency	Proportion of cases (%)
City of Hamilton	258	83.0
Province of Ontario	101	32.5
Private inspectors	58	18.6
Federal Government	34	10.9
Department of Health	5	1.6

TABLE 9.
MEANS THROUGH WHICH RESPONDENTS WERE AWARE OF RESTAURANT INSPECTION IN CITY OF HAMILTON

Means	Frequency	Proportion of cases (%)
Sign/certificate posted on door/window	256	81.0
Local newspaper	73	23.1
Website	11	3.5
Radio	3	0.9
Friends	1	0.3
Don't know	66	20.9

door/window, suggesting a very high level of awareness of the presence of, and information carried by, inspection certificates (Table 9). The only other significant source of information on restaurant inspections was local newspapers. Interestingly, 20.9% of respondents did not know where they obtained information on restaurant inspections.

In order to gauge the extent to which consumers have an accurate perception of the level of regulation and enforcement of food safety standards in restaurants provided by official inspections, respondents were asked how frequently they considered a restaurant was inspected in the City of Hamilton. Overall, 54.8% of respondents considered that restaurants were inspected twice in an average year or more frequently, while 76.7% considered restaurants were inspected at least once per year (Table 10). These perceptions compare with actual inspection rates of 1.6 visits per restaurant per year (4632 inspections of 2785 establishments) in 2003 (City of Hamilton 2004), suggesting that a significant proportion of respondents overestimated the frequency of inspection. At the same time, however, a significant minority (27.4%) of respondents significantly underestimated the frequency of inspection, with 14.5% believing that there was no routine inspection at all.

TABLE 10.
CONSUMER PERCEPTIONS OF THE FREQUENCY OF RESTAURANT INSPECTION

Frequency of inspections	Frequency
Every month	40 (12.9%)
Four times a year (every 3 months)	62 (20.0%)
Two times a year (every 6 months)	68 (21.9%)
Once a year	68 (21.9%)
Once every 2 years	13 (4.2%)
Once every 3 years	10 (3.2%)
Less than once every 3 years	4 (1.3%)
Only when a complaint is received	45 (14.5%)

Respondents were also asked to provide an estimate of the proportion of restaurants in the City of Hamilton that were prosecuted and that were closed for food safety violations in an average year. Across the sample, the mean proportion of restaurants estimated to be closed ranged from 0 to 75%, with a mean of 8.8% (SD = 12.7). This compares with an actual prosecution rate in the City of Hamilton of 0.43% (12 charges of 2785 establishments) in 2003 (City of Hamilton 2004). Likewise, respondents grossly overestimated the rate of closure of restaurants because of food safety violations; respondents estimated that an average of 8% (SD = 9.4) of food establishments were closed each year compared with an actual closure rate in 2003 of 0.39% (11 closures of 2785 establishments).

These results suggest that consumers have a rather poor understanding of the level and outcome of official inspection activities in the City of Hamilton. On the one hand, a majority of the survey respondents overestimated the frequency of inspection, a notable minority significantly so. On the other hand, rates of prosecution or closure because of food safety violations were grossly overestimated, suggesting that respondents were either overly pessimistic about the standard of hygiene in restaurants or overestimated the propensity of the Public Health Department to pursue a prosecution or closure when significant violations were identified. Regardless, these results suggest that consumers may misperceive the level of oversight provided through official inspection and, as a consequence, derive misperceived information on standards of food safety from official inspection certificates.

Impact of "Conditional Pass"

At the time of the study, inspection certificates in the City of Hamilton provided only limited information on the outcome of official inspection, namely the date of the current and last inspection and confirmation that the

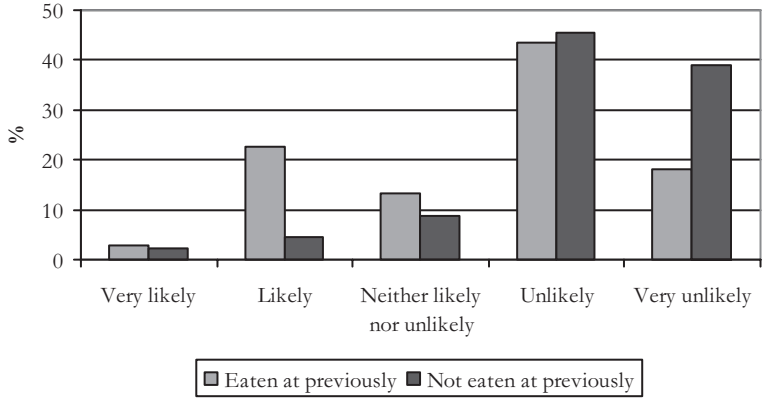

FIG. 1. LIKELIHOOD OF EATING AT RESTAURANT WITH "CONDITIONAL PASS" ACCORDING TO PREVIOUS PATRONAGE

establishment achieved a satisfactory standard. There were no details of the level and nature of any infractions. However, at the time of the study the Public Health Department was considering the introduction of a "conditional pass," in a similar manner to the City of Toronto (City of Toronto 2003) in the event of infractions that needed to be addressed but that did not pose an immediate food safety hazard. At this time there appeared to be public demand for a graduated portfolio of outcomes – full pass, conditional pass and failure – from official inspection as a means to communicate more detailed food safety information to consumers. However, the Public Health Department was not convinced that such a system would provide enhanced incentives for underperforming restaurants to enhance their hygiene standards, and thus result in higher rates of compliance.

To investigate the impact of the introduction of the "conditional pass" as an additional outcome of official inspection, survey respondents were asked how likely they would be to eat in a restaurant that had obtained a "conditional pass" (as indicated by the posted inspection certificate) using a 5-point Likert scale from 5 = "very likely" to 1 = "very unlikely". In so doing, respondents were asked to consider each of two scenarios; that they had eaten at the restaurant previously and that they had not eaten at the restaurant previously. Across both scenarios, the "conditional pass" had a significant and negative impact on the likelihood of respondents eating at the restaurant. There were, however, distinct reactions to a "conditional pass" on the basis of prior patronage, with 61.5% of respondents unlikely or very unlikely to eat at the restaurant if they had eaten at the restaurant previously, compared with 84.7% if they had no prior experience of the restaurant (Fig. 1).

These results suggest that, while the use of a "conditional pass" provides rather limited food safety information to consumers, and is far from the graduated measure of hygiene standards provided by inspection scores or grades, there is a significant impact on self-reported restaurant choice. Indeed, the use of a "conditional pass" might be considered a rather blunt instrument that is likely to bring about quite significant shifts in consumer behavior. At the same time, however, the results suggest that consumers temper the information provided by information certificates through their own experiences, substantiating the results presented here on the indicators used to assess food safety in restaurants. Indeed, 25.5% of respondents indicated that they were likely or very likely to eat in a restaurant that they had patronized previously, even if it were given a "conditional pass." The use and impacts of inspection certificates as a means to signal food safety information to consumers need to be interpreted in this context.

DISCUSSION

This study provides the first in-depth analysis of the ways in which consumers assess the safety of food in restaurants and the resultant impact on restaurant choice. It builds on the existing literature that explores the impact of hygiene inspection scorecards, illustrating how consumers use a range of observable indicators as proxies for the experience and/or credence characteristics associated with food safety hazards. These indicators include the consumer's own observation on standards of hygiene, broader concepts of restaurant quality, levels of patronage and external sources of information, of which official inspection certificates form one part. In turn, perceptions of food safety have a significant impact on restaurant choice, both in terms of the propensity to try new establishments and continued patronage of establishments that had been frequented previously. While the majority of respondents in the study based their assessments of restaurant safety predominantly on observed hygiene standards and overall restaurant quality, external information sources were the predominant cues for a minority. However, even in this latter case, official inspection certificates and other external information sources were utilized alongside other indicators, emphasizing the multiple attribute nature of consumer assessments of food safety when eating out. Further, the relative importance of particular indicators differs according to gender, age, level of education and perceptions of restaurant safety, among other factors. The role and impact of official inspection certificates as sources of food safety information need to be interpreted in this context.

While official inspection certificates can communicate food safety-related information to consumers, which in turn influences restaurant choice

and creates incentives for the enhancement of hygiene standards (Jin and Leslie 2003, 2005), there are concerns that consumers may not have a clear idea of what inspections entail. Indeed, the results of the current study suggest that consumers may not comprehend all of the information provided by inspection certificates, e.g., the date of the last inspection of an establishment or the frequency of inspection to which that establishment has been subject. Further, they may have rather exaggerated perceptions of the rate of serious food hygiene infractions, related perhaps to the predominance of the media as a source of information. While graduated inspection certificates, such as the use of the "conditional pass," in principle communicate greater information to consumers on the food safety standards of a particular establishment than a simple "pass" or "fail," the study results suggest that this can result in significant swings in behavior that may bear little relationship to the actual food safety risks associated with food hygiene infractions.

The results detailed here highlight the need for further research on consumer perceptions of food safety in the context of food consumption outside of the home. At the same time, however, the study suggests that the role of inspection certificates as information cues should be examined within the context of the multiple indicators used by consumers in assessing the safety of particular establishments, including their own past patronage experience. Clearly, we need to understand better the impact of different levels and forms of inspection result information on choice behavior, and thus the incentives for restaurants to enhance their hygiene standards, and how these impacts differ between consumer subgroups and types of restaurants.

REFERENCES

ALDENDERFER, M.S. and BLASHFIELD, R.K. 1984. *Cluster Analysis*. Sage Publications, Thousand Oaks, CA.

ARMSTRONG, J.S. and OVERTON, T.S. 1977. Estimating non-response bias in mail surveys. J. Marketing Res. *14*, 396–402.

AUTY, S. 1992. Consumer choice and segmentation in the restaurant industry. Serv. Ind. J. *12*(3), 324–339.

BAJARI, P. and HORTACSU, A. 2003. Winner's curse, reserve prices and endogenous entry: Empirical insights from eBay auctions. RAND J. Econ. *34*(2), 329–355.

BORENSTEIN, S. and ZIMMERMAN, M.B. 1988. Market incentives for safe commercial airline operation. Am. Econ. Rev. *78*(5), 913–935.

BURKINK, T., HUGHNER, R. and MARGUARDT, R. 2004. Health department violations in restaurants by ownership and format types. J. Foodserv. Bus. Res. *7*(1), 97–115.

CASWELL, J.A., NOELKE, C.M. and MOJDUSZKA, E.M. 2000. Unifying two frameworks for analyzing quality and quality assurance for food products. In *Global Food Trade and Consumer Demand for Quality* (B. Krissoff, M. Bohman and J.A. Caswell, eds.), Kluwer Academic, New York, NY.

CHEANG, M. 2002. Older adults' frequent visits to a fast-food restaurant: Non-obligatory social interaction and the significance of play in a "third place". J. Aging Studies *16*, 303–321.

CHIPTY, T. and WITTE, A.D. 1998. *Effects of Information Provision in a Vertically-Differentiated Market*. NBER Working Paper 6493. National Bureau of Economic Research, Cambridge MA.

CITY OF HAMILTON. 2004. Personal correspondence. Public Health Department, Hamilton, Canada.

CITY OF TORONTO. 2003. *Evaluation of the Food Premises Inspection and Disclosure System*. City of Toronto, Toronto, Canada.

DUNDES, L. and RAJAPAKSA, S. 2001. Scores and grades: A sampling of how college students and food safety professionals interpret restaurant inspection results. J. Environ. Health *64*(5), 14–19.

DUNTEMAN, G.H. 1989. *Principle Components Analysis*. Sage Publications, Newbury Park, CA.

FIELDING, J.E., AGUIRRE, A., SPEAR, M.C. and FRIAS, L.E. 1999. Making the grade: Changing the incentives in retail food establishment inspection. Am. J. Prev. Med. *17*(3), 243–247.

GREGORY, S. and KIM, J. 2004. Restaurant choice: The role of information. J. Foodserv. Bus. Res. *7*(1), 81–95.

HARMAN, H.H. 1976. *Modern Factor Analysis*. University of Chicago Press, Chicago, IL.

HENSON, S. and CASWELL, J. 1999. Food safety regulation: An overview of contemporary issues. Food Policy *24*, 589–603.

HENSON, S.J., MAJOWICZ, S., MASAKURE, O., SOCKETT, P., JONES, A., HART, R., CARR, D. and KNOWLES, L. 2005. *How Do Consumers Assess the Safety of Restaurants? Results of a Qualitative Investigation*. Department of Agricultural Economics and Business, University of Guelph, Ontario, Canada.

JIN, G.Z. and LESLIE, P. 2003. The effect of information on product quality: Evidence from restaurant hygiene grade cards. Q. J. Econ. *120*(May), 409–451.

JIN, Z.G. and LESLIE, P. 2005. *Reputational Incentives for Restaurant Hygiene*. University of Maryland, College Park, MO.

JOHNS, N. and PINE, R. 2002. Consumer behaviour in the foodservice industry: A review. Hosp. Man. *21*, 199–134.

JONES, T.F., PAVLIN, B.I., LAFLEUR, B.J., INGRAM, L.A. and SCHAFFNER, W. 2004. Restaurant inspection scores and food-borne diseases. Emerg. Infect. Dis. *10*(4), 688–692.

KIM, J-O. and MUELLER, C.W. 1978. *Factor Analysis: Statistical Methods and Practical Issues*. Sage Publications, Newbury Park, CA.

KOEUNE, T., SCHROTH, J.E., HOLMES, K.A. and HELMESTETTER, J.R. 2000. Should inspection reports be published? J. Environ. Health *68*(8), 27–32.

LEE, M.B. and MIDDLETON, D. 2003. Enteric illness in Ontario, Canada from 1997 to 2001. J. Food Prot. *66*(6), 953–961.

MAJOWICZ, S.E., DORE, K., FLINT, J.A., EDGE, V.L., READ, S., BUFFETT, M.C., MCEWEN, S., MCNAB, W.B., STACEY, D., SOCKETT, P. *et al*. 2004. Magnitude and distribution of acute, self-reported gastrointestinal illness in a Canadian community. Epidemiol. Infect. *132*, 607–617.

MAJOWICZ, S.E., EDGE, V.L., FAZIL, A., MCNAB, W.B., DORE, K.A., SOCKETT, P.N., FLINT, J.A., MIDDLETON, D., MCEWEN, S.A. and WILSON, J.B. 2005. Estimating the under-reporting rate of infectious gastrointestinal illness in Ontario. Can. J. Public Health *96*(3), 178–181.

MAJOWICZ, S.E., MCNAB, W.B., SOCKETT, P., HENSON, S.J., DORE, K., EDGE, V.L., BUFFETT, M.C., READ, S., MCEWEN, S., STACEY, D. *et al*. 2006. The burden and cost of gastroenteritis in a Canadian community. J. Food Prot. *69*(3), 651–659.

MATHIOS, A.D. 2000. The impact of mandatory disclosure laws on product choices: An analysis of the salad dressing market. J. Law Econ. *43*, 651–677.

NELSON, P. 1970. Information and consumer behavior. J. Polit. Econ. *78*, 311–329.

OLSEN, W.K., WARDE, A. and MARTENS, L. 2000. Social differentiation and the market for eating out in the UK. Hosp. Man. *19*, 173–190.

OMHLTC. 1998. *Hazard Analysis and Critical Control Point Protocol*. Ontario Ministry of Health and Long-Term Care, Toronto, Canada.

RESNICK, P. and ZECKHAUSER, R. 2002. Trust among strangers in internet transactions: Empirical analysis of eBay's reputation system. In *The Economics of the Internet and E-Commerce* (M.R. Baye, ed.), pp. 127–157, Elsevier Science, Amsterdam, The Netherlands.

RRFSS. 2003. Rapid risk factor surveillance system prevalence data 2003. Rapid Risk Factor Surveillance System, Oakville, Ontario, Canada.

RRFSS. 2004. Rapid risk factor surveillance system prevalence data 2003. Rapid Risk Factor Surveillance System, Oakville, Ontario, Canada.

SEIVER, O.H. and HATFIELD, T.H. 2000. Grading systems for retail food facilities: A risk-based analysis. J. Environ. Health *63*(3), 22–27.

SIMON, P.A., LESLIE, P., RUN, G., JIN, G.Z., REPORTER, R., AGUIRE, A. and FIELDING, J.E. 2005. Impacts of restaurant hygiene grade cards on food-borne disease hospitalizations in Los Angeles County. J. Environ. Health *67*, 32–36.

STATISTICS CANADA. 2003. *Food Expenditure in Canada 2001*. Statistics Canada, Ottawa, Canada.

STATISTICS CANADA. 2004a. *Survey of Household Spending 2004*. Statistics Canada, Ottawa, Canada.

STATISTICS CANADA. 2004b. *Household Internet Use Survey 2003*. Statistics Canada, Ottawa, Canada.

STATISTICS CANADA. 2005. *Monthly Restaurants, Caterers and Taverns Survey December 2004*. Statistics Canada, Ottawa, Canada.

TSE, A.C.B., SIN, L. and YIM, F.H.K. 2002. How a crowded restaurant affects consumers' attribution behavior. Hosp. Man. *21*, 449–454.

WIANT, C.J. 1999. Scores, grades and communication about food safety. J. Environ. Health *61*(9), 37–38.