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Regulatory Disclosure Policies and Potential Induced Changes in Behavior: An Outcome Evaluation of Santa Clara County's Enhanced Food Safety Program Elements

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Regulatory Disclosure Policies and Potential Induced Changes in Behavior: An Outcome Evaluation of Santa Clara County's Enhanced Food Safety Program Elements

by

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BACKGROUND

Despite countless advances in food microbiology and public health regulations, foodborne illness continues to be a major strain on public health outcomes and a costly economic burden. In the United States, many agencies are responsible for ensuring the quality of food, both domestically produced and imported. States and localities are delegated the responsibility of identifying and ensuring sound practices in the latter stages of the food production process, namely the retail distribution of food products to consumers.

Regulatory policies across the nation have only recently incorporated the evidenced-based principles of hazard risk management (Law, 2003). Still, food-related acute gastrointestinal illnesses have remained pervasive in the country, demonstrating the limits of existing standards and approaches employed by regulators. Even more recent is the adoption of these principles in the retail food domain. The trend has been complemented by transparency requirements augmented by technological developments such as the internet and mobile applications. Santa Clara County has recently become among the latest jurisdictions to adopt a placarding requirement and a searchable website in an attempt to improve compliance with retail food safety rules, as well as public health. This paper will attempt to determine whether or not the efforts to make inspection data more assessable to consumers has resulted in greater compliance with food safety laws by food retailers.

Problem Statement and Research Question

Foodborne illness remains a critical yet preventable public health issue across the world. Despite numerous scientific strides and the formation of international regulatory and coordination frameworks, the World Health Organization found that foodborne illnesses sicken 10 percent of the world's population each year (Zuraw, 2015). Just under a half million of these cases are fatal.

Zuraw further noted that the actual incidence of such illnesses is much higher, as the vast majority of cases go unreported. According to Henson et al. (2006), for each confirmed case of foodborne illness there may be over 300 cases that go unnoticed. These illnesses are the result of microbial, chemical, and physical contaminants that come into contact with foods and enter the food system because of financially motivated gross negligence, poor sanitation infrastructure, and the improper preparation and storage of foods ("Foodborne Illness and Germs", 2018).

Although the United States and other developed nations are considered to have safer food systems than their developing counterparts, food-related illnesses continue to remain a costly public health matter. Published estimates vary dramatically, but the most recent estimate by the Centers for Disease Control and Prevention (CDC) is 48 million cases per year and 3,000 related deaths ("Foodborne Illness and Germs"). The profile of disease agents that sicken Americans also differs from those that afflict developing countries. Diseases like Cholera and Typhoid Fever are considered extremely rare in the Unites States, but Norovirus, non-Typhoidal Salmonella, Campylobacter, and Listeria remain rampant (Zuraw, 2015). The costs associated with such illnesses are estimated to be up to $72 billion each year (Minor et al., 2015). Valuations of the total costs of foodborne illness are comprised of costs related to medical care, loss of work time, reputation and liability costs, and the costs of regulation and surveillance (Scharff, 2010).

According to Ogbu (2015) and Filion and Powell (2009), over two-thirds of foodborne illnesses are attributed to retail food establishments. Among food retailers, substandard hygienic behaviors and malpractice in food preparation and storage practices are believed to be the most critical risk factors for foodborne illness. Retail food employees thus function as critical control points in ensuring the acceptability of any food served by an establishment. Establishing and

maintaining a robust food safety culture has been a persistent challenge for food retailers due to of high turnover rates, low employee motivation, and an unusually high number of non-native English speakers (Strohbehn et al., 2014). Greig, Todd, Batleson, and Michaels (2007) found that foods that require more intensive and frequent contact for preparation are more likely to be contaminated. In a separate study that surveilled restaurant employees, handwashing was only completed one-third of the total necessary times (Pellegrino, Crandall, O'Bryan, & Seo, 2015). Foodborne illnesses also result from inadequate food preparation and storage practices that lead to the proliferation and survival of any pathogens that would otherwise not pose a health risk. As Americans continue to increasingly rely on food prepared outside the home, exposure to food-related health risks will likely continue to correspondingly increase (Talty, 2016).

Santa Clara County has not been impervious to problems of foodborne illness. While the vast majority of cases go unnoticed, several notable outbreaks have been the subject of numerous media reports and lawsuits. One notable case occurred in October of 2015 at a Mexican seafood restaurant in San Jose (Nelson, 2015). Over 190 people were sickened with the Shigella, a bacterial illness spread through fecal-oral transmission. The outbreak was eventually traced back to a single worker who did not properly wash his or her hands prior to preparing the patrons' food. The 2015 outbreak was widely reported in the media due to its scale, but most outbreaks and cases go unnoticed and do not garner the same level of attention. Table 1 outlines the incidence figures of various types of foodborne illnesses derived from the Department of Public Health's Open Data Portal. As several have noted, reportable cases of foodborne illnesses only represent a small portion of the total incidences (Henderson et al., 2006). Further, the County's Department of Public Health did not include the Norovirus total in its dataset; Norovirus infections are said to be one of the most common agents of food-related illnesses (Scallan et al.,

2011). One can thus infer that the Department of Public Health's dataset does not encompass the true extent of foodborne illnesses in the County.

Table 1: Reportable Cases of Foodborne Illness in Santa Clara County

Disease Type	Annual Figures		
	2015	2016	2017
Amebiasis	6	16	4
Campylobacteriosis	494	572	594
Cryptosporidiosis	20	24	39
Giardiasis	117	24	39
Listeriosis	7	5	11
Salmonellosis (non-Typhoidal)	349	344	340
Shiga toxin-producing E. coli (STEC)	117	123	140
Shigellosis	264	151	153
Typhoid and Paratyphoid Fever	20	11	24
Vibrio Infections	9	5	22
Total	1403	1442	1521

Source: Santa Clara County Department of Public Health, 2018

In order to address foodborne illnesses in the County and reports of noncompliance with State regulations within the County, the Board of Supervisors approved of new requirements that food establishments make visible a placard issued by the environmental health inspector subsequent to an inspection (Santa Clara County, 2014). The inspection reports, along with a numerical score, are also now posted on the Department of Environmental Health's dedicated website. By making inspection information assessable to consumers, county officials hope that vendors will follow changing consumer preferences and improve compliance with the State's retail food code (Santa Clara County, 2013). This paper will attempt to answer the following question: Has the county's overhauled food safety program improved compliance with the food safety laws among Santa Clara County food vendors?

Scientific and Regulatory Development

Despite the perpetual entwinement of humans and microbes around food, human understanding about the existence and nature of such microscopic life only developed in the last 150 years. Prior to the emergence of food microbiology, ancient civilizations around the world practiced food preservation techniques such as smoking and salting to prolong freshness and delay the onset of anything deemed foul to the senses (Anderson, 2011). Others, as indicated in Mesopotamian and Abrahamic texts, emphasized the purity and cleanliness of food. Early hygienic behaviors related to food resulted from the desires to conform to religious doctrines, not a scientific understanding of the contamination of food by disease-causing agents. Early regulatory decrees around the consumption and production of certain foods due to illness emerged well before the discovery of pathogenic agents. According to Zaccheo, Palmacio, Venable, Locarnini-Sciaroni, & Parisi (2017), "the leader of the Byzantine Empire, Emperor Leo VI, forbade the eating of blood sausage because of its association with a fatal food poisoning now presumed to be botulism" (p. 11). Zaccheo et al. (2017) also noted that it was not until 1683 when Dutch scientist Anton van Leeuwenhoek first viewed and confirmed the existence of microbial life. This discovery would pave the way for Louis Pasteur, now deemed the father of food microbiology, to develop the process of pasteurization and contribute to the germ theory of disease, alongside German chemist Robert Koch (Oberg, 2012). Pasteur and Koch's germ theory would effectively lay to rest the idea of the spontaneous generation of bacterial life and bring to prominence the conceptions of contamination and infection. The scientific advances made by Pasteur continue to serve as the basis for contemporary food standards and regulations around the world. Food regulatory standards, however, would take decades to adopt this new paradigm of microbial contamination (Law, 2003).

Federal efforts to regulate the food industry would only emerge after growing public awareness of the unsanitary environments that accompanied the growth of industrial food production. According to Law (2003), rapid urbanization and the emergence of industrial technology created a rift between food production and consumption; consumers "became increasingly reliant on the market exchange for food" (p. 1105). Following numerous outbreaks of illness and the publication of Upton Sinclair's *The Jungle,* public concern would culminate in some of the first federal food safety regulations (Anderson, 2011). Among the earliest notable legislative developments were the Pure Food and Drug Act and the Federal Meat Inspection Acts of 1906 (Johnson, 2011). Both laws aimed to ensure the quality and integrity of foods produced in or imported into the United States. Law noted that subsequent laws, such as the Federal Food, Drug, and Cosmetics Act of 1936 and the Restaurant Sanitation Program of 1934, would expand the scope of the 1906 laws, as well as identify which agencies would have statutory authority to carry out enforcement. These early efforts to ensure food safety by the Federal government were effective in reducing incidences of Typhoidal Salmonella and Botulism that were rampant in the industrial meat packing facilities. However, as Oberg (2012) noted, the scientific advances made by Pasteur concerning contamination and germ theory were not reflected in early regulatory standards. Oberg further found that many early food regulations were focused primarily on efforts to curtail adulteration and fraud, such as mislabeling and the dilution of spirits to maximize profits. Any evaluations of the sanitation practices of food producers were based on sensory cues, such as the appearance of rotting carcasses or foul odors (Ogbu, 2015). Although early food regulations were effective in mitigating large foodborne illness outbreaks, many of these earlier standards are today deemed scientifically outdated.

Cotemporary efforts by the federal government in ensuring the safety and integrity of foods eaten by Americans is dictated by a number of statutes and overseen by several federal agencies. The three primary agencies currently responsible for safeguarding the nation's food supply are the Centers for Disease Control and Prevention (CDC), Food and Drug Administration (FDA), and the United States Department of Agriculture (UDSA). The CDC is tasked with investigating interstate outbreaks of foodborne illness (Morris, 2017). Surveillance activities are also undertaken alongside local governments to prevent any local outbreak from becoming a national concern. The FDA's role in ensuring food safety is statutorily outlined in the federal Food, Drug, and Cosmetic Act (Orberg, 2012). This law ensures the safety and integrity of all foods, excluding meat, poultry, eggs, and certain seafoods. Of particular interest to this paper is the FDA's role in promoting retail food safety and hygiene. Retail foods transactions are intrastate in nature, so the responsibility of regulating such activities is vested with state and local governments (Ogbu, 2015). However, the FDA provides guidance through its Retail Food Code to the states; the states, in turn, govern the practices of local regulators ("Evolution of Food Safety", 2012). Finally, the USDA, through its Food Safety and Inspection Service (FSIS) program, regulates the production and processing of meat and poultry products. While other agencies also take part to ensure the safety of the nation's food, these efforts are ancillary and function as support to the CDC, FDA, and USDA ("Advancements in Public Health, 1990-1999: Safer and Healther Foods", 1999).

The FDA's Retail Food Code provides direction to state governments using the principles of the Hazard Analysis Critical Control Point (HACCP) system. HACCP is a not an exacting plan to be followed but instead employs a systems-based approach where risks for contamination are believed to be encountered and reduced to a level considered satisfactory (Taylor, 2001).

Instead of traditional inspections based on an inspector's evaluation of a food producer during a point in time, HACCP guidance directed regulators to examine a producer's quality control processes. According to Sperber and Stier (2009) and Axelrad (2006), HACCP is comprised of 7 foundational principles used to minimize foodborne risks:

1. Performance of a hazard analysis to identify points of the production or preparation process where risks can be introduced;
2. Identification of critical control points where the risks can be acted upon;
3. Outlining parameters, or limits, of the critical control points to decease the likelihood of contamination from biological, chemical, or physical threats;
4. Developing a process to monitor critical control points to ensure that limits are not exceeded;
5. Designing corrective actions that would be introduced in the event that a limit assigned to a critical control point is exceeded;
6. Instituting verification procedures to determine the effectiveness in minimizing the occurrence of hazards;
7. Ensuring that a sound recordkeeping system is in place.

HACCP is considered a flexible framework that can be and has been applicable to all phases of the food production process, including processing and retail preparation (Weinroth, Belk, & Belk, 2018).

HACCP was developed in the 1960s by Pillsbury and NASA during a joint effort to minimize the proliferation of pathogens during extended space endeavors (Weinroth, Belk & Belk, 2018). However, it was not fully embraced by the federal government and food industry until 1993 after an *E. coli* outbreak hospitalized over 700 and resulted in the deaths of 4 children.

Today, HACCP is widely embraced in the United States and across developed nations. The FDA's Retail Food Code, a non-compulsory document established to provide guidance to state public health departments, incorporates HACCP's principles of quality control and risk management (Axelrad, 2006). State and local regulatory agencies have been receptive in incorporating HACCP into their respective food codes. According to the FDA, there are 66 state agencies responsible for ensuring retail food safety throughout the country, and all but two agencies have at least partially incorporated the FDA's Food Code standards into their own respective codes ("Adoption of the FDA Food Code by State and Territorial Agencies Responsible for the Oversight of Restaurants and Retail Food Stores", 2016). The California Retail Food Code, which governs all county and local retail inspection programs, also employs many of the risk-mitigation controls outlined by the FDA Food Code and HACCP.

The California Retail Food Code was signed into law as SB 144 in 2007 and lays out the parameters for local enforcement agencies to follow ("Laws, Policies, and Legal Issues", 2019). The Code outlines the required food safety and preparation standards that are believed to minimize the risk of foodborne health risks. According to Ogbu (2015) retail establishments are defined in the Code as

> an operation that stores, prepares, packages, serves, vends, or otherwise provides foods for human consumption at the retail level. Permanent or nonpermanent food facilities include, but are not limited to restaurants, public school cafeterias, restricted food service facilities, mobile support units, temporary food facilities, vending machines, and certified farmers' markers. (p. 8)

Under the Retail Food Code, county governments are the principle entities responsible for enforcing the code. However, a few cities, such as Berkeley, have opted to develop their own

enforcement programs. The Retail Food Code does not impose a prescribed checklist for enforcement agencies to follow. Instead, it broadly outlines the components of retail food preparation that are to be inspected; these are the areas where foodborne hazards are most likely to occur (Ogbu, 2015). Some examples include evaluations of employee hygiene practices, temperature management, and the presence of pests. Also articulated by the Retail Food Code are the levels of severity of any findings of non-compliance. Anything deemed an imminent health hazard is classified as a major violation, and potential hazards not considered an imminent threat are considered minor violations. Any food establishment that is determined to have committed a major violation is subject to immediate closure unless a suitable corrective action is taken (Santa Clara County, 2013). Environmental health inspectors are tasked with implementing the statutory mandates of the State Retail Food Code but use their own judgements to determine compliance and the adequacy of any corrective actions taken. Also outlined by State law is the requirement that retail food establishments make inspection reports available to consumers (Susko, Putnam, & Villareal, 2013). However, the law only requires information to be presented upon request. No requirements are imposed on either the local agencies or venders to anticipate consumer requests and make the data assessable online or on storefronts ("Excerpt from the California Retail Food Code", 2018). Local enforcement agencies, such as Santa Clara County, also have broad discretion to establish their own grading systems, if any.

Across California, local enforcement agencies responsible for implementing the Retail Food Code have each pursued their own grading metrics or systems. According to Ogbu (2015), some of the types of placard grading systems found around California include letter grading, percentage grading, and color-coded grading. Some of the less populated counties in the northern part of the State employ neither a grading system nor a placard posting requirement, but many do

make their inspections reports available online. Such placard grading systems are designed to convey the findings of the most recent inspection in a succinct and accurate manner to potential patrons of a food establishment (Simon et al., 2005). While no research was found on the efficacy of one different grading system compared to the others on improving public knowledge and health, some have contended that letter grading systems may be more difficult to comprehend for English language learners or those not accustomed to letter-based academic grading systems (Ogbu, 2015). Systems that use a numeric or percentage-based system, such as the one in San Francisco, may fail to convey the severity of any violations discovered. A restaurant with one major violation, an imminent health hazard, may have a higher score than one with several minor violations (Santa Clara County, 2013). Color-coded systems, such as the one used by Sacramento County, are considered to lack nuance, as establishments with an excellent record of hygiene and sanitation are grouped together with those that are merely satisfactory enough to receive a green card. After careful examination of the various systems, the Board of Supervisors chose to develop a dual approach that combines a color-coded placard with a numeric score (Santa Clara County, 2014).

In addition to the State Retail Food Code, the State Food Handler Certification Law of 2011 also functions as the one of the primary statutory mandates imposed on local food establishments. Although not examined in this paper and not directly related to the disclosure requirements imposed by the State and County, food safety education and certification measures are believed to be a critical safeguard for public health. Credentialing, unlike disclosure requirements, is aimed to directly address the knowledge deficiencies of food handlers and managers (Ogbu, 2015). Under California's food handler card law, newly hired food employees whose job entails contact with foods are required to attain a food safety certificate within 30 days

of being hired ("California Food Handler Card"). Additionally, certified managers are required to be onsite and actively engaged in ensuring food handling practices at all times. The certification requires three hours of training for employees and can be obtained from an accredited vendor either in-person or online. According to one study (Park, Kwak, & Chang, 2010), food safety training programs do in fact increase knowledge of the appropriate handling and hygienic procedures, but desired shifts in actual workplace behaviors require continuous management and education processes beyond the initial training.

Santa Clara County's Food Safety Program

Santa Clara County's efforts to modernize its food inspection program were prompted by a local news investigation, as well as the recognition that technology should be leveraged to disclose inspection information (Wadsworth, 2013). In 2013, an investigative report by the local NBC news affiliate found that a number of food establishments refused to share inspection reports when requested, in violation of the State Retail Food Code (Susko, Putnam, & Villareal, 2013). At the time of the report, Santa Clara County had no grading system in place and no storefront placarding requirements. Consumers were entirely reliant on either the ineffective disclosure requirements imposed on establishments, or they were left to undertake a meticulous search for the data on the County's dated website. If the County's Department of Environmental Health (DEH) was notified of such a violation, an inspector would visit the establishment and ask if the report was readily available (Santa Clara County, 2013). During the 2013 initial discussion with DEH staff, it was concluded that no practical enforcement mechanisms existed; food establishments that denied an inspection report to a member of the public would not behave in a similar manner when asked by a County official, and no penalties would be levied. In March of 2013, the Board of Supervisors requested that the DEH begin a feasibility study of instituting a

new placard requirement (Santa Clara County, 2014). As part of its initial efforts, DEH would consult with a variety of stakeholder groups, including consumer advocates and business interest groups ("Placarding and Scoring Program", 2014). A survey of neighboring jurisdictions was also completed by the DEH and Board of Supervisors to compare the various grading systems that had been in effect for years. In April of 2014, the Board of Supervisors unanimously approved of the Ordinance No. NS-517.86 that required the placing of color-coded placards that conveyed the findings of inspections. According to the 2014 Board of Supervisors' meeting notes, the color-coded placard would be complemented by a numerical score which would be available on the county's redesigned DEH website.

The system adopted by the Board of Supervisors integrates the risk factor principles of the HACCP manifested in the placarding requirement with a numeric scoring system. Under the new ordinance, the color-coded placard issued after an inspection corresponds to the presence of any major violations found (Santa Clara County, 2014). A green pass placard is issued if no more than one major violation is found, and the violation must have been corrected during the time of inspection (See Appendix A; "Placarding and Scoring Program", 2014). A yellow, conditional placard indicates two or more major violations discovered; corrective actions must have been implemented at the time of inspection in order for a conditional placard to be issued ("Food Safety Program – Placarding and Scoring"). Conditional placards require a follow-up inspection to ensure that corrective actions undertaken during the inspection are indeed satisfactory. Finally, if any number of major violations are discovered and no corrective action can be feasibly taken at the time of inspection, the restaurant must be immediately closed and is issued a red closed placard. A follow-up inspection may be conducted at the owner's request once it is believed the situation has been rectified.

The numerical scoring system that supplements the color-coded placard requirement is based on whether or not an establishment receives any of three distinct violation classifications. The three types of violations can each result in a numerical score deduction on an inspection report (Santa Clara County, 2013). The scores are not indicated on the storefront placard but instead posted on the County's dedicated website for inspection results (Appendix B). A perfect score represents a numerical score of 100, and points are deducted with every violation found; the amount deducted will depend on the violation type ("Food Safety Program – Placarding and Scoring"). Major violations represent the same imminent health hazards that determine the placard color issued and also result in an eight point deduction. Minor violations are those that can pose health hazard if not rectified but are not considered imminent threats to public health ("Placarding and Scoring Program", 2014). These violations are each followed by a three point deduction from the total score. Lastly, the County deducts two points for each good retail practice violation discovered. Good retail practice violations include and consider factors such as the general cleanliness of the facility and its active onsite management (Santa Clara County, 2014). Both minor and good retail practice violations do not affect the color of the placard issued.

The inspection report is completed on a standardized form which lists out the 50 violation types (See Appendix C). Along with numerical scores and any violations found, the form includes a narrative report and the inspector's feedback on the staff's knowledge of best practices in food hygiene. With the implementation of the new placarding and scoring program, County officials prognosticated that the availability of new information would promote public health by incentivizing food vendors to improve their sanitation and preparation processes as a reaction to increased consumer information. The literature on transparency regulatory policies and their

impacts on behavior changes provides insight into the theoretical bases of such placarding programs. With respect to the retail food industry, the literature has been favorable to disclosure policies such as the one adopted by Santa Clara County.

LITERATURE REVIEW

Restaurant placarding or inspection transparency programs, such the one in Santa Clara County, are reliant on the assumptions that inspections do mitigate and prevent illness, that consumers are able to assess the information published, and that food establishments will respond to consumer behaviors. Over the years, research on placarding programs has examined each of these elements using models of economic incentives and information processing and assessment. The conclusions in the body of research that exists do appear to comport with the assumptions that serve as the basis for the publishing of inspection data. Moreover, the impacts of inspections and disclosures on actual health outcomes do appear to be beneficial. These models together comprise what Fung, Weil, Graham, and Faggoto (2004) refer to as the transparency action cycle. The subsequent literature cited will examine the nature of each of the causal pathways that together serve as the basis for transparency regulations in environmental health.

Transparency regulatory schemes are viewed as an emerging, viable policy alternative to standards-based regulation and subsidization. It has been noted, however, that the success of such policies is not guaranteed to achieve the desired ends of policymakers (Fung, Weil, Graham, and Faggoto (2004). Fung et al. (2004) note that such policies either introduce new information or make assessable existing information to rectify critical knowledge gaps that prevent individuals in a population from making the best possible decisions. They further note that cross domains, policymakers have deemed it necessary to protect the public by disclosing the relevant streams of information in order to mitigate any associated risks with the decisions of concern. The effectiveness of these policies is, though, contingent upon shifts in behavior from both the parties involved in evaluating the information, and the parties that either disclose the information or that the information concerns (Winston, 2008). If the changes in behavior are aligned with the intent of policymakers, the disclosure policy is deemed effective.

Inspections and Health Outcomes

While disclosing inspection data is aimed to change the habits of both consumers and food vendors alike, policymakers are concerned with maximizing public health outcomes (Jin & Leslie, 2003). Inspection policies and processes assume a nexus between the determinations made during inspections and actual foodborne-related illness health outcomes; more positive evaluations are supposed to correspond to some more positive measure of health. Guidelines and statutes, both at the federal and state levels, have increasingly focused on the risk-factors that are highly associated with incidence of foodborne illnesses (Ogbu, 2015). Inspections conducted by Santa Clara County are in turn focused on these risk-based factors ("Placarding and Scoring Program", 2014). These risk factors are comprised of hygiene practices and facilities maintenance, and they are believed to account for 75 percent of reported illnesses (Fleetwood et al., 2018). Although many jurisdictions do use risk-based inspections, inquiry into the extent of any relationship between inspection results and health poses a significant challenge for researchers due to the jurisdictional variations in classifying violations, inspector differences, and the dependent variables used to measure health (Yeager et al., 2013). Still, several studies have attempted to provide some insight into the efficacy of inspection efforts in promoting better health.

Several studies have attempted to gauge the impacts of food establishment inspections on the incidences of foodborne illness outbreaks by comparing data on establishments where outbreaks had occurred to those where none occurred over a given period of time. As previously noted, these studies employ varying measures of health risks or outcomes and examine different jurisdictions that have adopted their own respective approaches to inspecting food vendors. Among the earliest studies examining the extent of any association was a study that examined

restaurants in King County, Washington between 1986 and 1987 (Irwin et al., 1989). Irwin, Ballard, Grendon, & Kobayashi (1989) examined the scores and violations of restaurants that had reported outbreaks of foodborne illnesses, and they compared the data to those control restaurants that had no such reports of illness. They discovered that there was indeed a heightened risk for contracting a biological foodborne illness among restaurants that received lower scores. According to the study, "Restaurants of an overall score of less than 86 were about five times more likely to have an outbreak. Restaurants that received an inspection result of unsatisfactory or suspended were three times as likely to have an outbreak" (Irwin et al., 1989, p. 589). Certain infractions that involved not keeping food at a proper temperature and those relating to food storage were also found to be statistically significant in their associations with outbreaks. Another study that compared inspection reports to illness outbreaks in Minnesota from 2005 to 2011 found no relation between illness and overall scores (Petran, White & Hedberg, 2012). However, it was found that certain violations were highly likely to be associated with underlying pathogen classifications that were behind various outbreaks. For example, hand washing violations and inadequate work policies involving employee illness were more likely to be found in restaurants that experienced Norovirus outbreaks, while Salmonella outbreaks were more likely to occur in restaurants that were cited for improper management of food temperature. In contrast, Cruz, Katz, & Suarez's (2001) retrospective evaluation of Miami-Dade County restaurants found no association between overall score and reported outbreaks.

Research conducted using data from Los Angeles and the United Kingdom have employed different measures to operationalize health outcomes or risks. In their study of food establishments in Norther Ireland, Fleetwood et al. (2018) compared compliance scores to data from the United Kingdom's Local Authority Enforcement Management System (LAEMS) and

United Kingdom Food Surveillance System (UKFSS), both of which are managed by the nation's Food Service Agency. The databases store information about samples randomly collected from establishments and analyzed for pathogens well known to cause foodborne illness. If any given sample tested positive for any one agent, the sample was deemed unsatisfactory. Compliances scores were then compared to these microbiological determinations. Fleetwood and his colleagues discovered that compliance scores are indeed associated with the presence of foodborne illness inducing pathogens. Among the Northern Ireland restaurants that were examined, with each successive level of compliance, samples that tested positive for pathogens were less likely to occur. Fourteen percent of restaurants that were fully compliant had a sample that tested positive, whereas those restaurants that were considered "not broadly compliant" were 21 percent likely to have a sample that tested positive.

A separate study by Simon et al. (2005) described Los Angeles' adoption of publishing inspection results and foodborne related hospitalizations in the county. Simon and his colleagues compared hospital discharge data prior to and after the County's adoption of the new placarding disclosure program. Although the study does not examine any determinations made by the inspector, the study addresses directly the impact of disclosing inspection notices and subsequent health outcomes. This avenue of inquiry is something that is directly relevant to the terminal goals of Santa Clara County in improving public health outcomes.

How Disclosed Information is Used by Consumers

In adopting transparency requirements, policymakers are seeking to induce behavioral changes in both the party that information is targeting as well as the discloser of the information. As Weil, Fung, Graham, & Faggoto (2006) assert, however, the process of introducing information to the public to changing the behavior of the discloser can fail at one or more points in the cycle,

effectively rendering the entire policy ineffective. For the county's newly transparency-focused food program to achieve its intended ends, the information must be incorporated into the decision-making calculus of the consumers patronizing food vendors in the jurisdiction. Policymakers requiring the disclosure of such information must consider the constraints on information processing capacity and the propensity to rely on information cues to make decisions (Henson et al., 2006). Fung, Graham, Weil, & Faggoto (2004) claim that for the information to be valuable, it must be comprehensible, relevant to the issue at hand, and proximate to the point where the person makes the decision in time or spatially. Research examining the impacts of publishing or posting inspection data is sparse, but what has been done does appear to substantiate the utility of making inspection data available for consumers to consider and act on.

Existing research on the need and demand for readily available inspection data indicates that consumers are interested but lack the information to make the most informed decisions about which establishments to patronize. Jones and Grimm (2008) found that the public is unanimously aware that establishments are subject to inspections by local officials. Within the same sample of individuals, 87 percent believed inspection data should be easily assessable before deciding where to eat; a plurality identified a score of 90 on a 100-point scale as the minimum acceptable score for a restaurant. Dundes and Rajapaska's (2001) study of college undergraduates found similar results but applied to a hypothetical alphabetical grading metric. When presented with the opportunity to evaluate an establishment on a numerical or alphabetical scale, subjects in both studies indicated preferences for only those that received highly positive evaluations. When not equipped with adequate information on restaurant hygiene, consumers resort to using arbitrary, less reliable cues, including the number of individuals seen dining and reputational station among family and friends (Henson et al., 2006).

In seeking to rectify the information asymmetries consumers face when choosing where to purchase food, policymakers assume that the information will be both processed and acted on. The research on how consumers use inspection data does support the idea that when consumers are provided with comprehensible information that is provided in a manner that is proximate to the point of decision-making, the information can be used to seek to minimize risks of foodborne illness. Harris, Hanks, Line, & McGinley (2017) found that consumers will process information heuristically when confronting a positive score. Conversely, if a score is interpreted as negative, the prospective consumer will process any provided information in a systematic manner. They add, however, that the placard must be posted in a visible spot and presented in a comprehensible manner, consistent with the aforementioned requirements of information to be integrated into an individual's decision-making calculations (Fung, Weil, Graham, & Fagotto, 2004). Henson et al. (2006) found that the posting of inspection results was not as salient in the decision of whether to dine at a particular restaurant as other visual cues, including perceived cleanliness and number of patrons. However, taken together, subjects did report hygiene as a dispositive factor in whether or not to dine.

Disclosure and the Incentives to Motive Changes Among Food Retailers

Once consumers are provided with the information to make informed decisions about the risks associated with patronizing a particular establishment, food vendors themselves would ideally be motivated by market incentives to change their behaviors to meet shifting consumer preferences. In order for the policy change to be deemed effective, behaviors on the part of the disclosers need to shift in accordance with the goals of the policymakers (Fung, Weil, Graham, & Fagotto, 2004). In the case of Santa Clara County's efforts to provide consumers with more information about vendor hygiene, vendors are expected to exercise greater compliance with safety practices

and norms as outlined by the State and County ("Placarding and Scoring Program", 2014). Several studies have attempted to gauge the impact of the disclosure of hygiene information on vendor practices. The results have indicated that making such information assessable can be an effective tool for motivating such changes.

Studies attempting to gauge the nature and extent of the response to disclosure policies have yielded largely positive results. In their examination of Los Angeles County restaurants in 1998, Jin and Leslie (2003) found that the implementation of placarding postings did in fact raise subsequent scores by 5% (2003). Fielding, Aguirre, & Palaiologos (2001) were led to similar conclusions in a study also done of Los Angeles County. A separate study of restaurants in Salt Lake City found that the jurisdiction's launching of a website where inspection results would be posted was followed by a decrease in the number of critical inspection violations by up to 30 percent for some inspection categories (Waters, VanderSlice, DeLegge, & Durrant, 2013). In a later study by Jin and Leslie (2009), the perceived salience of restaurant reputation and changes following inspection determinations varied by the type of establishment. Chain restaurants believed they were less susceptible to critical evaluations by inspectors due to their national profiles.

Other studies pursue other methods of inquiry to understand the impact of reputational incentives on vendor behaviors. According to Makofske (2017), growing ubiquity of social media platforms, and informal sharing of relevant information, has become an increasingly used tool for consumers in choosing where to spend their money. The same study also notes that platforms such as Yelp have partnered with local jurisdictions to post inspection data on their websites. Inspection data of Santa Clara County establishments is posted alongside Yelp reviews following an agreement between the company and HD Scores, a company that collects such

information for public agencies (Yurieff, 2018). It is not believed, however, that HD Scores has a formal partnership with the County to disseminate the information. Rather, the company likely obtained the information from the County's own website. In a separate study, Almanza, Ismail, and Mills (2002) examined the impact of media reports of restaurant hygiene on food handling behaviors. The study found that they were in fact responsive to media reports on inspection records, and subsequent scores were found to increase.

The body of literature on the impact of the compulsory disclosure of establishment inspection data provides some basis for the adoption of such policies. Existing research covers most of the causal pathways identified in the desired transparency action cycle from disclosure to potential changes in consumer behavior to shifts towards more positive health outcomes (Fung, Weil, Graham, & Fagotto, 2004). From the impact of inspections on mitigating health risks to the desired changes to safer food establishment handling practices, the research leads one to believe that the aims of policymakers in instituting transparency as a regulatory tool can be effective in the area of food safety. Also following an examination of the literature, notable lines of inquiry have yet to be undertaken by researchers. This includes studies on the various placard formats and the role of other disclosing entities such as Yelp in shaping consumer judgements about where to spend their money.

METHODOLOGY

In order to ascertain whether or not Santa Clara County's efforts to modernize its food safety program have achieved its intended outcomes, an outcome evaluation served as the most appropriate evaluative approach to employ. In their book, *Program Planning and Evaluation for the Public Manager*, Ronald and Kathleen Sylvia noted that articulating the theoretical and program goals, inputs, and measures aids in understanding how the program is intended to work, as well has how the various components interrelate (2012). In order lay out a program's components to conduct an outcome evaluation, Sylvia and Sylvia suggested the use of a visual instrument to succinctly lay out each element of a given program. A logic model will outline seven elements of a program: (1) theoretical goals, (2) program goals that are defined by program administrators, (3) program functions, (4) identifying intermediate and measurable goals that operationalize less actionable program goals, (5) program measures, (6) program outcomes, and (7) outcome valence. According to Sylvia and Sylvia, the fourth step, program measures, is the stage where any evaluative efforts are determined. In addressing the program measures of performance, the proximate indicators are assessed for any shifts in the program's intended direction. Table 2 provides information on each component of the County's food safety program as a first step of the outcome evaluation.

Table 2: Logic model for Santa Clara County's Food Program

Theoretical Goals	Program Goals	Program Functions	Proximate Indicators	Selected Program Measures	Program Outcomes	Outcome Valance
T_1: Ensuring the safety and integrity of all foods served to patrons of Santa Clara County food establishments	G_1: Increasing compliance with the State Retail Food Code (T_1)	F_1: Conducting routine and/or follow-up inspections	I_1: Number of reported foodborne illnesses in the County ($F_{1\text{-}4}$)	M_1: Comparing the number of foodborne illnesses reported (I_1)	O_1: (M_1)	+/-
	G_2: Minimizing the incidence of foodborne illnesses in Santa Clara County (T_1)	F_2: Issuance of a color-coded placard	I_2: Number of major violations found (F_1), (F_2)	M_2: Comparing number of major violations found in first year versus subsequent years (I_2)	O_2: (M_2)	
	G_3: Ensuring that consumers have sufficient information about an establishment's record of hygiene and food handling practices (T_1)	F_3: Posting inspection reports and numerical scores on County DEH's updated website	I_3: Number of minor violations found (F_1)	M_3: Comparing minor violations found in the first year and subsequent years (I_3)	O_3: (M_3)	
		F_4: Revoking the operational permits of any establishments found to have imminent health hazards that cannot be corrected (G_1), (G_2)	I_4: Number of closures or red cards issued	M_4: Have the number of closures increased since the adopted on the new placarding and scoring program? (I_4)	O_4: (M_4)	

As part of the evaluation of Santa Clara County's Food Safety Program, a quasi-experimental, longitudinal statistical analysis was used to examine program measures M_2 and

M_3. In order to gauge the effect of both program measures, paired sample t-tests were performed in an attempt to answer the following questions:

a. Are there any statistically significant differences in the proportion of restaurants found to have a major violation between 2015 and 2017?
b. Are there any statistically significant differences in the proportion of food establishments found to have a minor violation between 2015 and 2017?

Although the County adopted the ordinance in April of 2014, the program did not take effect until October of that year (Santa Clara County, 2014). Therefore, 2015 was the first full year of implementation, and the first time that data from all food establishments in the County are available for analysis. Also, 2017 was used as the final year of evaluation instead of 2018 due to incomplete inspection data from 2018. Statistical significance will be determined using the standard confidence level of 95%, or a p-value of .05. SPSS version 25 will be used to perform both analyses. Due to the limitations of the dataset, analysis on placard colors issued could not be feasibly completed. Further, because of the County's record retention policy of three years, the analysis examined Years 1 (2015) and 3 (2017) of the program. The design did not use a true pre-test/post-test analysis. The methods employed in answering questions A and B are comparable to Ogbu's (2015) analysis of Alameda County's adoption of a new hybrid color-coded and scoring scheme. However, due to the disparities in how Santa Clara County and Alameda County categorize and group infractions, the results generated were not comparable. Additionally, like Ogbu's analysis, the results will also be broken down according to establishment type. However, the classification system employed by Alameda County somewhat differs from that of Santa Clara County's. Both measure size, but the numerical delineations are distinct.

Prior to the statistical analysis being performed, the several steps in data collection and re-coding were performed. All data was collected through a public records request submitted to the Santa Clara County Department of Environmental Health. The data was received in an .xlsx format, and included numerical facility identification codes, establishment name, establishment type, address, inspection date, each violation found, violation severity, and a violation description that corresponds to the labels on the county's standardized inspection form. For the purpose of the analysis, information on an establishment's address, name, and violation description were hidden in the dataset due to the information's limited utility to perform the analysis. A random sample of 382 establishments was drawn from the over 6000 available using the tools available on the Microsoft Excel platform. Data was then recoded as a binary 0 or 1 variable to indicate the presence of major and minor violations to tests hypotheses A and B. Finally, the recoded data was transferred to SPSS in order to perform the inferential statistical analyses. To ensure validity, only routine inspection data was used in the sample. Also, only establishments with data available for both years were selected. In answering questions A and B, this research attempts to answer the broader research question of this paper of whether or not the revamped Food Safety Program has improved compliance with food safety laws.

FINDINGS

Descriptive Statistics

This study examined 382 of the roughly 6,400 retail food establishments in Santa Clara County. The composition of the sample is also presented according to the categories presented in the dataset provided by the Department of Environmental Health. Table 3 presents the sample demographics and frequencies. As displayed, the County categorizes retail food establishments according to their respective sizes, as measured by the number of people employed.

Table 3:
Sample Demographics of *Randomly Selected Establishments*

	N	%
0-5 Employees	235	61.5
6-25 Employees	109	28.5
26+ Employees	18	4.71
Schools	20	5.25
Total	382	100%

Of the 382 retail food establishments randomly selected, smaller establishments which employ 0-5 individuals make up over 60 percent. Medium-sized are considered those that have 6-25 employees comprise just over 28 percent. Larger establishments and schools together account for roughly 10 percent of establishments sampled. Grocers are primarily categorized into one of the three employee count categories, as many prepare food onsite. However, those that do not prepare food onsite do make up a distinct category, but none were selected to be in the sample. Also grouped into the categories which identify number of employers are a variety of other establishments including commissaries, health facilities, and markets. Schools, however, are included in their own distinct category.

An examination of the total counts of both major and minor violations shows that both categories of violations have decreased between 2015 and 2017. Figure 1 displays the violation totals for both 2015 and 2017. Major violations, which are identified by the State Retail Food Code as posing imminent threats to public health, decreased overall. The number of minor violations discovered in the sampled establishments also saw a modest decrease in 2017 from 2015. Tables 4 and 5 show violations counts for both 2015 and 2017 and also includes a tally of each violation type discovered. The tables also illustrate that certain types of infractions discovered during an inspection are either exclusively major, exclusively minor, or either minor or major.

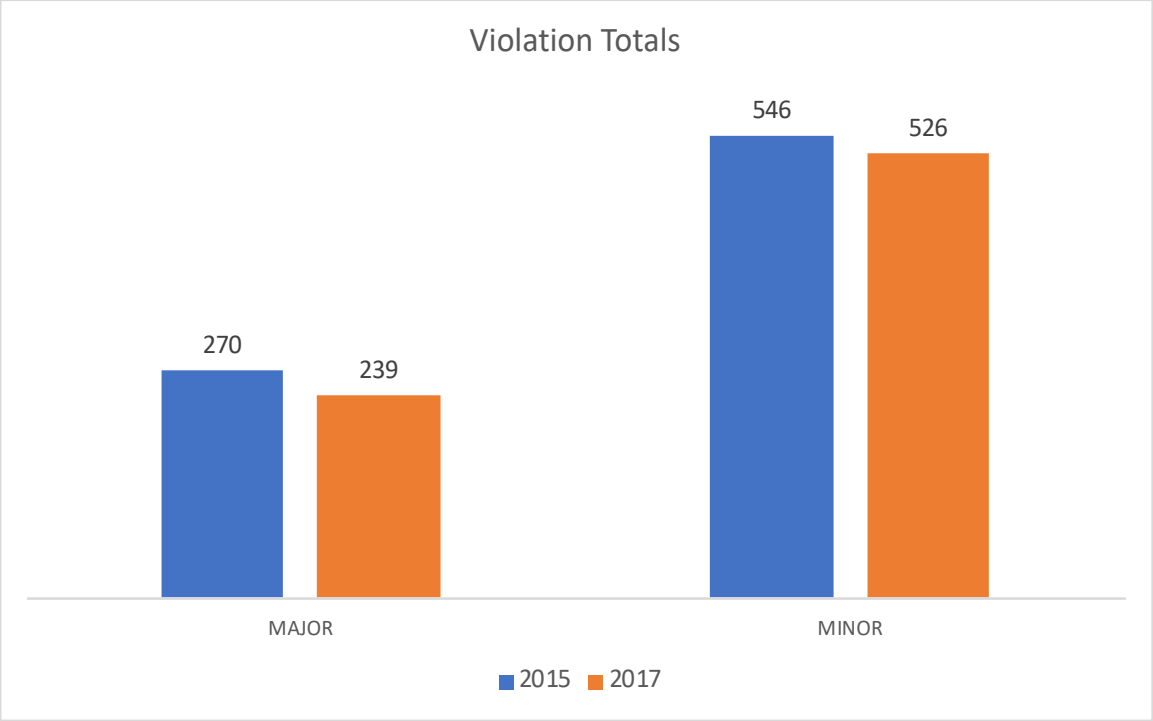

Figure 1: Violations Counts by Type: 2015 vs. 2017

For example, if an inspector finds an employee who has a bodily discharge from his or her eyes, nose, or mouth, the violation would automatically be categorized as major. The findings of any

Table 4:
Major Violations Discovered in 2015 and 2017

Violation Description	2015	2017	Total	Change
Communicable Disease: Did not report, restrict, or exclude a food employee	1	0	1	-1
Discharge	0	0	0	-
Food Contact Surfaces Unclean and Unsanitized	53	29	82	-24
Food not in Food Condition/Unsafe/Adulterated	7	4	11	-3
Food not Obtained from an Approved Source	1	2	3	+1
Hands not Clean/Improperly Washed/Gloves not Used Properly	15	9	24	-6
Hot and Cold Water not Available	7	6	13	-6
Improper Cooking Times and Temperatures	1	0	1	+1
Improper Cooling Methods	16	9	25	-7
Improper Hot and Cold Holding Methods	82	85	167	+3
Improper Reheating Procedures for Hot Heating	0	5	5	-5
Improper Shell Stock Tags/Conditions/Display	0	2	2	-2
Improperly Using Time as a Public Health Control Procedures and Records	9	22	31	+13
Inadequate Handwashing Facilities: Supplied or Assessable	65	54	119	-9
Non-compliance with Variance ROP/HAACP Plan	4	0	4	-4
Observed Rodents, Insects, Birds, or Animals	7	8	15	+2
Sewage and Wastewater Improperly Disposed	2	4	6	+2
Total	270	239	509	

Source: Santa Clara County

rodents, birds, or insects can be determined to be either major or minor, depending on the infraction's severity and the inspector's discretion. A complete list of infractions and their designated categorizations can be found in the County's standardized inspection report in Appendix C.

Table 5:
Minor Violations Discovered in 2015 and 2017

Violation Description	2015	2017	Total	Change
Food Contact Surfaces Unclean and Unsanitized	81	64	145	-17
Food not in Good Condition/Unsafe/adulterated	15	12	27	-3
Hands not Clean/Improperly Washed	26	18	44	-8
Hot and Cold Water not Available	56	57	113	+1
Improper Cooling Methods	23	28	51	5
Improper Eating, Tasting, Drinking or Tobacco Use in Food Preparation Area	14	11	25	-3
Improper Hold and Cold Holder Temperatures	49	70	119	21
Improperly Using Time as a Public Heath Control Procedures and Records	10	10	20	0
Inadequate Demonstration of Knowledge; Food Manager Certification	111	100	211	-11
Inadequate Hand wash Facilities: Supplied or Accessible	93	93	186	0
Non-compliance with Consumer Advisory for Raw or Undercooked Foods	2	2	4	0
Non-Compliance with variance/ROP/HAACP Plan	1	2	3	+1
Not in Compliance with Shell Stock Tags, condition	7	7	14	0
Observed Rodents, Insects, Birds, or Animals	48	42	90	-6
Returned and Reservice of Food	2	0	2	-2
Sewage and Wastewater Improperly Disposed	8	10	18	+2
Total	546	526	1072	-20

Source: Santa Clara County

Hypothesis Tests

In order to further gauge any potential changes in compliance with State law as a result of the implementation of the new disclosure measures, statistical analyses and hypothesis testing were also employed. As previously discussed, the inferential analysis is comprised of two research questions, both of which examine the breadth and likelihood of compliance. Using the standard 95% percent confidence level, or a p-value of 0.05 to determine statistical significance, the

research questions assess compliance by examining data on major and minor violation prevalence.

Table 6:

Summary Table of Dependent T-tests performed on proportions of Santa Clara County Retail Food Establishments Sampled Found to have Major (RQ 1) and Minor (RQ 2) Violations

Violation Type	2015	2017	Change	t	p-value (Sig.)
Major	.41	.45	-.045	-1.341	.181
Minor	.73	.72	-.008	.266	.790

The results of both research questions are presented in Table 6. As displayed the results indicate that for both major and minor violations, changes in the likelihood of a given establishment having committed either category of infraction are statistically insignificant. Concerning major violations, hypothesis test one, the proportion of establishments within the sample having committed such a violation modestly increased from 0.41 to 0.45. However, the shift can only be explained by randomness, as indicated by the 0.181 p-value. Concerning minor violations, hypothesis test B, the proportion of establishments found having committed such an infraction slightly decreased from 0.73 to 0.72. Similar to the analysis of establishments and major violations discovered, the statistical analysis performed on minor violations did not yield a significant result**.** Thus, any variation in the proportions and likelihood of establishments having committed a minor violation can also be explained by random variation. Not surprisingly, the proportions of establishments both in 2015 as well as 2017 having committed a minor violation are both well above the proportions concerning major violations. This is likely explained by the

greater number of minor infraction types and the higher thresholds required for a major violation to be recorded by an inspector.

In addition to assessing the overall sample with changes in compliance from 2015 to 2017, analysis was also performed on compliance by establishment category. Categories are distinguished in the dataset by size and the results are presented accordingly in Tables 7 and 8.

Table 7: *Summary of Dependent Sample t-tests Examining any Changes in Major Violations Discovered between 2015 and 2017 by Establishment Type*

Establishment Type	2015	2017	Change	T-statistic	P-value (Sig.)
0-5 Employees	0.40	0.46	0.06	1.482	.140
6-25 Employees	0.43	0.45	0.02	.456	.649
26+ Employees	0.56	0.44	-0.12	-.809	.430
Schools	0.20	0.25	0.05	.326	.748

Table 8: *Summary of Dependent Sample T-tests Examining Any Changes in Proportion of Establishments Found to Have Committed a Minor Violation Between 2015 and 2017*

Establishment Type	2015	2017	Change	T-Statistic	P-value (Sig.)
0-5 Employees	0.73	0.74	0.01	.333	.740
6-25 Employees	0.81	0.78	-0.03	-.684	.495
26+ Employees	0.68	0.68	-	0.00	1.00
Schools	0.40	0.30	-0.10	-.809	.428

As both tables demonstrate, the breadth of change in the number of both major and minor violations discovered from 2015 to 2017 for all types of establishments appears to be

underwhelming. While there were modest decreases in the proportions of larger establishments and schools found to have committed a major violation, the changes appear to be the result of random variation and cannot be generalized to the broader population. Interestingly, schools were found in both 2015 and 2017 to have better performed than every other category of establishments. Table 8 illustrates that the proportions of establishments which have committed minor violations also remains largely unchanged. Consistent with the aggregated results displayed in Table 6, minor violations were similarly less likely to be encountered than major violations for each type of establishment. Also, as with major violations, schools were less likely to have committed minor violations.

The results of this study attempt to add to the already extensive body of literature on the matter of inspection data disclosure and changes in food preparation behaviors. Overall, an examination of both the descriptive figures and the inferential analysis returned mixed findings. From the 382 sampled establishments, the overall counts of both major and minor violations discovered appear to have declined. Conversely, the inferential analysis did not demonstrate that establishments as a whole have shifted their behaviors and practices in the manner intended by the County.

ANALYSIS

Transparency requirements are becoming an increasingly employed regulatory strategy for changing private behaviors. As much of the literature discusses, success of such policies is contingent on the comprehension and integration of the disclosed information by the intended recipients of the information and, ultimately, changes in behavior of the disclosing parties. More recently, the compulsory disclosure of information has been considered to be a viable tool in minimizing the incidence of foodborne illness and promoting public health. Public policy decisionmakers, such as the Santa Clara County Board of Supervisors, have approved of enhanced disclosure requirements of inspection and violation data to the public, hoping that the public will make informed decisions about where to eat. In turn, food establishments in the County would theoretically modulate their practices, knowing that consumers are equipped with the pertinent information to make informed decisions. As discussed in the review of the literature, the results of comparable policies have been mixed. As neighboring jurisdictions have adopted comparable initiatives since Santa Clara County approved its own, it is incumbent on researchers and public agencies to ensure that their efforts are in fact achieving their desired ends. This research paper aims to add to the growing body of literature on enhanced disclosure regulatory requirements imposed on food-preparing and food-serving establishments, particularly in the State of California.

The results from this paper's efforts to evaluate the impacts of Santa Clara County's enhanced disclosure policies for local food establishments yielded mixed results. The analysis was comprised of both a descriptive and inferential analysis and generated conflicting results. In examining the descriptive violation totals for both major and minor violations, both violation classifications experienced modest decreases from 2015 compared to 2017. In 2015, the total

major and minor violations found among the 382 sampled establishments amounted were 270 and 546, respectively. 239 major violations were discovered in 2017, and 536 minor violations were found to have been committed. The analysis was also comprised of inferential hypothesis tests which examined the proportions of establishments sampled having committed either a major or minor violation. For both major as well as minor violations, any changes in the proportions of establishments, or likelihood of encountering one in violation, encountered were found to be statistically insignificant. This was also true when the analysis was applied to the subcategories of establishments. Although the results of this paper were neither entirely negative nor positive, the disclosure requirements are still relatively new. The County will undoubtedly continue to modulate any efforts to ensure compliance with State's Food Code and promote public health. Along with ensuring that its new efforts to provide information to consumers are effective in promoting public health, other strategies and considerations need to be addressed in order to maximize the desired health outcomes. These include the county's large ethnic population, the proliferation of mobile food facilities, and promoting sound management practices within food establishments. In order for environmental health regulators to successfully mitigate foodborne illness sources, it is imperative for researchers, practitioners, and policymakers to further inquire about the nature and extent of their impacts on relevant behaviors and outcomes.

Limitations

In attempting to examine the effects of the County's efforts to disclose inspection data on compliance and performance, several obstacles related to data collection and implementation timelines introduce limitations to the generalizability of the study. First, the updated disclosure requirements are still a relatively new requirement imposed on local establishments. The

requirements, along with the companion website and mobile application, are in year three of operation. Three years of data points and inspections may or may not be adequate in undertaking any longitudinal analysis of the policy. Secondly, due to the Department of Environmental Health's data retention policy of three years, there is no available inspection data for the pre-implementation period. Therefore, a true pre-test post-test analysis was not possible to perform, and insights into whether or not behaviors and compliance have changed as a result of the program could not be gathered. Instead, similar to Ogbu's (2015) analysis of Alameda County's adoption of comparable disclosure policies, this study was limited to measuring the nature and extent of compliance during the period of the policy's existence.

Future Areas of Research

Santa Clara County and the broader Silicon Valley are believed to be experiencing a burgeoning food scene, and some have attributed this to the area's ethnic and immigrant population. The County is home to a disproportionate number of Asian residents compared to national and State level data ("Quick Facts: Santa Clara County, California"). Latinos are more prevalent in Santa Clara County than nationwide, but slightly less than Statewide. While this may present numerous opportunities for tourism and economic development, the prevalence of ethnically owned or themed establishments will likely continue to present challenges to mitigating foodborne illnesses. It should be noted that the nature of the relationship between ethnic establishments and ethnic populations is not precisely known, but it can be reasonably inferred that the relationship is positive. Further, no such data exists on the number of ethically-run food establishments in the County. None of the data provided by the Department of Environmental Health contains information of such a nature. The research has been fairly consistent, however, that ethnically

managed food establishments have a higher propensity to experience foodborne illness outbreaks (CDC, 2012).

The literature on ethnic food handling norms, inspection performance, and outbreak incidence presents a challenge that needs to be taken into consideration by local policymaking bodies, such as those in Santa Clara County. While various explanations for why ethnic populations present such a challenge for environmental health professionals, some of the possible sources include language factors, the use of niche ingredients and equipment, and foods that are subject to intensive manual preparation (Harris, Murphy, DiPietro, & Rivera, 2015). In Quinlan's (2013) analysis of the FDA's FSNet food surveillance system, it was found that ethnic minorities experience higher rates of foodborne illness across most bacterial or viral sources. Patil, Cates, and Morales (2005) found that overall knowledge of food handling best practices was lower among ethnic Americans than their Caucasian counterparts. Concerning inspection scores and evaluations, ethnic restaurants were found to have performed significantly lower than non-ethnic establishments (Roberts, Kwon, Shanklin, Liu, & Yen, 2011). The body of research implicates ethnically-operated establishments as a notable and growing source of foodborne illnesses. In order to address this factor, the county will be best served to adopt a much more concerted and targeted strategy in addition to the disclosure regulations.

In efforts to target ethnic establishments, the county would need to undertake a more extensive and culturally competent campaign to educate local operators and employees. In a discussion on the matter, Harris (2016) noted that cultural outreach and educational efforts concerning food preparation and oversight practices must take into account the perceived position of the targeted population within the broader local society and its dominant culture, and the role of food within that particular culture. Promoting standardization in managerial and

preparation practices is also believed to be disproportionately absent from ethnic establishments, and instilling such practices would considerably benefit owners' bottom line and also serve to promote public health (Quinlan, 2013).

Another issue that has increasingly vexed local policymakers has been the proliferation of mobile food facilities, or food trucks. These facilities have been an increasingly ubiquitous element of urban living and provide a more affordable business model compared to traditional brick-and-mortar establishments (Kaufman, 2018). Food trucks have grown at a rate of 7.2 percent in the last five years, far outpacing the 2 percent growth in traditional establishments ("What Data Can Tell Us About the State of the Food Truck Industry", 2017). Research is sparse on the implications this phenomenon may have on public health, and data on the numbers of food trucks operating within Santa Clara County was not included in the dataset used in the paper. The county, however, has been well aware of the trend and has explored various options to monitor and regulate these establishments. In one report, the county conceded that mobile food facilities are not subject to the same regulatory processes as traditional establishments ("Mobile Food Facilities", 2018). The challenges in regulating and inspecting such facilities stem from the irregular routes and venues many food trucks serve. While traditional "roach-coach" facilities that regularly serve construction sites and business parks have been the predominant mobile food facilities in the past, the newer business model of specialty trucks that do not follow an itinerary and only announce their locations through social media have been a larger source of concern for regulators ("Oversight of Food Truck Operations by the Department of Environmental Health", 2013). This has made conducting unannounced inspections on such operations challenging for Department of Environmental Health staff. Social media and GPS tracking have been proposed as solutions to confronting these emerging challenges, but no

substantive actions have been taken since they were evoked in the 2013 Civil Grand Jury Report. As the specialty mobile food facility market expands, county officials and the Board of Supervisors should return to devising solutions to ensure that these producers are satisfactorily complying with the regulations and best practices related to retail food preparation and service .

In seeking to encourage greater compliance with the State Retail Food Code and maximizing public health outcomes, local officials must also consider the managerial nuances and unique challenges of the industry. As previously noted in the discussion, retail food establishments account for most outbreaks. Within that subset of outbreaks, employee hygienic practices were reported to be a factor in many of these cases (Harris, 2016). An examination of the literature shows that undesired behaviors on the part of employees can be largely attributed to low motivation, demographic and language barriers, and high turnover (Pellegrino, Crandell, O'Bryan & Seo, 2014). Literature on disclosure policies, particularly pertaining to the retail food industry, does not address how transparency impacts employee actions. Such regulatory actions target ownership and management, but the extent to which their subsequent impacts trickle down to and permeate everyday employee deliberations is unknown. It appears to be more likely that such top-down approaches motivating behavioral changes are misaligned with the dynamics of the industry. The efficacy of mandatory training certifications such as California's Food Handler Card Law have also been questioned, as the lax certification requirements entail that certification courses do not optimally impart the knowledge necessary to execute food handling and hygienic best practices and change behaviors (Park, Kwak & Chang, 2010). One approach suggested by industry experts has been the development and fostering of a positive food safety culture. As Wan and Marterer (2018) noted, the development of a food safety culture will allow for best practices to "become a normal way of doing things and a source of personal pride…Inspections,

audits, and testing are all necessary, but they identify problems after the fact and depend on fear of detection and penalties to incentivize compliance"(¶ 3).

Conclusion

Disclosure policies have been an increasingly viable and cost-effective regulatory strategy. In the realm of retail food safety, such policies have been increasingly adopted in recent years in efforts to increase food safety behavior performance and minimize foodborne illness cases. While the research on such policies has been mixed, Santa Clara County has been among the recent wave or jurisdictions to adopt such policies. This paper attempted to examine the extent of food safety related behavioral changes as measured by inspection performance metrics outlined by the State Retail Food Code and implemented by the County Food Safety Program. The results generated from the descriptive and inferential analyses show mixed results in performance changes from 2015 to 2017. While overall violation counts decreased, the breadth of compliance, or the proportion of establishments in violation, remained largely unchanged. Still, the program provides new information to consumers that was not available prior to the adoption of the enhanced requirements. This paper was not without its limitations, but it provides additional avenues for research that must be considered for the county be successful in mitigating foodborne illness.

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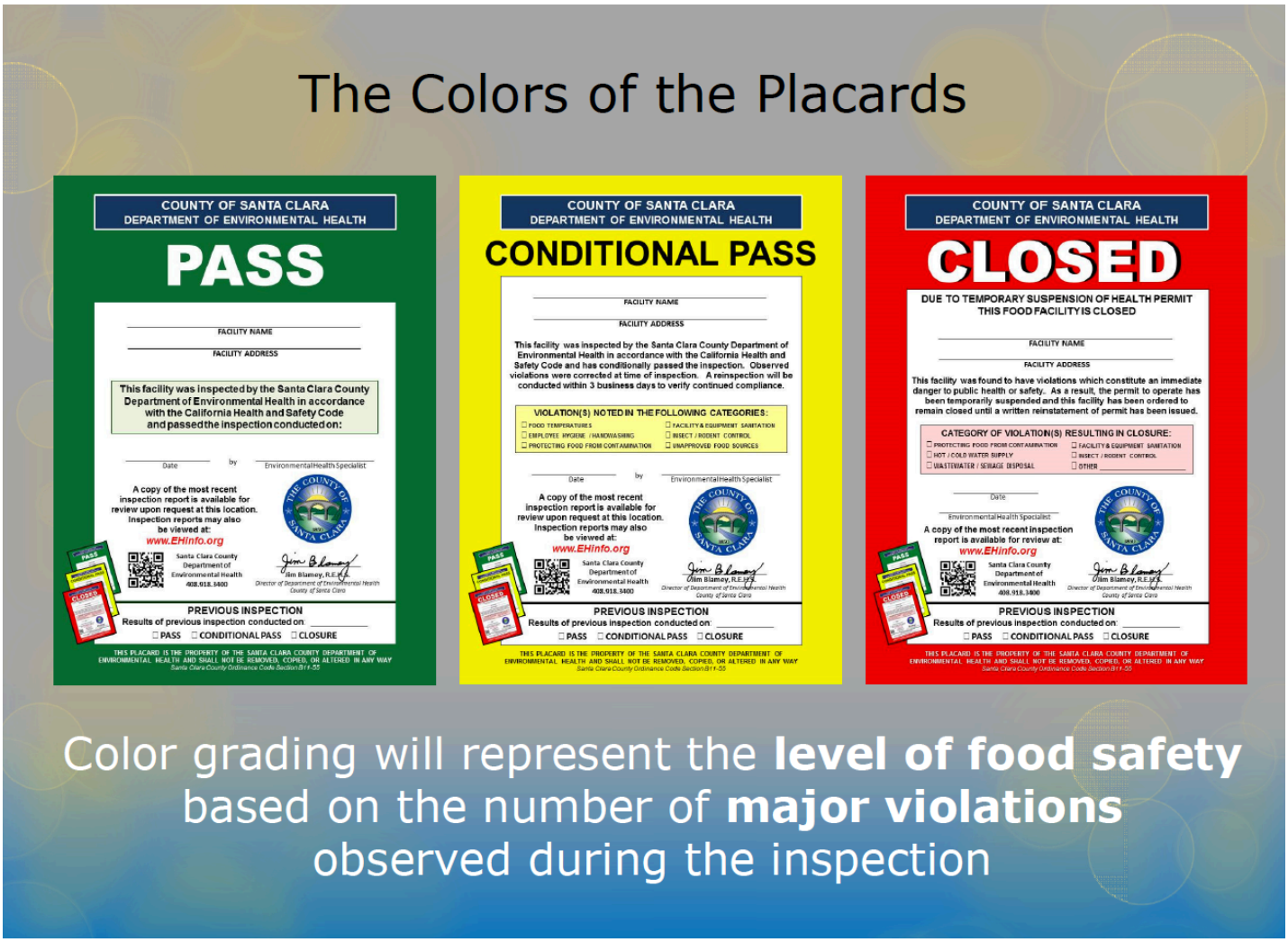
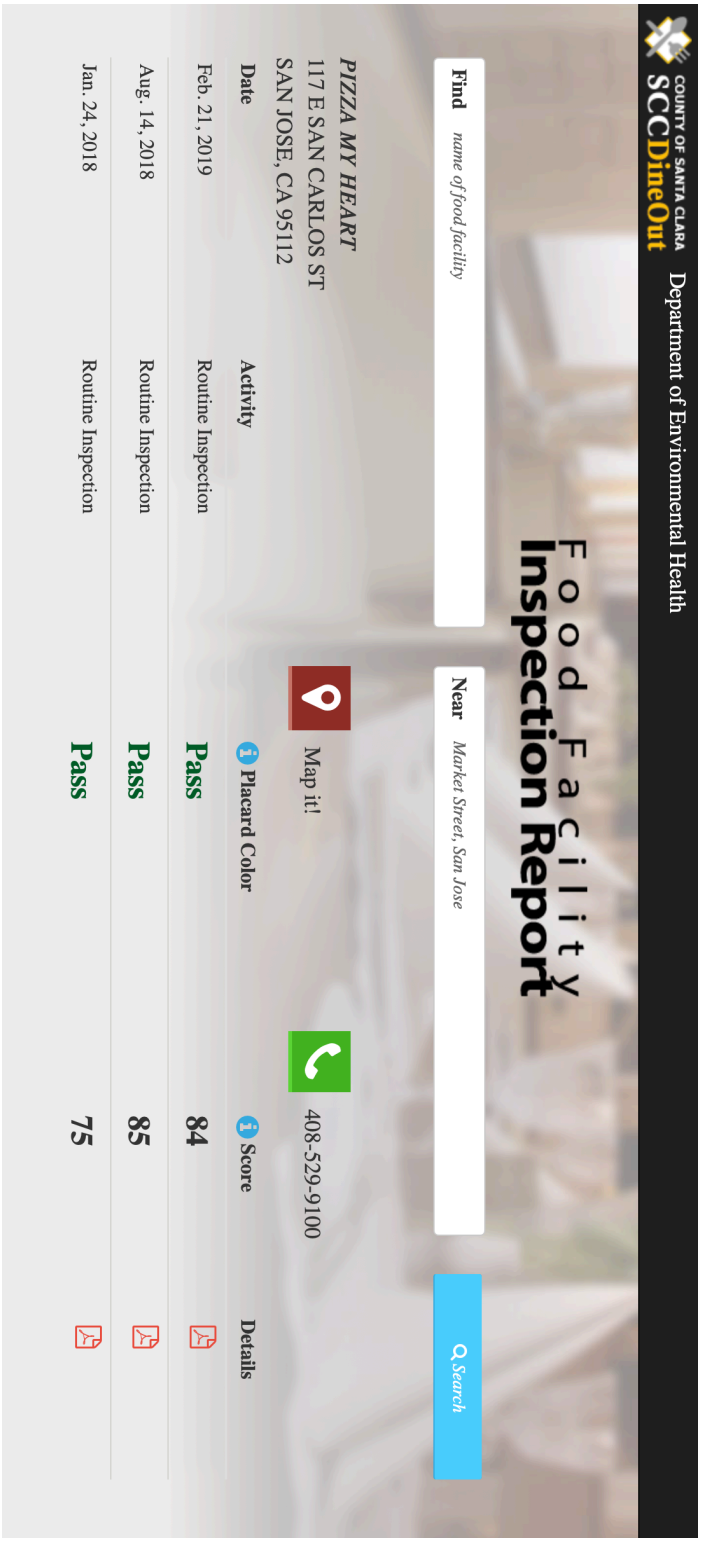
Appendix A



Source: ("Food Placarding and Scoring Program", 2018)

Appendix B



Source: Placarding and Scoring Program, 2014

Appendix C

County of Santa Clara
Department of Environmental Health
Consumer Protection Division
1555 Berger Drive, Suite 300, San Jose, CA 95112-2716
Phone (408) 918-3400 www.ehinfo.org

OFFICIAL INSPECTION REPORT

Facility	Site Address	Inspection Date	Placard Color & Score
FA0263404 - OLD WAGON SALOON & GRILL, THE	73 N SAN PEDRO ST, SAN JOSE, CA 95110	09/18/2018	RED 81
Program	**Owner Name**	**Inspection Time**	
PR0387975 - FOOD PREP / FOOD SVC OP 6-25 EMPLOYEES RC 3 - FP14	DUGALA LLC	15:00 - 16:45	
Inspected By	**Inspection Type**	**Consent By**	**FSC** Jorge Ortega 12/15/2022
GINA STIEHR	ROUTINE INSPECTION	NATHANIEL KENNEDY	

	RISK FACTORS AND INTERVENTION	IN	OUT Major	OUT Minor	COS/SA	N/O	N/A	PBI
K01	Demonstration of knowledge; food safety certification			X				
K02	Communicable disease; reporting/restriction/exclusion	X						S
K03	No discharge from eyes, nose, mouth	X						
K04	Proper eating, tasting, drinking, tobacco use	X						
K05	Hands clean, properly washed; gloves used properly	X						S
K06	Adequate handwash facilities supplied, accessible	X						S
K07	Proper hot and cold holding temperatures	X						
K08	Time as a public health control; procedures & records						X	
K09	Proper cooling methods					X		
K10	Proper cooking time & temperatures					X		
K11	Proper reheating procedures for hot holding	X						
K12	Returned and reservice of food	X						
K13	Food in good condition, safe, unadulterated	X						
K14	Food contact surfaces clean, sanitized	X						
K15	Food obtained from approved source	X						
K16	Compliance with shell stock tags, condition, display						X	
K17	Compliance with Gulf Oyster Regulations						X	
K18	Compliance with variance/ROP/HACCP Plan						X	
K19	Consumer advisory for raw or undercooked foods						X	
K20	Licensed health care facilities/schools: prohibited foods not being offered						X	
K21	Hot and cold water available	X						
K22	Sewage and wastewater properly disposed	X						
K23	No rodents, insects, birds, or animals		X					

	GOOD RETAIL PRACTICES	OUT	COS
K24	Person in charge present and performing duties		
K25	Proper personal cleanliness and hair restraints		
K26	Approved thawing methods used; frozen food		
K27	Food separated and protected		
K28	Fruits and vegetables washed		
K29	Toxic substances properly identified, stored, used		
K30	Food storage: food storage containers identified		
K31	Consumer self service does prevent contamination		
K32	Food properly labeled and honestly presented		
K33	Nonfood contact surfaces clean		
K34	Warewash faciltiies: installed/maintained; test strips		
K35	Equipment, utensils: Approved, in good repair, adequate capacity		
K36	Equipment, utensils, linens: Proper storage and use	X	
K37	Vending machines		
K38	Adequate ventilation/lighting; designated areas, use		
K39	Thermometers provided, accurate		
K40	Wiping cloths: properly used, stored		
K41	Plumbing approved, installed, in good repair; proper backflow devices	X	
K42	Garbage & refuse properly disposed; facilities maintained		
K43	Toilet facilities: properly constructed, supplied, cleaned		
K44	Premises clean, in good repair; Personal/chemical storage; Adequate vermin-proofing	X	
K45	Floor, walls, ceilings: built,maintained, clean	X	
K46	No unapproved private home/living/sleeping quarters		
K47	Signs posted; last inspection report available		

OFFICIAL INSPECTION REPORT

Facility	Site Address	Inspection Date
FA0263404 - OLD WAGON SALOON & GRILL, THE	73 N SAN PEDRO ST, SAN JOSE, CA 95110	09/18/2018
Program	**Owner Name**	**Inspection Time**
PR0387975 - FOOD PREP / FOOD SVC OP 6-25 EMPLOYEES RC 3 - FP14	DUGALA LLC	15:00 - 16:45

K48	Plan review		
K49	Permits available		
K58	Placard properly displayed/posted		

Violation Comments and Observations

Major Violations

K23 - 8 Points - Observed rodents, insects, birds, or animals; 114259.1, 114259.4, 114259.5

Inspector Observations: Observed live cockroaches in traps and behind ice machine. [CA] Eliminate pests from facility. Recommend professional pest control.

Follow-up By 09/21/2018

Minor Violations

K01 - 3 Points - Inadequate demonstration of knowledge; food manager certification

Inspector Observations: The facility is unable to produce food handler cards upon request.[CA]Facilities serving food shall have evidence of at least one valid FSC available at all times and valid Food Handler Cards for all other employees who serve or handle food.

K36 - 2 Points - Equipment, utensils, linens: Improper storage and use; 114074, 114081, 114119, 114121, 114161, 114178, 114179, 114083, 114185, 114185.2, 114185.3, 114185.4, 114185.5

Inspector Observations: Pressurized cylinders are not securely fastened to a rigid structure.[CA]Pressurized cylinders shall be securely fastened to a rigid surface.

K41 - 2 Points - Plumbing unapproved, not installed, not in good repair; improper backflow devices; 114171, 114189.1, 114190, 114192, 114193, 114193.1, 114199, 114201, 114269

Inspector Observations: Observed leaking faucet at handwash sink. [CA] Repair plumbing and maintain in good condition.

K44 - 2 Points - Premises not clean, not in good repair; No personal/chemical storage; inadequate vermin-proofing; 114067(j), 114123, 114143 (a,b), 114256, 114256.1, 114256.2, 114256.4, 114257, 114257.1, 114259, 114259.2, 114259.3, 114279, 114281, 114282

Inspector Observations: Observed large blue container of gray waste water under the portable handwash station in the outdoor bar. [CA] Properly dispose of wastewater in janitor sink.

Back door to facility propped open and no screen door in place to prevent the entrance of flying insects.[CA]Front and back door to facility shall be closed, have an air curtain, or a screen door to prevent the entrance of flying insects.

Observed floor mats being washed in 3 comp sink. [CA] Clean mats in janitorial sink. [COS] Employee washed and sanitized 3 comp sink.

K45 - 2 Points - Floor, walls, ceilings: not built, not maintained, not clean; 114143(d), 114266, 114268, 114268.1, 114271, 114272

Inspector Observations: Cove base tiles under 3 comp sink have been removed. [CA] Replace cove base tile.

Performance-Based Inspection Questions

All responses to PBI questions were satisfactory.

Source: Santa Clara County