CHOICES
The magazine of food, farm, and resource issues
2nd Quarter 2005 • 20(2)
A publication of the American Agricultural Economics Association

The Case in Support of Restaurant Hygiene Grade Cards

By Ginger Zhe Jin and Phillip Leslie

Throughout the United States, consumers rely on local health authorities to regulate and inspect restaurants in an attempt to assure that high-quality hygiene standards are maintained. Few people would argue that this is unimportant. If hygiene were left unregulated and unmonitored, it is likely that restaurant workers would shirk in their efforts to maintain good hygiene, and customers would generally have little idea that their meals may have been prepared without meeting appropriate health standards. Of course, not all restaurants would be irresponsible in this way, but it only takes one shirking restaurant to give rise to a public health emergency.

How effective are the regulations and inspections by public health authorities at assuring good-quality restaurant hygiene? We have studied restaurant hygiene and the role played by health inspections in Los Angeles County over a three-year period (1996–1998). Our research indicates that restaurant hygiene regulations and inspections are a fairly imperfect device for assuring good-quality hygiene. However, in January 1998 the Department of Health Services (DHS) in Los Angeles implemented a critical change in their regulations that led to a dramatic improvement in restaurant hygiene—restaurants were henceforth required to display prominently in their window a letter-grade card (A, B, or C) corresponding to the result of their most recent DHS hygiene inspection. We analyzed a variety of different data to assess the effects of these grade cards on restaurant hygiene, restaurant revenue, restaurant prices and output, behavior of DHS inspectors, and, most importantly, the occurrence of food-related illnesses. We also explored the differential effects of the grade cards on different types of restaurants.

Weak Incentives for Good Hygiene in the Absence of Grade Cards

Before the grade cards were introduced in Los Angeles, DHS inspectors would randomly inspect restaurants about twice a year. During these inspections, the inspector would explain to the restaurant staff where violations occurred, tell them to fix these problems, and offer general advice on how to maintain good hygiene. Restaurants were given a score out of 100, with prespecified points being deducted for each violation. For example, a food temperature violation results in a five-point deduction, and evidence of cockroaches results in a three-point deduction. However, there are no fines for these violations, and a restaurant is only closed in severe cases such as an infestation, or if a restaurant received two consecutive scores below 60. Even then, it would be closed only for the time it took to fix the problems. Hence, a restaurant could consistently have many violations and incur little penalty. Furthermore, the assigned hygiene scores were not made available to the public.

It would be wrong to argue that restaurants had zero incentives to maintain good hygiene in the absence of grade cards. On the regulatory side, inspectors provide education about safe food-handling practices and require at least one certified food handler be present in each restaurant. This probably causes some hygiene improvements. On the consumer side, consumers are not completely ignorant about restaurants' hygiene qualities. Consumers may observe some aspects of restaurant hygiene (such as bathroom cleanliness). Consumers may also learn from experience and form beliefs over time about the hygiene at certain restaurants. These consumer beliefs may provide incentives for restaurants to form and maintain reputations for providing good hygiene.

In search of evidence of reputational incentives for restaurant hygiene, we measured a restaurant's hygiene condi-

tion by the average hygiene scores across all the inspections that restaurant received before graded cards. We found that chain-affiliated restaurants develop reputations for good hygiene quality, which provides an incentive to maintain good hygiene, leading to better hygiene than non-chain restaurants on average (Jin & Leslie, 2005). We also showed that franchised chain restaurants tend to have lower hygiene quality than company-owned chain restaurants, indicating that franchised units tend to free-ride on the chain reputation to some extent.

There is also variation across neighborhoods in the degree of repeat customers at restaurants, which affects the ability of restaurants to form reputations. For example, in locations with many tourists (who are not repeat customers), restaurants may be less able to develop reputations for good hygiene; hence, these restaurants tend to have worse hygiene. Our analysis showed that regional variation in the degree of repeat business has a significant effect on restaurant hygiene quality.

We concluded that hygiene regulations and inspections (without posted grade cards), as well as free-market reputation mechanisms, provide some degree of incentives for restaurants to maintain good-quality hygiene. However, these incentives are likely weak, as many aspects of restaurant hygiene are unobservable to consumers, and inspectors cannot punish a restaurant for violations if the restaurant's hygiene score is above 60. This may be why only 25% of restaurants in Los Angeles had the equivalent of A-grade hygiene before the grade cards were introduced in 1998.

Grade Cards Lead to a Reduction in Food-Related Illnesses

By posting grade cards in restaurant windows in 1998 in Los Angeles, the DHS increased the provision of information to consumers about restaurant hygiene quality. From a public health point of view, the key question is whether the increased information generates any improvement in health outcomes. An ideal answer to this question requires data on the number of people who get sick from eating at restaurants. But, obviously, most people get sick and spend an unpleasant day at home without this being recorded by any kind of authority. Even when there is a visit to a doctor, it is not recorded in a central database of such incidents.

However, in California we have access to data on people who are admitted to hospitals. This data comes from the California Office of Statewide Health and Planning Development. Using this data, we observed the number of people admitted to hospitals with specific diagnoses each month in each three-digit zip code for the period January 1993 to 2000. We determined which diagnoses were almost certainly due to unsafe food by following the criteria of a prior study (Mead et al., 1999) and independently with the help of medical specialists.

We used the data for all periods before and after the grade cards were introduced. We compared the number of food-related hospitalizations in the zip codes in Los Angeles to (a) the number of hospitalizations for non-food-related digestive disorders in zip codes in Los Angeles and (b) the number of hospitalizations for food-related illnesses in zip codes in the rest of California. Our approach was to estimate a regression model in which the dependent variable was the log of the number of people admitted to hospital with a particular kind of diagnosis in a particular month and zip code. The independent variables were binary indicators for each zip code and illness-type combination, binary indicators for year and month, and a binary variable equal to one for zip codes in Los Angeles after the introduction of grade cards.

Estimating this regression model, we found that the introduction of grade cards in January 1998 in Los Angeles corresponded to a 20% decrease in the number of people admitted to hospitals with food-related illnesses. The estimate is significantly different from zero with 99% confidence. This was a discrete change exactly at the time of the grade cards, leading us to suspect strongly that this reduction in food-borne illnesses was because of the grade cards.

Remember, this finding was based on data for hospitalizations. These were very sick people that needed to spend at least one night in hospital. It is unclear whether grade cards affected less severe cases of food-related illness. It is conceivable this broader effect may be either larger or smaller than 20%. We do not know the answer to this.

There are two ways the grade cards may lead to improved health outcomes. First, the grade cards may cause restaurants to make actual hygiene improvements. Second, they enable consumers to substitute demand away from poor-hygiene restaurants in favor of good-hygiene restaurants. Under the second mechanism, even if restaurants make no actual improvements, we could still find a decrease in the incidence of food-related illnesses. We refer to this as a *sorting effect*, because consumers sort themselves across restau-

rants with different hygiene grades. From the point of view public health, it does not matter if only the sorting effect applies. However, it would be interesting to know whether the grade cards cause restaurants to make actual improvements, which also contribute to the apparent improvement in health outcomes.

We developed a model of consumer sorting, which we estimated using the combined revenue and inspection grades data. Specifically, we obtained permission from the California State Board of Equalization to access confidential sales-tax data for all restaurants in Los Angeles county in 1996, 1997, and 1998. This data allowed us to infer each restaurants' quarterly revenues during this period. We matched this data to the DHS hygiene inspection scores of each restaurant over the same period of time.

In order to disentangle consumer sorting effects from actual hygiene improvements by restaurants, we separated restaurants into three groups—A, B, and C or below—according to their hygiene scores before grade cards. Suppose each group represents a specific risk of food-borne illnesses, and restaurant revenue is a good proxy for consumer flows to these restaurants. If posted grade cards generated no actual improvement in restaurant hygiene, but motivated consumers to sort into better restaurants, the improvement in foodborne hospitalization should follow a specific pattern, given restaurant revenues and the risk of foodborne illnesses in each type of restaurant. If the actual health improvement exceeds the predicted sorting effects, it is likely due to actual hygiene improvement by restaurants. Using econometric techniques, we showed that both effects do in fact contribute to the decrease in food-related-illness hospitalizations. Full details are available in Jin and Leslie (2003).

Grade Cards Magnify Economic Incentives for Good-Quality Hygiene

The above analysis suggests that restaurant owners have made efforts to improve hygiene after the introduction of grade cards. We argue that this is because grade cards magnify economic incentives for good-quality hygiene.

The 1996–1998 revenue data allowed us to analyze whether consumers are responsive to the grade cards. We found that before the grade cards, changes in restaurants' hygiene quality (as measured by the DHS inspection scores) had no impact on restaurant revenue. This is consistent with consumers having limited ability to assess restaurant hygiene. After the grade cards were implemented, if a restaurant received an A grade, their revenue increased by 5.7% relative to their revenue when there were no grade cards. For restaurants that received a B grade, revenue increased by 0.7%. For a C grade, revenue decreased by 1%.

The analysis of the revenue data verifies that after grade cards, consumers become sensitive to restaurant hygiene when choosing which restaurants to patronize. Critics of the grade cards argue that consumers may be misled—the fact that a restaurant obtained an A during an inspection does not ensure the restaurant has A-grade hygiene at other times. This is true. However, before the grade-card system was implemented in Los Angeles, the average difference in DHS inspection scores between two randomly chosen restaurants was 13.5. Meanwhile, the average difference in scores between two randomly chosen inspections at a single randomly chosen restaurant was only 8.8. The point is that there tends to be much greater variation in hygiene across different restaurants than there is at any individual restaurant over time. Hence, although grade cards don't assure consumers that the restaurant has the posted grade at other times, they provide valuable information about which restaurants are more likely to have better hygiene. Grade cards are an informative, although imperfect, signal.

The revenue analysis also suggests that restaurants may actually benefit from the grade cards. The impact on revenue varies according to the grade and is positive for A and B-grade restaurants. Revenue is not the same thing as profit, and we have no information on the cost for restaurants to obtain an A or B. As noted above, about 25% of restaurants already had the equivalent of A-grade hygiene, so for these restaurants there was only upside to the grade cards. Some restaurants will incur significant costs to improve hygiene to become an A or B, and in these cases it is conceivable the grade cards have reduced their profits. However, these are the worst hygiene offenders, so policymakers may be unsympathetic with these restaurants.

The grade cards stimulate demand for good-hygiene restaurants, raising the possibility that restaurants may also increase prices, which would be bad for consumers. Revenue equals price times quantity, and so the fact that revenue has increased at good restaurants implies we can only rule out the possibility that both price and quantity have fallen. It could be that price has increased and quantity has fallen, with a net positive impact on revenue.

We are unaware of restaurant-level data on prices. To shed light on the possible impact of the grade cards on prices, we examined price indices constructed by the Bureau of Labor Statistics. Specifically, we looked at the monthly price index for "food away from home" in the combined region of Los Angeles, Riverside, and Orange counties (LRO). This is the least aggregated price index available that includes Los Angeles restaurant prices. Note that Los Angeles has more than twice the combined population of Riverside and Orange counties. We compared this index with the same product category in regions other than LRO[1] and with other consumer price indices[2] within LRO. The data cover the time period January 1991 to February 2001.

In separate regressions we examine the dependent variables: (a) prices over time for food away from home in various regions and (b) prices over time for various goods categories within LRO. Explanatory variables were a grade-card dummy (1 for food away from home in LRO in all months after January 1998) and binary indicators for year, month, region, and goods category. The level of the price index for food away from home in LRO in December 1997 is 171.1. In the cross-region regression, the coefficient on grade cards was estimated to be -2.14, suggesting a 1.25% price drop in LRO after 1998 as compared to non-LRO regions. In the cross-categories regression, the coefficient on grade cards was estimated to be -5.78, suggesting a 3.38% drop in the price of food away from home as compared to other industries within LRO. In both cases, the estimates are statistically different from zero with 99% confidence.

Because revenue is equal to price times quantity, an overall increase in restaurant revenue and a decrease in the price index suggests that output may have increased after grade cards. This conjecture is confirmed when we compare the total number of people employed in the food industry in and out of Los Angeles county, as well as before and after graded cards within Los Angeles county. (More details are available at Jin and Leslie, 2003). Decreased price and increased output may be explained by the grade cards lowering search costs for consumers, leading to more intense competition among restaurants. In other words, the grade cards make consumers more confident about trying restaurants they have not experienced before and make them less captive to the restaurants they have had good experiences at.

Grade Cards Make Inspectors Slightly More Lenient

The revenue analysis verified that the restaurant hygiene grade cards create an economic incentive for restaurants to obtain an A grade. However, these incentives may also affect the behavior of inspectors, probably because the grade cards cause restaurant managers to pressure inspectors during an inspection. In our conversations with DHS inspectors, it was clear that inspectors feel much more pressure from restaurants than they did before the grade cards. For example, an unhappy restaurant manager may complain of discrimination by the inspector. This is of course not surprising—restaurants will do what they can to obtain an A; this includes improving hygiene as well as pressuring inspectors.

Some evidence is highly suggestive that the grade cards cause inspectors to become more lenient in their inspections. Before the grade cards, the distribution of inspection scores was a smooth bell-shaped distribution. After the introduction of grade cards, there is a dramatic upward spike in the distribution at the score of 90, which is the cut-off score for obtaining an A grade. There is also a downward spike at 89. A similar pattern occurs around the cut-off for a B grade.

One interpretation of this pattern, which is also consistent with the anecdotal evidence from inspectors, is that inspectors choose to "bump up" a score of 89 to 90 so that the restaurant is not punished because of one point. As long as inspectors do not bump up restaurants which deserve even lower scores, this is a mild form of grade inflation. However, monitoring from the DHS is needed to ensure that the grade inflation does not become worse over time.

A final point of interest: Before the grade cards, the average DHS inspection score for restaurants in locations where residents have income below the Los Angeles median was 74.5. For restaurants in locations with income above the median, the average score was 78.8. In the first year after the grade cards, the averages increased to 89.8 and 89.5, respectively. Hence, grade cards appear to be particularly effective at improving restaurant hygiene in low-income areas.

---

1. *Comparison regions include San Francisco-Oakland-San Jose counties, Chicago-Gary-Kenosha counties, and New York-Northern New Jersey-Long Island counties.*
2. *Comparison industries include food at home, alcoholic beverages, and all items.*

Conclusion and Further Thoughts

In conclusion, the use of restaurant hygiene grade cards in Los Angeles has been a great success. By increasing the provision of information to consumers, powerful economic incentives are created for restaurants to improve hygiene, leading to a significant improvement in public health outcomes. Moreover, because the DHS already perform inspections, the grade cards create negligible additional cost for the government.

Three factors seem to have contributed to the successful implementation of the grade cards in Los Angeles County. First, the grade-card policy was adopted in response to a three-part report aired on CBS 2 News on the Los Angeles-based Channel 2000 on November 16–18, 1997. The report, "Behind the Kitchen Door," used hidden cameras to show viewers unsanitary restaurant kitchens. The TV exposé had an immediate influence—it raised consumer awareness about restaurant hygiene, highlighted the weakness of the existing system, and added political pressure for regulatory change.

A second key factor is the format of the grade cards. There are many ways to disseminate hygiene inspection results. Rather than issue a grade card to be displayed in the front window of a restaurant, Los Angeles County government could publicize the inspection reports online (which has been adopted recently in New York City) or require every restaurant owner to provide the most recent hygiene report if a consumer asks for it (which is the state law of California). The policy of "available upon request" was apparently insufficient for maintaining good restaurant hygiene. This was confirmed by Tribbey (2005), who reported a very low degree of compliance with the state law in Napa, CA. As for internet posting, we are not aware of any study examining the impact of publicizing inspection reports in an online database. Arguably, grade cards reach more consumers and are more readily available to consumers than an internet database. According to what we have seen in Los Angeles County, wide access to the inspection results plays a critical role in enhancing consumer awareness of restaurant hygiene, thus reinforcing the economic incentives for restaurants to improve hygiene quality.

Within the format of grade cards, the DHS could print the numerical inspection score instead of a simple letter grade on the card. In fact, some counties in North Carolina have adopted a "Know the Score" program, which indicates that grade cards must show the letter grade and numeric score in the same size type, side by side (Pytka, 2005). Posting the numerical score may give more information to consumers and alleviate inspector bias around the cutoff of the letter grades. However, it may also entail more education efforts to ensure that consumers understand the details behind the numerical scores. We are not aware of any study evaluating the "Know the Score" program, but the experience in Los Angeles County suggests that letter grades have a clear interpretation to consumers, which is essential for consumers to pay attention to grade cards. Nevertheless, it would be useful future research to examine the issue of what is the ideal form of information to provide consumers.

A third factor contributing to the success of grade cards is the assessment criteria. In Los Angeles, inspectors follow rigid codes that relate specific violations to carefully defined numerical point deductions. By minimizing the subjective component in hygiene inspections, the criteria help standardize evaluations across restaurants and inspectors, helping to encourage consumer confidence in the grade cards. Of course, this does not mean the Los Angeles assessment criteria are perfect. There have been concerns that the current criteria in Los Angeles may not reflect the true hygiene conditions and may not give appropriate weights to certain aspects of restaurant hygiene. Although we are unaware of any specific evidence indicating the inspection criteria in Los Angeles may be imperfect, this is surely a topic for ongoing evaluation by public health specialists in Los Angeles as well as the rest of the United States.

Finally, restaurant hygiene regulations fall within the jurisdiction of local governments (to the best of our knowledge). In the case of Los Angeles, the inspections are carried out by county health inspectors, but at least some of the regulations are at the discretion of each city government. For example, the policy of mandatory posting of grade cards that we have studied was a decision made separately by each city government in Los Angeles County. At the other end of the spectrum, the federal government provides guidelines for retail food handling, which are voluntary for local governments to adopt (Food and Drug Administration, 2001). Our research suggests that standardized assessment criterion and mandatory posting of grade cards for every city in the United States would provide significant public health benefits. We cannot help but wonder if the federal government could play a more active role in this respect.

For More Information

Jin, G., & Leslie, P. (2003). The effect of information on product quality: Evidence from restaurant hygiene grade cards. *Quarterly Journal of Economics, 118*(2), 409-51.

Jin, G., & Leslie, P. (2005). *Reputational incentives for restaurant hygiene* (working paper). College Park, MD: University of Maryland. Available on the World Wide Web: http://www.stanford.edu/~pleslie/reputation.pdf.

Mead, P.S., Slutsker, L., Dietz, V., McCaig, L.F., Bresee, J.S., Shapiro, C., et al. (1999). Food-related illness and death in the United States. *Emerging Infectious Diseases*, *5*(5), 607-25.

Pytka, E. (2005). *Publicly posted health inspection grade cards* (Research Report 2005-R-0403). Hartford, CT: Connecticut General Assembly Office of Legislative Research. Available on the World Wide Web: http://cga.ct.gov/2005/rpt/2005-R-0403.htm.

Tribbey, C. (2005, February 13). Local restaurants skirt the law when it comes to telling diners about cleanliness and health. *Napa News*.

United States Food and Drug Administration. (2001). *U.S. Department of Health and Human Services Public Health Service Food and Drug Administration 2001 food code*. Available on the World Wide Web: http://www.cfsan.fda.gov/~dms/fc01-pre.html.

Ginger Zhe Jin is an assistant professor of Economics at the University of Maryland, and Phillip Leslie is an assistant professor of Strategic Management at Stanford University. Both authors are affiliated with the National Bureau of Economic Research.