



Note. The city restaurant letter-grading program began on July 27, 2010. Pre-adjudicated score from initial inspection closest to end of each period for unique restaurants was included in the analysis. For the time before the letter grading program began, inspection scores before grading were adjusted to remove points given for nonsanitary administrative violations.

FIGURE 1—Inspection score category on recent initial restaurant inspection: New York City, NY, 2007–2013.

improved to an A grade on the next cycle as of the 2- and 3-year mark, respectively.

Public Perception Surveys

Results from 2 independent telephone surveys suggested that New Yorkers dine out frequently and support and use letter grades to help them decide where to eat. Among NYC adults, 67% (95% CI = 63%, 71%) and 68% (95% CI = 63%, 72%) reported eating meals from a restaurant, deli, coffee shop, or bar at least once per week at the 1-year and 18-month mark, respectively. At the 1-year mark, 90% (95% CI = 87%, 93%) approved of the program and 71% (95% CI = 66%, 74%) had seen a grade card in restaurant windows. At 18 months, support remained at 91% (95% CI = 88%, 94%) and 81% (95% CI = 77%, 84%) had seen grade cards. Among those who had seen grade cards, 88% (95% CI = 85%, 92%) considered them in their dining decisions at the 1-year and 18-month mark.

Results suggested that grades reassure diners about food safety; 76% (95% CI = 71%, 80%)

felt more confident in a restaurant's food safety when an A grade was posted. An estimated 70% (95% CI = 66%, 74%) expressed concern about getting sick from eating from restaurants, delis, and coffee shops, with 38% (95% CI = 34%, 43%) being very concerned. A majority of 88% (95% CI = 85%, 91%) supported more frequent inspections for restaurants that do not earn an A grade.

DISCUSSION

The NYC Health Department launched the restaurant letter-grading program to motivate restaurants to improve food safety, inform the public about inspection results, and reduce illness associated with dining out. The program introduced multiple changes to the enforcement landscape, including the mandatory posting of letter grades summarizing sanitary inspection scores, a fine-tuned risk-based inspection schedule, and a revised policy on financial penalties. Survey results suggest that New Yorkers approve of the program

and use it when making dining decisions. Our restaurant hygiene analysis suggests that the program provided an effective incentive for operators to comply with regulations and improve practices. We also found that there is an incentive to maintain hygiene practices, with the majority of A-grade restaurants earning A grades on their next inspection cycle.

Our ultimate goal is to reduce foodborne illness, but evaluating the impact of 1 program on such a multifactorial outcome is challenging. Past foodborne illness studies have noted that case finding suffers from underreporting and potential misclassification.^{4,15} Among cases that are identified, it can be difficult to know if exposures occurred in a restaurant. Certain hygiene and food-safety conditions monitored in restaurants are known risk factors or environmental antecedents for foodborne illness outbreaks,^{7,16,17} so we think measurement of sanitary conditions alone serves as a good proxy for public health risks.

TABLE 2—Estimated Success in Scoring in the A-Range on Initial Inspection in Restaurants: New York City, NY, July 2007–July 2013

Indicator	Inspections, No.	Model I, ^a SR (95% CI)	Model II, ^b SR (95% CI)
Time period			
13–36 mo before grading (Ref)	42 016	1.00	1.00
0–12 mo before grading	26 200	1.05 (1.01, 1.09)	1.05 (1.01, 1.09)
0–12 mo after grading	32 594	0.86 (0.83, 0.89)	0.87 (0.84, 0.90)
13–24 mo after grading	38 339	1.24 (1.20, 1.29)	1.26 (1.22, 1.31)
25–36 mo after grading	32 918	1.33 (1.29, 1.38)	1.35 (1.31, 1.40)
Season			
July–September (Ref)	36 598	...	1.00
October–December	41 697	...	1.20 (1.16, 1.24)
January–March	45 825	...	1.30 (1.26, 1.35)
April–June	47 947	...	1.20 (1.16, 1.24)
Chain restaurant			
No (Ref)	151 374	...	1.00
Yes	20 693	...	3.46 (3.31, 3.61)

Notes. CI = confidence interval; SR = success ratio. The city restaurant letter-grading program began on July 27, 2010. Preadjudicated initial inspection scores for all restaurants in operation between July 27, 2007, and July 26, 2013, included. A-range is equivalent to ≤ 13 points.

^aModel includes random intercepts for unique restaurants.

^bModel includes random intercepts for unique restaurants and adjusts for chain restaurant status and season of inspection.

Improvement in hygiene conditions appeared to be driven by certain categories of violations. Having a certified kitchen manager on site is important because it has been associated with fewer critical violations on inspection^{18,19} and identified as an important factor for preventing foodborne outbreaks.²⁰ Decreases in violations for inadequate hand-washing facilities and worker hygiene and improper storage or use of equipment or utensils are also likely to decrease risk for foodborne illness.²¹ Decreases in presence and severity of vermin violations contributed in large part to improvements in inspection scores, but vermin violations remain the largest average contributors to inspection score on initial inspection, suggesting a need for more restaurant operator education on this topic. The increase in average violation points related to food contact surface maintenance was likely an artifact related to a tendency for inspectors to cite this violation under a “miscellaneous” section before grading.

Although overall inspection performance improved in the second and third year of grading, A-range scores (0–13 points) decreased slightly in the first year of grading compared with the year before. We believe this decrease reflects the method in which the

program was rolled out. The first restaurants inspected under the grading program were those that scored poorly under pregrading program rules. These poorer-performing restaurants were overrepresented during year 1.

We call attention to the strong association between chain restaurant status and A-range score on initial inspection. This finding is consistent with other studies that reported better sanitary conditions (i.e., fewer critical violations) in chain restaurants compared with non-chains.^{18,22,23} It is instructive to consider the mechanisms used by chains to ensure food safety, such as use of standardized procedures, specialized equipment, and additional worker training and internal mock inspections, when conducting educational outreach among nonchains.

New York City is not alone in requiring public disclosure of restaurant inspection results at the point of decision-making. This type of disclosure program is becoming more common in North America at the state, county, and local level and several jurisdictions have published program evaluation findings. Similar to our results, the Toronto and Los Angeles evaluations found their disclosure programs were used by consumers and led to improved restaurant sanitary practices.^{24–26} Jin and

Leslie²⁴ found that mandatory posting of grade cards in Los Angeles County improved inspection scores after they controlled for restaurant characteristics. Similar to our findings, Toronto Public Health found overwhelming program approval by diners and that diners felt safer making purchases with their program.²⁵ Both of these evaluations were also able to detect decreases in foodborne illness after program implementation.^{15,27}

A previous study of the NYC restaurant grading program analyzed a public-use restaurant inspection data set and concluded that the program was not associated with an improvement in scores.²⁸ However, the analysis included only 17 complete months of inspection data after grading. We identified improvements in sanitary conditions only after the 2-year mark, which may partially explain the inconsistency in results. The previous analysis also did not account for overrepresentation of poorer-performing restaurants resulting from more frequent inspection for poorer performers after grading. By contrast, our regression analysis addressed oversampling by including random intercepts for individual restaurants.

Limitations

This study has certain limitations. We compared inspection performance across time among inspected restaurants. In our earliest period (July 2007–July 2008), about 25% of restaurants were uninspected because of reduced staffing and other inspectional priorities. Because initial inspection assignment before grading was random, we believe inspections during this period were not biased toward poorer-performing restaurants. Use of inspection scores over time may have also been problematic. Subtracting administrative violation points from pregrading inspection scores to make them comparable with grading scores may have underestimated inspection scores pregrading, because the scoring system did not always include points from every violation to calculate inspection score. The impact would be an underestimate of the success of the program. We were unable to find an adequate comparison group (e.g., nongraded jurisdiction) because of jurisdictional differences in food-safety regulations and inspection scoring systems, but we used time and within-restaurant analysis as controls to isolate the impact of the program over time.

TABLE 3—Average Points per Inspection for Specific Violations Cited on Recent Initial Inspections in Restaurants: New York City, NY, 2008–2013

Violations	From 24 Mo to 13 Mo Before Grading (n = 21 208)	From 12 Mo Before to Start of Grading (n = 22 313)	From 13 Mo to 24 Mo After Grading (n = 24 942)	From 25 Mo to 36 Mo After Grading (n = 24 681)
Facility and worker violations				
Critical violations				
Improperly maintained food contact surfaces ^a	0.69	0.98	1.31	1.53
Inadequate worker hygiene	0.51	0.47	0.36	0.35
Public health hazards^b				
No food safety-certified supervisor on site	1.29	1.37	0.84	0.79
Inadequate hand-washing facilities	1.81	1.45	0.65	0.58
Food handling and holding violations				
Critical violations^c				
Improper storage of in-use utensil	0.83	0.76	0.62	0.58
Inadequate protection of food from contamination during storage, preparation, display, service	1.03	1.01	1.20	1.16
Public health hazards				
Food not held cold enough	2.40	2.59	2.52	2.75
Food not held hot enough	1.28	1.39	1.28	1.36
Cross-contamination of foods	0.69	1.05	0.80	0.82
Pest violations: all vermin violations ^d	3.47	3.33	2.97	2.95

Notes. The city restaurant letter-grading program began on July 27, 2010. Each time period covers 12 months. Preadjudicated results from initial inspection closest to the end of each period for unique restaurants. Average points per violation cited on all recent initial inspections used to quantify the severity of violation conditions.

^aViolation citation practices changed when grading started. Before grading, violation was cited in a miscellaneous violation category.

^bPublic health hazards point range is 7 to 28 points, except for "inadequate hand-washing facilities," which is 10 or 28 points, and "no food safety certified supervisor on-site," which is 10 points.

^cCritical violation range is 5 to 8 points.

^dVermin includes rats, mice, cockroaches, or flies; all vermin violations range from 5 to 28 points. Points were bundled together for multiple vermin types.

Finally, the NYC restaurant grading program involved multiple changes to the enforcement landscape—more nuanced risk-based inspection frequency, greater exposure of restaurants to the risk of fines, grade posting, improvements to online resources, and additional training opportunities.²⁹ We cannot tease out which factors contributed most to improving hygiene or grades.

Conclusions

The results from our analysis indicate that the NYC restaurant letter-grading program exhibited a positive impact on restaurant hygiene, food-safety practices, and public awareness, suggesting that the program is an effective tool for improving food safety. Our analysis also identified violation areas that can be targeted for improvement in future program operations. ■

About the Authors

Melissa R. Wong, Wendy McKelvey, Kazuhiko Ito, and J. Bryan Jacobson are with the Bureau of Environmental Surveillance and Policy, New York City Department of

Health and Mental Hygiene, New York, NY. Corinne Schiff and Daniel Kass are with the Division of Environmental Health, New York City Department of Health and Mental Hygiene.

Correspondence should be sent to Melissa R. Wong, MPH, Bureau of Environmental Surveillance and Policy, New York City Department of Health and Mental Hygiene, 125 Worth St, 3rd Floor, CN 34E, New York, NY 10013 (e-mail: mwong2@health.nyc.gov). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints" link.

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Contributors

M. R. Wong contributed to program evaluation design, performed analysis, and drafted the article. W. McKelvey contributed to program evaluation design and assisted with drafting the article. K. Ito and J. B. Jacobson conducted the analysis and assisted with drafting the article. C. Schiff and D. Kass conceptualized the program and assisted with drafting the article. All authors helped to interpret findings and review drafts of the article.

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Human Participant Protection

The New York City Department of Health and Mental Hygiene institutional review board determined that the program evaluation protocol was not human participant research in accordance with 45 CFR Part 46.

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