



Factors That Influence Whether Health Inspectors Write Down Violations on Inspection Reports

ABSTRACT

The purpose of this study was to evaluate how different factors influence health inspectors' judgment in inspections of retail food establishments. Using a scenario method, 116 health inspectors responded to an electronic survey. The likelihood of writing down violations was found to be influenced by several factors, including whether the violation was critical/non-critical, the inspector's perception of the manager's willingness to make suggested changes, whether the manager argued or was generally hostile, the perception of the manager's knowledge about food safety, whether the violation was corrected immediately, whether the inspector had a long-term relationship with the manager through inspections or community organizations, whether the manager accompanied the inspector on the inspection, the offer of food or beverages, the inspector's perception of the manager's experience, and the length of time that the manager had been working in that position. This research clearly demonstrates that the inspection process is an extremely complex task. Results may be useful in training

programs, stimulating conversations among colleagues regarding their experiences in handling specific situations, or in discussions on policies related to standardizing inspections or the training process.

INTRODUCTION

Foodservice establishment inspections by health inspectors have a long history in the United States dating back to the 1930s or 1940s, when the first federal food code relating to restaurants appeared, setting the stage for ever-increasing food safety standards that are enforced by federal, state, and local government agencies (2, 6). In the inspections, health inspectors (also called sanitarians in some jurisdictions) use their knowledge, training, and experience in use of their state and local regulations and the federal food code to inspect foodservice establishments. Because of the complexity of the regulations and the wide diversity of foodservices and operations, inspectors are frequently called upon to use their expert consideration in interpreting the regulations when novel and unique circumstances present themselves. Anecdotally, health

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inspectors may sometimes say, “Just when you think you’ve seen everything, something new happens...”

Education and training for health inspectors vary with the jurisdiction (3), an approach that may result in differences in inspections. For example, a significant difference was found between more experienced and less experienced inspectors in the amount of risk they associated with words such as soiled, dirty, or filthy, terms that might be used to describe violations (4). In addition, results from this focus group study suggested that training may affect how health inspectors describe violations (4). As pointed out, these issues may not be unexpected, particularly when health inspectors undergo training through shadowing more experienced health inspectors. Since experiences will vary during the training period, so will the new health inspector’s ability to describe the violations, thereby creating variability in descriptions from one health inspector to another.

Other differences among inspectors have been found. For example, one study (19) reported substantial variability in the activities of health inspectors during the investigation of foodborne illness outbreaks, and more recent research suggests that there may also be differences in the inspection results from one inspector to another (4, 12, 13).

Because of education and training differences among health inspectors, it is useful to determine how typical health inspectors make complex professional judgments. Such information may be useful in training new health inspectors and may help to inform experienced health inspectors about how their peers approach decision making. In addition, if professional judgments differ from administrative policies, information may provide useful starting points for discussions that may help to standardize inspections. This approach may also be valuable to the restaurant industry, as standardized health inspections have been cited as key to achieving foodservice excellence among restaurant operators (1). The purpose of this study was to evaluate how different factors influence health inspectors’ judgment. More specifically, it examined how these factors influence health inspectors’ likelihood in writing down a violation.

In most states across the U.S., inspections of retail foodservice establishments are performed by local health inspectors employed by the county or city in which they perform their inspections. The Food and Drug Administration (FDA) offers guidance for the inspection standards (5) but allows the individual states to determine specific methods and codes. Indiana’s regulations regarding retail food establishment inspections are contained in the Retail Food Establishment Sanitation Requirements, or Title 410 IAC 7-24 (9).

In the state of Indiana, there are 92 county health departments, one city health department, and the Indiana State Department of Health in Indianapolis, with a total of approximately 200 inspectors. Some counties have several inspectors, while other, more rural, counties must share an

inspector with another county. Additionally, budget cuts and expanding job responsibilities have made the job of the local health inspector more challenging.

Inspection systems vary from one jurisdiction to another (14) and may influence inspection scores. More specifically, the frequency of inspection has been shown to be correlated with inspection scores (15). Results of one study showed that inspection scores were significantly lower when the time since the last inspection was greater than 12 months. Other research has not confirmed this relationship (17), although the length of time between inspections was a factor in compliance. In addition, at least one study has suggested that differences occur in inspection scores based on food establishment operation type, year that the inspection was conducted, and, more importantly, the individual health inspector (12).

One research study has suggested that factors influencing inspector behavior include perception of their responsibilities in an inspection (8). Although this research was conducted in the construction industry, it would seem likely that a similar situation might occur in foodservice establishment inspections. For example, this study (8) suggests that an inspector may play the role of both educator and enforcer in order to do the job effectively, and that perception of the relative importance of these two roles may vary among inspectors. According to this study, “Regulations are extensive and difficult to read, much less understand. This issue may lead the inspector to cite a violation thought by the licensee to be obscure, redundant, or questionable.” At such times, the inspector may even need to change or increase the role as educator to ensure that those being inspected understand how the law was violated, how the violation should be corrected, and even why the law is there in the first place, thereby making the establishment less likely to violate that particular regulation in the future.

Similarly, in the foodservice industry, one of the suggested state regulators’ goals is “to cooperate with operators to correct the violations observed and to educate operators and employees on how best to avoid problems in the future” (21). The importance of the educational role was clearly identified in another study; when restaurant operators were asked what they found most helpful about inspections, the most frequent response was practical advice about problems and solutions, and the second most frequent response was new information, explanations, and education (10).

The behavior of individual inspectors and their effect on the inspection process have received far less attention than they are due, according to a research study addressing the effect of the inspector’s enforcement style and regulatory compliance in the construction industry (16). According to this study, inspectors are on the front lines of policy enforcement and often have to make on-the-spot decisions about the best action to take in order to produce a desired set of behaviors in those being inspected. The authors suggest that previous regulatory enforcement literature focused

only on the results in the final inspection report and that the process of making inspections should now also be studied. The importance of “enforcement style” was cited. According to this study, while an inspector may have a certain style formed from individual personality traits and experiences, they often must adapt their approach based on the situation with which they are presented. This style may include being “alternately informative, cajoling, educating, or punitive as needed to produce the desired levels of cooperation and compliance” (16).

Inspectors’ expert judgment in their use of these alternating approaches to educate and enforce may be valuable in maximizing the inspection results. For example, one study (16) states, “If inspectors are too rigid or picky, regulatees are likely to see rules as unreasonable and misunderstand the rules’ content. If inspectors are too lax, regulatees are likely to perceive inconsistencies and become confused about what is important.” In addition, enforcement style is thought to impact the degree of cooperation of those being inspected. Research points to the importance of the interaction between the successful inspector-licensee relationship. Finally, the importance of the role of those being inspected is discussed; simply put, “Contrary to the belief of some licensees... inspectors are people, too. It is important for licensees to build professional relationships with the inspectors and other individuals in the regulatory agency” (8).

In summary, regulation of retail food establishment inspections is highly variable among states and localities. Regulations differ with regard to frequency of inspection, inspection format, certification requirements, reporting policies, and many other issues (1, 11, 14). In addition, various factors related to the individual inspector may create differences in the inspection experience. Research suggests that enforcement style and professional judgment are critical tools in the inspection process and can be used selectively to achieve optimum inspection results, an approach that also creates variability in the inspection process. The purpose of the current research study was to assess how sixteen factors related to the health inspector, the manager, and the history of the foodservice establishment influenced health inspectors’ likelihood of writing down critical and non-critical violations.

MATERIALS AND METHODS

The head of food protection for the Indiana Health Department first suggested the need for a research project to improve understanding of how inspectors make decisions about writing down violations and how inspections could be standardized inspections. Subsequently, two meetings were held with inspectors in the Tippecanoe County Health Department and with other interested state-level health inspectors and food safety professionals at an Indiana Environmental Health Association Food Protection Committee meeting. The purpose of the meeting was to

obtain insight into: (1) how inspections are conducted, and (2) factors that might influence the likelihood that health inspectors would write down violations. The information from these two meetings was used to create survey questions in three areas: scenarios involving two critical and two non-critical violations, mitigating factors in writing down violations, and demographics of the survey participants.

Critical and non-critical violations for the scenarios were chosen from the Indiana Retail Food Code (9) as well as from suggestions made by local and state-level health inspectors about frequently observed violations. The four violations identified were: food not held at the correct temperature for service (e.g., “Chicken is being held at 130°F for service” — a critical violation); improper storage of chemicals (e.g., “Aerosol insecticide is being stored next to food products in the store room” — a critical violation); “Food handler not wearing proper hair restraint” — a non-critical violation, and “Coving is missing from the wall around the dish room”— a non-critical violation. Using the scenario-based approach (7), scenarios, centering around these critical and non-critical violations were created, and questions regarding response behaviors were asked of the health inspectors. In the scenario-based approach, participants are asked to estimate the likelihood of performing a behavior (in this case, writing down the violation) on a seven-point scale rather than responding “yes” or “no,” thus creating a greater range of responses, as well as allowing respondents to express more complex responses with regard to behaviors.

Mitigating factors that affect the likelihood of writing down violations included manager hostility; manager’s offer of beverages or snacks (which could be viewed as bribery); possible impact of the inspection report on the reputation of the restaurant; whether the health inspector was running short on time; correction of the violation during the inspection; manager’s willingness to make the suggested changes; manager’s level of food safety knowledge; and inspection history of the restaurant. Other manager-related factors included whether the inspector knew the manager through previous inspections or through organizations outside the establishment, the age and experience of the manager, and whether the manager accompanied the inspector on the inspection. Responses were given on a seven-point Likert scale. Demographic questions about the inspectors consisted of employment type (city, county, or state); years of experience inspecting food establishments; highest level of education completed; gender; age; and continuing education and/or professional training in the past five years. Inspectors also were asked to identify their purpose in conducting inspections (e.g., educate in food safety, enforce the food code, or equal emphasis on both goals) and to estimate the likelihood that violations would be corrected if they were not written down.

The Institutional Review Board at Purdue University approved the project, after which the questionnaire was pilot-tested with 26 members during a Food Protection

Committee Meeting of the Indiana Environmental Health Association. In addition to this pilot study, the online version of the survey was distributed to test its clarity and

TABLE 1. Demographics of health inspectors

	Number	Percent
Age (n= 113)		
Under 25 years old	1	0.9
25–34 years old	23	20.4
35–44 years old	29	25.7
45–54 years old	30	26.5
55–64 years old	24	21.2
65 years and over	6	5.3
Highest level of education completed (n = 115)		
High school diploma or equivalent	10	8.7
Some college	12	10.4
Associate degree	6	5.2
Bachelor degree	73	63.5
Master’s degree	13	11.3
Doctoral degree	1	0.9
Length of retail food establishment inspection experience (n = 116)		
Less than 1 month	1	0.9
1 month to less than 6 months	4	3.4
6 months to less than 1 year	3	2.6
1 year to less than 5 years	25	21.6
5 years to less than 10 years	25	21.6
10 years to less than 15 years	21	18.1
15 years to less than 20 years	17	14.7
20 years or more	20	17.2
Gender (n = 113)		
Male respondents	45	39.8
Female respondents	68	60.2

functionality with 10 health inspectors, professors, and graduate students. The online version of the questionnaire was created in a web-based survey program called Qualtrics (18).

On the basis of the results of the pilot study, the questionnaire was revised; the survey was then sent to approximately 200 participants through an email with a link to enable recipients to participate in the study. Participants were inspectors of retail food establishments in the state of Indiana, whose 92 counties have 93 health departments and approximately 200 inspectors, sanitarians, and environmental health specialists. One additional contact was made with participants when technical difficulties with the Qualtrics Web site made it impossible for several participants to access the survey link. Although multiple requests for response are typically sent and help to minimize non-response bias, additional reminder emails were not sent because of the early high response rate. Upon completion of the survey, respondents were automatically taken to a thank-you message linked to the Qualtrics Web site.

SPSS statistical analysis software (20) was used to analyze the data. First, the likelihood of writing down each of the four violations was statistically compared individually, using a frequency table and a comparison of means using a one-sample Wilcoxon signed rank test with four as the test value. This test was selected because the data were too skewed to allow use of a standard one-sample *t*-test (with four again used as the test value). Then, additional variables were created by averaging the likelihood of writing down the violations, first for the two critical ones and then for the two non-critical ones. Those averages were grouped by the

inspector's view on the purpose of the inspection. Because of the skewness of the data, the Mann-Whitney U test was used to determine significance for the critical violations. A standard *t*-test was used to determine significance for the non-critical violations. Additionally, Cohen's *d* was calculated to determine the effect of sample size on the results for the *t*-test. Next, a one-sample Wilcoxon signed rank test using four as the test value was used to test which (if any) of the mitigating factors had a significant effect on the inspector's likelihood of writing down a particular violation. As before, this test was selected because the data were too skewed to allow use of a one-sample *t*-test. Analysis of variance and the Kruskal-Wallis test were used to compare the demographic variables of the respondents to the likelihood of their writing down each of the violations. Analysis of variance was used unless the assumptions required by the statistical method were not met; for those instances, the Kruskal-Wallis test was used. Levene statistics were used to check for homogeneity of variances (one of the assumptions for use of analysis of variance). Finally, the mean and frequency of the inspector's opinion about how likely it is that each violation will be corrected if it is not written down were calculated. Each mean was compared to the value of four (meaning "Does Not Affect"), using a one-sample Wilcoxon signed rank test, because the data were too skewed to allow use of a one-sample *t*-test.

RESULTS

Of the 200 invitations sent out to complete the survey, 145 were started and 123 were completed, for a response rate of approximately 58%. The demographics of the respondents

TABLE 2. Average likelihood of writing down critical and non-critical violations based on respondents' perception of their purpose when conducting inspection^a

Purpose When Conducting Inspections	Critical Violations ^b Mean ± SD	Non-critical Violations ^c Mean ± SD
Educate in food safety (n= 38)	6.20 ± 1.01	4.75 ± 1.60
Enforce the food code (n = 1)	6.50	5.00
Equal emphasis on both (n = 71)	6.46 ± 0.87	5.44 ± 1.30
Total (n = 110)	6.37 ± 0.92	5.20 ± 1.42

^aBased on a scale of 1 to 7 with 1 = "Least likely to write it down," 4 = "Undecided", and 7 = "Most likely to write it down"

^bDue to the skewed data, the Mann-Whitney U test was used to determine significance between "Educate in food safety" and "Equal emphasis on both" for the critical violations. The z-value was -1.422 with a significance level of 0.155

^cA standard *t*-test was used to determine significance between "Educate in food safety" and "Equal emphasis on both" for the non-critical violations. The *t*-value was -2.422 with a significance level of 0.017 and 107 degrees of freedom. The Cohen's *d* was -0.473

are given in **Table 1**. More than half of the inspectors were between 35 and 54 years old, had a bachelor's degree, and had between 1–15 years of retail food establishment inspection experience. Ages, education, and experience varied greatly. For example, 6 health inspectors were 65 years or older, one respondent had a doctoral degree, and 20 respondents had 20 years or more of inspection experience.

Respondents were (as expected) very likely to write down all violations. Likelihood for writing down the two critical violations was significantly higher than for the two non-critical violations (**Table 2**). The F-value for the analysis of variance was 53.519, with one degree of freedom resulting in a statistical significance of less than 0.001. When the four violations were considered individually using a one-sample Wilcoxon signed rank test to compare the means to a test value of four (which represented “undecided” on a scale of one to seven), responses indicating a likelihood of writing down both critical and non-critical violations were significantly greater than four and were higher for critical than for non-critical violations (**Table 3**). Responses for likelihood of writing down a violation varied, with the higher mean response given for the “aerosol insecticide stored near

food” for the critical violation and the higher mean response given for the “improper hair restraint” for the non-critical violation. Means for all violations ranged from 5.07 to 6.50 on a scale of one to seven (1 = least likely to write it down, 4 = undecided, and 7 = most likely to write it down).

To obtain information about a health inspector's style of inspection, participants were asked about their purpose in conducting inspections (“Education in food safety,” “Enforcement of the food code,” or equal emphasis on both goals). Two-thirds of the respondents (60.2%, or 71/118) felt that their purpose was to place equal emphasis on both goals. Approximately one-third said “Educate in food safety” (32.2 or 38/118). Only one respondent (0.9%) said “Enforcement of the food code.”

Results of the Mann-Whitney U test indicated no significant difference in behavior of inspectors based on their purpose of inspection (“Educate in food safety” or “Equal emphasis on both”) for the critical violations. However, the *t*-test did show a significant difference (*t*-value = -2.422) for the non-critical violations. Respondents whose purpose was both to educate and to enforce the food code reported that they would be more likely to write down a non-critical than

TABLE 3. Mean and distribution of responses for overall likelihood of writing down violations^{a,b}

Violation	Mean ^c + SD (n)	Very Unlikely 1	2	3	Undecided 4	5	6	Very Likely 7
Critical Aerosol insecticide stored near food	6.50 + 1.11 n = 115	0.9%	0%	4.3%	17%	4.3%	13.0%	75.6%
Chicken held for service at 130°F	6.24 + 1.44 n = 123	4.1%	0.8%	2.4%	0.8%	8.1%	19.5%	64.2%
Non-critical Improper hair restraint	5.34 + 1.71 n = 116	3.4%	2.6%	12.9%	9.5%	15.5%	20.7%	35.3%
Missing coving in dish room	5.07 + 1.70 n = 114	1.8%	8.8%	12.3%	11.4%	12.28%	30.7%	22.8%

^aBased on a scale of 1 to 7 with 1 = “Very unlikely to write it down,” 4 = “Undecided,” and 7 = “Very likely to write it down”

^bOverall likelihood of writing down violations represents the health inspectors' responses prior to being asked how the likelihood would change based on other factors

^cFor all violations, a significant difference was found from a response of 4 (Undecided) using a One-Sample Wilcoxon Signed Rank Test

TABLE 4. Influence of mitigating factors on the likelihood of writing down the violations^a

	Aerosol Insecticide Stored Next to Food		Chicken Held for Service at 130°F		Improper Hair Restraint		Coving Missing from Wall around Dish Room	
	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD
Manager willing to make suggested changes to improve food safety	115	4.02 ± 0.84	120	3.87 ± .96	117	3.35 ± 1.04*		
Manager does not seem willing to make suggested changes to improve food safety							113	5.34 ± 1.37*
Manager demonstrates satisfactory level of food safety knowledge	115	4.04 ± 0.80	120	3.87 ± 1.01	117	3.50 ± 1.10*		
Manager has not demonstrated a satisfactory level of food safety knowledge							112	5.26 ± 1.31*
Manager argues violations and is generally hostile toward suggestions	115	4.87 ± 1.21*	120	4.95 ± 1.28*	117	4.93 ± 1.28*	113	5.10 ± 1.36*
Manager is friendly and routinely offers beverages and snacks	115	4.17 ± 0.66*	120	4.10 ± 0.65	117	4.06 ± 0.61	113	4.06 ± 0.65
Inspection report could have impact on reputation and financial health of establishment	115	4.10 ± 0.70	120	4.08 ± 0.78	117	3.96 ± 0.68	113	3.97 ± 0.70
Inspector is running short on time and behind on inspections for the day	115	4.11 ± 0.64	120	4.10 ± 0.78	117	3.93 ± 0.68	112	4.02 ± 0.70
Manager corrects violation on the spot	115	3.80 ± 1.03	120	3.54 ± 01.00	117	2.99 ± 1.25*	113	3.15 ± 1.28*
No criticals on the last 2 inspections	115	4.14 ± 0.83	120	4.02 ± 0.87*				
The restaurant had at least 5 non-critical violations on each of the last 2 inspections							113	4.47 ± 1.20*
Never cited for improper hair restraints in previous inspections					117	3.76 ± 1.21*		

^aBased on responses to the question “how much do the following circumstances affect you when you are writing down the violation on the health inspection report?” using a scale from 1–7 with 1 = least likely to write it down, 4 = undecided, and 7 = most likely to write it down; likelihood of writing down these violations was not asked in the same way for all mitigating factors, as explained in the methodology

*Significantly different from response value of 4 at $P < .05$ based on a One-Sample Wilcoxon Signed Rank Test

a critical violation. The Cohen's d for this test was -0.473, indicating only a medium impact related to the large sample size. "Enforcement of the food code" was not included in either test, since only one respondent selected this reason for the inspection.

The influence of mitigating factors on the likelihood of writing down the four violations was next assessed by use of a one-sample Wilcoxon signed rank test and a test value of four. These results are shown in [Table 4](#). Five mitigating factors were inquired about, using identical phrasing for each violation. These were: "manager argues violations and is generally hostile toward suggestions;" "manager is friendly and routinely offers beverages or snacks;" "inspection report could have an impact on the reputation and financial health of the establishment;" "inspector is running short on time and behind on inspections for the day;" and "manager corrects violation on the spot." Two mitigating factors were phrased in the negative for some violations and in the positive for others as a check of respondent attentiveness to the questions. These were: "manager is (or does not seem) willing to make suggested changes to improve food safety;" and "manager demonstrates (or has not demonstrated) a satisfactory level of food safety knowledge." Finally, one mitigating factor related to inspection history was customized for each violation. For the critical violations, "no critical violations on the last two inspections" was used. For the non-critical violations, "the restaurant had at least five non-critical violations on each of the last two inspections" and "never cited for improper hair restraints in previous inspections" were used.

Several mitigating factors affected the inspectors' likelihood of writing down the violations ([Table 4](#)). Mitigating factors appeared more likely to be influential

with regard to writing down non-critical violations. For example, a manager's willingness (or unwillingness) to make suggested changes to improve food safety, and a manager's demonstration (or lack of demonstration) of a satisfactory level of food safety knowledge, both showed significance for the non-critical violations but not for the critical violations.

The most influential mitigating factor was "manager argues violations and is generally hostile toward suggestions." Inspectors were significantly more likely to write down both critical and both non-critical violations in this situation. The second most influential factor was related to previous inspections, which influenced the writing down of one of the critical and both of the non-critical violations. The next most influential factor was related to whether the manager corrected the violation on the spot. If this occurred, the inspector was significantly less likely to write down the violation for either of the non-critical violations. Finally, if the manager was friendly and routinely offered beverages or snacks, the health inspector was significantly more likely to write down one of the critical violations. No significant differences in likelihood of writing down the violation were found when the mitigating factors were "inspection report could have an impact on the reputation and financial health of the establishment" and "inspector is running short on time and behind on inspections for the day."

Other manager-related factors also were evaluated by analysis of variance in terms of their general impact on the likelihood of an inspector writing down a violation ([Table 5](#)). These factors included the relationship that the inspector and manager had developed through their inspection history and involvement with community organizations, as well as the appearance of the manager (young and inexperienced or having done the job for many years), and whether the

TABLE 5. Affect of other manager-related factors on the likelihood of writing down violations on the inspection report^a

Manager-related Factor	n	Mean ± SD
The inspector knows the manager outside of the restaurant through a local community organization	111	3.66* ± 0.91
The inspector has known the manager for several years and has inspected this establishment many times	112	3.71* ± 0.96
The manager accompanies the inspector during the inspections	112	3.83* ± 1.07
The manager appears to have been doing this job for many, many years	111	4.31* ± 0.91
The manager seems young and rather inexperienced	112	4.66* ± 1.07

^aBased on a scale of 1–7, with 1= least likely to write down violations and 7 = most likely to write down violations

*Significantly different from response value of 4 at $P < .05$ based on a One-Sample Wilcoxon Signed Rank Test

manager accompanied the inspector during the inspection. All factors were shown to be statistically significant based on one-sample Wilcoxon signed rank test and a test value of four. There was a greater likelihood of writing down the violation when the manager appeared young and inexperienced, as well as when the manager appeared to have been doing the job for many years. By contrast, inspectors reported a lower likelihood of writing down the violation for the other three factors: “the inspector has known the manager for several years and has inspected this establishment many times,” “the inspector knows the manager outside the restaurant through a local community organization,” and “the manager accompanies the inspector during an inspection.”

No significant differences were found in the likelihood of writing down violations based on inspector characteristics, which consisted of their years of retail food establishment inspection experience, education, gender, or age. For inspection experience, the degrees of freedom for all tests was five and the F-values were 0.246, 0.123, and 0.148 for writing down critical violations, non-critical violations and all violations, respectively. For education, the homogeneity assumption was not met, so the Kruskal-Wallis test was used to determine significance. The degrees of freedom for all tests was four and the Chi-square values were 6.101, 5.008,

and 4.792 for writing down critical violations, non-critical violations and all violations, respectively. A *t*-test was used to determine gender significance. The degrees of freedom for all tests were 99 and the *t*-values were -1.521, -0.899, and -1.424 for writing down critical violations, non-critical violations and all violations, respectively. Finally, for age, the homogeneity assumption was not met for the combined violations, so analysis of variance was used for critical and non-critical violations and the Kruskal-Wallis test was used to determine significance for all violations. For the critical and non-critical violations, the F-values were 0.654 and 2.065, respectively, and the degrees of freedom were four for both. For the combined critical and non-critical violation tests, the degrees of freedom were four and the Chi-square value was 8.406.

Finally, inspectors were asked about the likelihood of the violation being corrected if the violation was not written down (Table 6). Data were analyzed using a one-sample Wilcoxon signed rank test and a test value of four. Significance was shown for all violations, in that health inspectors believed that the violation was less likely to be corrected if they did not write down the violation. The highest impact mean was shown for the “chicken held for service at 130°F,” with 78% of the inspectors selecting scores less than four (four = does not affect whether the violation

TABLE 6. Mean and distribution of responses about the likelihood that the violation will be corrected if it is not written down on the inspection report^a

Violation (n)	Mean ± SD	Less Likely to be Corrected	Does Not Affect					Likely to be Corrected
		1	2	3	4	5	6	7
Critical Chicken held for service 130°F (n = 118)	2.19 ± 1.80*	55.9%	16.9%	5.1%	11.0%	2.5%	1.7%	6.8%
Aerosol insecticide stored near food (n = 114)	2.52 ± 1.79*	41.2%	21.0%	10.5%	14.0%	4.4%	2.6%	6.1%
Non-critical Improper hair restraint (n = 116)	2.51 ± 1.79*	42.2%	19.8%	10.3%	14.7%	4.3%	2.5%	6.0%
Missing coving in dish room (n = 113)	2.54 ± 1.61*	39.8%	16.8%	8.8%	25.7%	4.4%	1.8%	2.6%

^aBased on a scale of 1 to 7 with 1 = Least likely to be corrected, 4 = Does not affect whether it will be corrected, and 7 = Most likely to be corrected

*Significantly different from response value of 4 at *P* < .05 based on a One-Sample Wilcoxon Signed Rank Test

is corrected) on a seven-point scale (1 = least likely to be corrected, 7 = most likely to be corrected) and almost 60% selecting one on the scale from one to seven. Similar impact was shown for “an aerosol stored near food” and “improper hair restraint,” with 73% of the respondents selecting scores less than four for both. The lowest impact was shown for “missing coving,” although 65% of the respondents still selected scores less than four.

CONCLUSIONS

The likelihood of writing down violations was found to be influenced by several factors. For example, although all violations were very likely to be written down (as expected), inspectors were significantly more likely to write down the critical violations, and this likelihood was less strongly influenced by the factors in this study. The two most influential factors appeared to be whether the manager argued or was generally hostile and the previous inspection history. For example, if the manager argued or was generally hostile, both critical and non-critical violations were more likely to be written down. Inspection history also was influential for both of the non-critical and one of the critical violations.

The perception of the manager’s cooperation or willingness to make suggested changes and immediate correction of a violation also influenced whether inspectors were likely to write down non-critical violations. In addition, non-critical violations were more likely to be written down if the manager did not appear knowledgeable about food safety. Finally, one of the critical violations was more likely to be written down if the manager offered food or beverages.

Manager characteristics, such as a long-term relationship with the manager through inspections or community organizations, or willingness to accompany the inspector on the inspection, decreased the general likelihood of writing down violations. Inspectors were generally more likely to write down violations if the manager appeared inexperienced or had been a manager for many years.

The inspector’s perception of the purpose of the inspection did have a significant effect on the likelihood of their writing down violations. If they perceived their purpose to be both enforcing the code and educating, they were more likely to write down non-critical violations. No effect was shown for the possible financial impact on the restaurant or the feeling that the inspector might be running short on time, or any of the inspector demographics (years of inspection experience, education, gender, or age).

Results of this study do suggest that differences exist in the perceptions of inspectors in the likelihood of their writing down violations, based on several factors. Therefore, it is apparent that this complex process does rely on professional judgment of the inspectors and in their efforts to improve restaurant sanitation. The complexity of the process is evident in that these situational factors may interact differently in each foodservice establishment inspected,

thereby requiring a health inspector to integrate numerous variables in their assessment of how to regulate and educate managers of restaurants they inspect. These results suggest that inspectors may gauge the establishment’s sanitation on the basis of the attitude, knowledge, and experience of the person in charge of managing the foodservice. An additional implication might be that health inspectors may feel required to base their judgments on more than just a snapshot of the operation, and in fact may take into account the entire state of the operation.

It is ironic that health inspectors also perceived that violations are less likely to be corrected if they are not written down. Since enforcement as well as education is a goal of the inspections, this finding underscores the complexity of the process. If health inspectors realize that undocumented violations are less likely to be corrected, one might expect that all violations would be written down. Results of this study clearly suggest that they are not; therefore, further research is recommended. For example, it would be useful to know why health inspectors do not write down all violations. Perhaps they were mostly focused on achieving changes in specific (and perhaps perceived as more essential) areas, that the educational aspects of the inspection were more relevant at certain times during the inspection, or that long-term goals or strategies were being used to achieve improvements in restaurant sanitation. Future research should include more open-ended questions and/or complement this study’s data with the use of qualitative research methodologies to obtain better answers to questions regarding why and how these decisions are made by health inspectors.

It is interesting to note how much variation occurred in health inspections and how individual inspectors may react differently to the same situation. The results of this study may be useful in training programs, stimulating conversations among colleagues regarding their experiences in handling specific situations, or in discussions on policies related to standardizing inspections or the training process. In addition, the scenario approach appeared to be useful in assessing the range of responses that health inspectors might have in specific situations and could be a valuable tool in training new inspectors.

For the retail food industry, this study may help change some of the negative attitudes that foodservice workers feel toward health inspectors. The majority of inspectors (in the state of Indiana) felt that educating the foodservice establishments in food safety is as important as enforcement of the food safety regulations. The retail food industry should also take note of factors related to the manager that increased the inspector’s likelihood of writing down violations, such as being argumentative or being unwilling to make suggested changes to improve food safety. On the other hand, immediate correction of a violation and accompanying the inspector during the inspection resulted in a significant decrease in the likelihood that the violation would be written down.

Limitations of this study include its reliance on self-reported behaviors of health inspectors, rather than on actual behaviors. Although data were gathered anonymously, self-reported behaviors may be influenced by behavioral norms and what is perceived as the “right thing to do.” In addition, only four violations (two critical and two non-critical) and sixteen possible mitigating factors were evaluated. Other factors that might influence the inspection include the foodservice establishment’s menu type, the size of the operation, the number of staff at the establishment, or the number of managers who have their food sanitation certification, among others. Also, this study evaluated only inspectors in the state of Indiana. Inspection methods vary greatly across the United States and around the world. Similarly, training and educational requirements may vary from one geographic area to another.

This research on inspections in foodservice establishments clearly demonstrates that the inspection process is an extremely complex task and the inspected establishments extremely varied. The number of areas inspected within each operation also is vast and includes facility, equipment, operational, personnel, and management areas. It may be that no matter how much regulation, standardization, or training is put into the inspection process, there will always be the need for the health inspector to exercise expert and professional judgment. It is hoped that this research opens the door for discussion on this important aspect of the inspection process.

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