

POSSIBLE FACTORS FOR FOOD SAFETY INFRACTION AND FRAUD CONTINUITY IN RESTAURANTS IN SAUDI ARABIA

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ABSTRACT

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Preventable foodborne diseases present an important public health burden worldwide. Reported estimates indicate that the majority of investigated foodborne disease outbreaks originated at restaurants where food safety infractions were committed. In the Kingdom of Saudi Arabia (KSA), critical food safety infractions and fraud are repeatedly observed at inspected restaurants. In this paper, the factors that may lead to the continuity of these violations are discussed. Labor, inspectors, and regulatory factors are issues that need to be reconsidered to improve food safety in restaurants and in the KSA in general.

Key words: *Food safety, Restaurant, Infraction, Fraud, Saudi Arabia*

INTRODUCTION

Foodborne illnesses are preventable diseases that affect people globally and present a growing public health concern (WHO, 2007). The proportion of foodborne disease outbreaks in which restaurants are implicated is unclear. However, restaurants are considered to be a major source of outbreaks (Jones and Angulo, 2006). Studies that investigated foodborne disease outbreaks reported that the majority of these outbreaks have been traced to foodservice establishments (Bean and Griffin, 1990; CDC, 2006; CDC, 2005; Collins, 1997; Nsoesie *et al.*, 2014 and Todd *et al.*, 2007). It is estimated that up to 70% of foodborne diseases that occur in developed countries are linked to food prepared at foodservice establishments (Jacob and Powell, 2009; Lee, and Middleton, 2003 and Nsoesie *et al.*, 2014). This percentage is a high proportion considering the advancements in food safety regulations and food inspection processes. In developing countries, food and water contamination results in an estimated 2.2 million deaths every year (WHO, 2005).

Consumers have become more concerned about food safety in foodservice operations. Their trust in the safety of restaurant-prepared food, which is becoming more fragile, is affected by media coverage, which generally focuses on the low standards practiced in restaurants (Bruhn, 1997; Worsfold and Worsfold, 2008). Additionally, this mistrust could be due to the estimation that the majority of known reported foodborne illnesses has been caused by mistakes made in commercial foodservice establishments (CDC, 2005).

Because the foodservice sector employs thousands or millions of people in a country (Lo and Jacobson,

2011), the potential for mistakes and outbreak incidences in this sector is significant (Todd *et al.*, 2008). Food workers have been involved in foodborne disease outbreaks in different settings. Outbreaks in a restaurant (Todd *et al.*, 2007), resort hotel (Birkhead *et al.*, 1993), wedding (Friedman *et al.*, 2005), hospital (Fone *et al.*, 2001), nursing home (White *et al.*, 1989), school (Michino, and Otsuki, 2000), daycare center (Gotz *et al.*, 2002), cruise ship (Cramer *et al.*, 2003), airplane (Burslem *et al.*, 1990), and private home (Latham and Schable, 1982) are examples of settings where food workers or their actions have been identified as the risk factors that led to the outbreak. The variety of settings where attendants can be affected in large numbers indicates the importance of food workers' state/behaviors in incidences of foodborne disease outbreaks (Todd *et al.*, 2007).

Observational studies by the Food and Drug Administration (FDA, 2009) were conducted to identify risk factors for foodborne illness in retail operations, schools, nursing homes, and restaurants. The lowest compliance scores were observed in restaurants, a trend that was maintained for more than a decade. The risk factors identified included poor personal hygiene, improper holding temperature/time, cross-contamination, inadequate cooking, and chemical control (FDA, 2009). The first three factors represent a continuing problem that requires attention in a foodservice establishment (Riyadh Province Municipality, 2014). Employee knowledge and motivation can limit the contribution of these factors toward a foodborne illness outbreak (Arendt and Sneed, 2008.).

The Kingdom of Saudi Arabia (KSA) is the largest country within the Gulf Cooperation Council

countries in terms of size, population, and economy. (United States Department of Agriculture, 2013). While self-sufficiency was reached for fresh milk and table eggs, KSA imports more than 80% of its food needs. With an annual increase of more than 8% per year, the import value of KSA agri-food products alone was approximately \$ 22 billion in 2012 (United States Department of Agriculture, 2013). Of this amount, 52% was consumer-oriented food products. Food retail sales increased from \$ 4.35 billion in 2007 to \$ 33.5 billion in 2013. By 2020, KSA's food imports are estimated to be more than \$ 35 billion annually (United States Department of Agriculture, 2013).

The Saudi Commission for Tourism and Antiquities estimates that there are 28410 foodservice establishments (of which 7.9% are cafés) (United States Department of Agriculture, 2013). The number might be higher because many newly operating businesses are not regularly added to databases. The estimated number of meals served at such establishments is 2.8 billion annually. Restaurants and cafés in KSA are the primary points for socializing and meeting friends because other options are limited.

Currently, the burden of foodborne diseases in KSA is not known. Because there is only one system surveying these diseases, which belongs to Ministry of Health (MOH), estimates of foodborne disease incidence rates are only available for the diseases that require MOH notification (Alsayeqh, 2014). Other systems for surveillance and epidemiological investigation are currently under development by the Saudi Food and Drug Authority (Saudi Arabian Monetary Agency, 2013). Incidence rate means for a 5-year period from 2007-2011 for notifiable diseases and food poisoning (ill-defined) cases are shown in figure 1 (Ministry of Health, 2011).

It has been reported that more than 60% of foodborne diseases in KSA are caused by food prepared in restaurants (AlButhi, 2008; Al-Mutairi *et al.*, 2014). In Riyadh city alone, an average of 55 foodservice establishments are involved in outbreak incidence annually. However, as is the case in many countries, foodborne diseases may be underdiagnosed or underreported in the KSA. Obtaining more accurate estimates for these diseases is hindered by the shortage of sufficient infrastructure and specialized scientists and staff. The majority of surveyed consumers in the KSA thought restaurants were responsible for the foodborne disease they experienced (Alsayeqh, 2014).

Throughout developed countries, the fundamentals of restaurant inspection are well established (Pilling *et al.*, 2008). Food safety inspections are carried out in foodservice operations (restaurants, cafes, street food

stands, grocery stores, catering companies) with the goal of preventing operation-associated foodborne disease outbreaks (Jones *et al.*, 2004; Rennie, 1994). Repeated food safety infractions are reportedly observed (FDA, 2009). Many studies have investigated such infractions and possible causes (Arendt, 2008, Riyadh Province Municipality, 2014) and worker motivations (Johnson, 2005) to implement better practices.

This paper presents a review regarding food safety infractions and fraud reported in restaurants in the KSA and possible factors affecting their continuity.

Type of food safety infractions and fraud

Food fraud is defined as deliberate and intentional tampering, substitution, or addition to food for economic gain. It also includes misrepresentation of food/ingredients or food packaging or misleading statements about food products (Spink and Moyer, 2011). Food fraud presents a risk to public health, and it is potentially more risky than other types of food risk due to the enormous number of possible contaminants/adulterants that can be introduced into fraudulent products (Spink and Moyer, 2011).

In restaurants, food safety infractions are considered crucial, significant, or minor. Contamination or adulteration of food are examples of crucial infractions that present an immediate health hazard to the public and are associated with foodborne illnesses (Noble *et al.*, 2009). Significant infractions, which are indirectly related to food preparation and storage, potentially pose health risks. Use of an improper holding temperature is an example of such an infraction. Dirty floors or walls are examples of minor infractions that are unlikely to present immediate health risk (Noble *et al.*, 2009).

In the KSA, the most common food safety infractions and fraud reported by Ministry of Municipality and Rural Affairs (MOMRA) inspectors (Ministry of Municipality and Rural Affairs, 2011; Ministry of Municipality and Rural Affairs, 2012; Ministry of Municipality and Rural Affairs, 2013) in restaurants (table 1) were mostly similar to findings in FDA studies but also include serious fraudulent attempts to sell food unfit for human consumption (e.g., expired or spoiled food). The observed infractions may have been the factors that led to most food poisoning cases reported to MOH (Ministry of Labor, 2014). The type of infraction and food consumed may assist in predicting the presence of microbial pathogens that can cause a foodborne disease (Jay *et al.*, 1999). In the KSA, the cuisines most commonly consumed by citizens are meat (red meat, poultry, and fish) and rice, flour-based traditional dishes, and assorted sandwiches. These are multi-ingredient meals that require many preparation steps. Therefore, there are many contamination possibilities and opportunities to

implement improper holding practices (Todd *et al.*, 2008). For these cuisines, *Salmonella* spp., and *Staphylococcus aureus* have been commonly implicated in foodservice-originating foodborne diseases (AlButhi, 2008; Al-Mazrou, 2004; Tajkarimi *et al.*, 2013). Additionally, ill-defined cases reported to MOH may have been caused mostly by *Campylobacter jejuni*, *Bacillus cereus*, *Clostridium* spp., and *Escherichia* spp. (Alsayeqh, 2014).

1. Possible factors affecting food safety infraction and fraud continuity

1.1 Restaurant general regulations and violation fines.

The MOMRA has issued a document (Ministry of Municipality and Rural Affairs, 2013) with requirements that need to be met when opening a restaurant. These requirements include general (location and size, building, restaurants divisions, storage, public area, and equipment), special (raw materials, food products, transportation, food storage, meal preparation, frozen food use, serving meals, general hygiene, health inspection records), and personnel categories (health certificates, contagious diseases and injury, and general appearance and behavior). The presence of a qualified manager of trained food handlers is not required.

Although these requirements are designed to assist in part in preparing and serving safer foods, infractions are repeatedly observed during inspection. The lenient fines restaurants are required to pay in the case of a violation may play an important role in their failure to meet the required standards and practices. The types of violations and fines imposed by MOMRA are shown in table 2.

During 2013, more than 350 restaurants were temporarily closed by Riyadh Province Municipality (RPM) in Riyadh after an intensive campaign against establishments that violated food safety protocols (Riyadh Province Municipality, 2014). Most restaurants reopened after paying the fines, which are considered a negligible fraction of annual profits. Similar campaigns throughout the KSA resulted in temporary closure of restaurants in violation of regulations. If this high number of businesses that repeatedly violate food safety rules occurs in Riyadh, the central location of government offices, the situation in other cities and villages may not be better.

The fine for a foodborne disease outbreak is only \$ 266/ affected customer for a first-time indictment with a maximum of \$ 2666 if a second outbreak occurs. There is no clear regulation indicating that restaurants must provide compensation to outbreak victims. In other countries, victims of foodborne illness outbreaks at restaurants can sue for compensation. Such legal suits can bankrupt a foodservice business (Cochran-Yantis *et al.*, 1996).

The allowable compensation for unintentionally causing death set by the Saudi Council for Jurisdiction (SCJ) does not exceed \$ 107239 (Saudi Council for Jurisdiction, 2011). Currently, who would pay such compensation, especially if the indicted restaurant's operator cannot is not legally specified. As a step toward applying proper food safety practices, authorities should consider a more effective fine scheme.

1.2 Food transportation.

Most imported food products enter the country via the seaport at Jeddah (on the west coast) and Dammam (on the east coast). Trucks are used when importing foods from neighboring countries. Chilled meat and fresh fruits and vegetables are imported by air through the Riyadh and Jeddah airports (United States Department of Agriculture, 2013).

Some bulk food supplies (e.g., grains) are transported mainly by rail (Erera, 2005). Truck transportation remains the most common transportation, especially toward the consumer end of the food supply chain. It is used to move goods among manufacturers, wholesalers, retailers, and preparation establishments (Böge, 1997). Perishable food items are transported mostly by trucks. In the US, approximately 90% of cooled-truck transport is used for moving food, and 80% of all food shipments rely on trucks (Ackerley *et al.*, 2010, United States Department of Agriculture, 2007). This percentage is expected to be higher in the KSA because there is only 1380 km of railways limited to connecting the eastern province's port to Riyadh.

The most commonly observed food safety hazards associated with food transportation are improper holding practices, improper temperature control, improper security procedures during transportation, practices leading to cross-contamination, and improper loading equipment/conditions. Others include poor driver's personal hygiene, lack of product traceability, poor maintenance of the transpiration unit, and lack of policy enforcing proper transportation (Ackerley *et al.*, 2010).

In the KSA, where the summer temperature can average more than 40 °C, improper food handling practices and unsuitable vehicles and equipment will result in higher microbial growth in foods. If proper food transportation is not employed, the effect of other food safety practices may be minimized. In the KSA, a driver with a truck driver's license can work transporting food. There are no additional requirements (e.g., food handling training, prior food transportation experience). Transporting food improperly has been reported as a common and repeated violation in the kingdom (table 1). Truck cargo weight regulations on highways, permitted driving hour windows within cities, long work hours,

and untrained drivers are factors that may lead to food handling abuse during transport.

1.3. Design and equipment.

Preventing pathogen entrance into foodservice businesses is difficult because of size and design issues associated with these businesses. Building design, which is usually overlooked during inspection, can contribute to the incidence of an outbreak by facilitating the spread of pathogens throughout the premises (Giambrone, 2009). Inappropriate design can interfere with proper workflow and the application of hygienic practices. The design should take into consideration protection from contaminant introduction and transfer by aerosol, dust, pests, and dirt (Giambrone, 2009, Greig *et al.*, 2007). Improper or unclean utensils have been implicated in reported outbreaks (Greig *et al.*, 2007, Todd *et al.*, 2008).

Although the requirements for a restaurant's location, building, and equipment are defined by MOMRA (Ministry of Municipality and Rural Affairs, 2014), it is currently possible for a commercial space, usually the ground floor of an office or residential building, to be outfitted and operated as a restaurant. Self-contained restaurant buildings are generally operations of an international franchise. Proper workflow and practices may not be possible in a space that is not designed to be operated as restaurant. Improper general hygiene and pest and insect presence are two common violations (table 1) that may indicate that most restaurants in the KSA are poorly designed and fitted.

An open kitchen design that enables customers to observe food preparation is reported to positively influence cleanliness and employers' behavior in restaurants (Chow *et al.*, 2010). Recently, MOMRA required that restaurants use a glass barrier between the kitchen and the serving area to allow customers to see workers preparing food. Noncompliant restaurants are fined and closed. In the KSA, it is questionable that visual observation will improve food safety in restaurants where workers commit fraud and other serious infractions (table 1).

1.4. Restaurant workers.

The restaurant industry has followed the model of "increasing profits based on practices that marginalize employees". Labor and work ethic regulations are often violated. Paying wages under the table, hiring without training, and denying rights are examples of these violations. Jobs in the restaurant sector are often offered with very low wages, few or no benefits, and limited opportunities for career advancement (Lo and Jacobson, 2011).

According to the Ministry of Labor (MOL), most private-sector jobs in the KSA are occupied by non-

Saudis (Ministry of Labor, 2014). This phenomenon could be observed partially because Saudis are not attracted to jobs with long work hours, low salaries, and no clear retirement plan. Of the total population, 32% are non-Saudi. Approximately 88.27% of private sector male workers in the country are non-Saudi. The majority of these workers are non-Arabic speaking and have limited or less than high school education (table 3) (Ministry of Labor, 2014).

Although Saudi Monetary Agency (SAMA) estimated that the number of non-Saudis employed in restaurants/cafes is approximately 250,343 (Saudi Arabian Monetary Agency, 2013), this number may represent only legally working employees. The frequent presence of illegal workers in restaurants indicates that the estimate of the total non-Saudi restaurant employees is highly underestimated.

Undercover trading costs the KSA economy an estimated \$ 80 billion a year. Because it is illegal for a non-Saudi to practice investing activities without permission, a non-Saudi may use a citizen's trade permission to do business in return for a monthly payment, which is considered undercover trading (AlMutairi, 2012). Most profits made from such business are transferred outside the country, including approximately 22% of the total money sent overseas by non-Saudi workers. Due to the ability of some businesses to obtain entry permits for hundreds or even thousands of workers, the number of entry permits has been estimated 1.2 million annually. Most of the coming workers change job and/or work illegally.

Restaurants, retail, and construction are the types of businesses mostly suspected to be practicing undercover trading and employing illegal workers (AlMutairi, 2012). These practices directly affect restaurant food safety. If an outbreak occurs at a restaurant that employs illegal workers, there is a low chance of investigating the cause of the outbreak. This is because illegal workers may leave the premises with the assistance of their employer when an inspector arrives for a visit. The MOMRA has also established a fine for those who assist escapee workers (table 2). Illegal workers may not apply food safety measures and could be responsible for food fraud violations. The government requires private businesses to employ a certain percentage of Saudis (Ministry of Labor, 2014) in its effort to minimize unemployment in the country. This resulted in an increase in fake job nationalization practices, in which a private employer hires a Saudi worker to increase the percentage of Saudis employed even though that worker does not actually come to work. It is not uncommon that many of the 91,183 Saudi workers (Saudi Arabian Monetary Agency, 2013) in restaurants are hired just to comply with the government requirement. Whatever the real number

of actively working Saudis in restaurants is, they usually work as accountants and are not often food handlers.

1.5. Worker health certificates.

All workers entering the country are required to undergo medical examination before obtaining permission to stay and work (Ministry of Health, 2008). In the past, examinations were only accepted if they were performed in government-operated hospitals/health centers. With the increase in population and incoming workers, it has not been possible for government health systems to keep with increasing demands for laboratory services. Therefore, private sector health establishments have been allowed to perform worker health tests (Ministry of Health, 2008). This created competition among the establishments to attract more businesses to send workers for testing, resulting in a price-per-test drop under even the government laboratory costs. It is possible for a worker the required examination for less than \$ 30. This price decrease raised concerns about the ethics and integrity of services performed at private laboratories (AlSudan and Khan, 2008). These prices may not cover the basic costs of these laboratories. Therefore, a presumably valid health certificate displayed at the restaurant obtained on the basis of a private laboratory service may not mean that the worker is truly medically fit.

Government and private health care systems employ less than 20,000 people total, of which 1665 are laboratory-associated workers and 1665 are specialists (Ministry of Health, 2011). The overstretched health system may not capture workers with medical conditions of public health concern. Non-compliance with regulations has recently resulted in closure of some private-sector health service establishments (Ministry of Health, 2011).

1.6. Worker salary and benefits.

When employees lack motivation, it is expected that there will be problems in turnover and retention, morale, and productivity. In restaurants, employers must first understand their employees' motivations before utilizing ineffective techniques (Johnson, 2005).

For hourly restaurant workers, extrinsic motivation factors are important. These factors include good wages, good working conditions, tactful discipline, and job security. Additionally, intrinsic factors (a feeling of being involved, supervisor's help with personal problems, interesting work, promotion and career development, and appreciation of job well done) must be considered when surveying employees' motivational issues (Johnson, 2005; Kassa *et al.*, 2001; Lo and Lamm, 2005; Wong *et al.*, 1999).

Making employees feel that they are paid what they are worth is the postulation of Theory M, which is based on an above-average performance system (Weaver, 1988). Graduated incentives are paid for any amount achieved above a base of expected sales. Incentives need to be simply determined and paid out as soon goals are achieved. Paying employees what they are worth is argued to have effects different from those expected by raising the minimum wage (Weaver, 1988).

Restaurant customers may or may not tip workers depending on the social norms of their country. Tipping is considered another income source for millions of workers (Azar, 2003). The effect of pay, which may be not a motivator for all employees in different jobs (Rynes *et al.*, 2004), is best modeled in a poorly performing businesses (Weaver, 1988).

Behavior, as determined by intention, which in turn is predicted by attitude, subjective norms, and perceived behavioral control, can be predicted by applying the theory of planned behavior (TPB) (Ajzen, 1991). Food safety practices in a foodservice operation, proper hand washing, consumer food handling practices, and food thermometer use have been predicted by TBP modeling (Clayton *et al.*, 2002; Clayton, and Griffith, 2008; Mullan and Wong, 2009; Mullan *et al.*, 2010; Shapiro *et al.*, 2011).

Various studies have investigated theories and motivational factors such as incentives and tipping for workers who did not receive less than less than minimal wages. Before replicating such studies in a country where a minimum wage scheme is not applied, one may ask what might motivate an expatriate restaurant worker who receives less than \$ 11 a day to follow food safety measures. In the KSA, the labor law (Ministry of Labor, 2014) does not set a minimum-wage scheme for foreign workers. The MOL estimates that the average salary for a worker in the service sector is about \$ 311 per month (Ministry of Labor, 2014), which corresponds to \$ 10.38 a day and \$ 1.038 per hour, 5 times less than the less than minimal per-hour wage applied in other countries (Metcalf, 2008, Schmitt, 2013). The law also does not require other benefits for service workers such as medical insurance, housing allowances, paid sick leave or a weekly day off.

Working for long hours in restaurants and without benefits on a low salary may not motivate workers to comply with regulations or observe food safety practices. Tipping is not generally practiced in restaurants in the KSA. These factors could result in attempts to commit food fraud by some workers to supplement their income. Attempting to sell leftover, expired, or spoiled food are examples of commonly committed food fraud in restaurants in the KSA (table 1).

In addition to the danger of questionable worker health certificates, low pay may prevent workers from taking day(s) off while sick. If a food worker does not receive paid sick leave, there is a possibility that this worker will continue to work (Strohbehm *et al.*, 2008). A worker with gastroenteritis can show symptoms for a period ranging from days to months (Michael, 2002). After symptoms subside, shedding of the agent(s) can occur at a rate of 1-70% of affected persons (Michael, 2002). In a study investigating the carriage rate among food workers in restaurants, 34% of the workers were colonized, mostly with enterotoxigenic *S. aureus* (Fischer *et al.*, 2007).

A sick working employee can put other employees and customers at risk (Todd *et al.*, 2008). While employers may be unwilling to grant paid sick leave, working while sick can result much higher lost productivity time (Levin-Epstein, 2005). This is because an ill worker may perform poorly and infect others (Levin-Epstein, 2005). Contagious infection rates have been reported decrease by implementing a paid sick-leave policy. Failure to apply this policy would be detrimental to a worker's health, spread disease in the workplace, and could result in huge profit losses (Levin-Epstein, 2005). Food workers can be infected with pathogens that may be resident or transient flora (Nicolay *et al.*, 2011). Sources of transient pathogen include raw products, fecal matter, body fluids and infected boils and cuts (Todd *et al.*, 2008). Workers who are symptomatic or asymptomatic have been similarly implicated in foodborne disease outbreaks (Nicolay *et al.*, 2011; Todd *et al.*, 2008).

1.7. Restaurant inspection.

In Saudi Arabia, seven governmental authorities (table 4) are involved in issues related to food safety control in Saudi Arabia. They are MOMRA, Ministry of Agriculture (MOA), MOH, MOCI, Saudi Standards and Metrology Organization (SSMO), Customs Clearance Agency (CCA), and SFDA. The latter is the newest authority to be established, with the objective of centralizing and overseeing food and drug safety in the country. Many food safety responsibilities that the first six authorities dealt with in the past are now being gradually transferred to the SFDA (Al-Kandari, and Jukes, 2012; Al-Mutairi *et al.*, 2014).

The MOA has been responsible for the quarantine of imported agri-foods and local product inspection. Retailers, wholesalers, restaurants, hotels, fast food chains, food factories, and fresh produce market inspections are primarily carried out by MOMRA. As of May 2009, imported food inspection became an SFDA and not MCI responsibility. When completely operational, SFDA will also carry out local food and foodservice operation inspections. Chemical and microbial analyses of food are performed in local

laboratories that are now operating under SFDA supervision (Al-Kandari and Jukes, 2012).

Inspection reports can affect dining decisions and consumers' trust in restaurants. They can promote safe food culture by providing incentives for restaurants to obtain better scores (Fielding *et al.*, 2001; Jin and Leslie, 2003; Simon *et al.*, 2005; Worsfold and Worsfold, 2008). Disclosure systems for restaurant inspections are communication tools that deliver information obtained during restaurant inspections to consumers and to other relevant authorities. Making the inspection results publicly available puts more focus on the importance of violations and risks found during inspection (Seiver, and Hatfield, 2000).

Disclosure of inspection results can occur via the local media, internet, and posting at the premises. Information regarding unhygienic restaurants, outbreaks, convictions, and closure can be communicated using newspapers, radio and television (Henson *et al.*, 2006). Restaurants meeting the required standards can also benefit from media influence on consumer dining choices (Gregory and Kim, 2005). The concern over food safety at restaurants can be affected by media images of pest-infested premises, improper food handling, and poor hygiene (Worsfold, 2006). Although word of mouth can be a source of information about restaurants and dining options (Gregory and Kim, 2005), media images and information are considered the most influential sources (Henson *et al.*, 2006).

Inspection certificates posted at the premises do influence consumer choices and are considered an important source of information when dining out (Henson *et al.*, 2006). In the UK, some restaurants post inspection scores or notices even though the local inspection department posts all inspection reports on its website (Worsfold and Worsfold, 2008). The majority of surveyed consumers wished for the inspection report to be available online and displayed at the premises (Worsfold and Worsfold, 2007).

Name-and-shame notices can be published on the authority's website for establishments that fail to correct risky conditions. Such notices remain posted for 3 months after corrections. A closure order is posted for restaurants in which public health is in immediate danger (Filion, and Powell, 2009).

In the KSA, there are no full restaurant inspection reports available to the public in print or online forms. Consumers usually read about restaurant closures due to food safety violations in the local newspaper. However, newspapers are not allowed to publish the restaurant name or exact location. Closure news headlines mostly state the Arabic word "Shaheer", which translates to "popular or famous".

This is because name-and-shame is not generally allowed in the KSA. However, due to the increase of restaurant-mediated foodborne outbreaks, MOMRA has allowed the use of a "Closed due food poisoning" sign at the restaurant in question.

Non-traditional mechanisms of dissemination of information such as the use of social media to communicate messages related to food safety have been reported (Bernardo *et al.*, 2013, Brownstein *et al.*, 2009). Individuals who have experienced foodborne illnesses may not seek medical care but might be willing to tell others about their experiences using social media platforms (Nsoesie *et al.*, 2014.). In the KSA, newspapers are utilizing social media to communicate restaurant-related news to consumers. Consumers can obtain more details (e.g., restaurants names and locations) by messaging others. From 2011-2013, 42 outbreaks occurred in many "popular" restaurants, resulting in 821 people seeking medical attention. Other restaurants that did not receive media attention may also contribute greatly to incidences of notifiable foodborne diseases and to what the MOH classified as "food poisoning" cases that were reported to the surveillance system (figure 1).

1.8. Food Inspectors.

In KSA, there are less than 2500 health inspectors employed by MOMRA, which is primarily responsible for carrying out inspections of restaurants, food-sale stores, hotels, and other services that may affect public health. Clearly, this number of inspectors is unable to cover and perform inspections for all related sectors. This shortage became evident after MOMRA, which is presented in 285 municipalities throughout the country, has increased inspection visits to 5 times per establishment per year (Mullan and Wong, 2009). Given an estimated 2.5 hours for every inspection trip, 5 visits, and 1840 work hours each year, a minimum of 1932 inspectors is required to inspect only restaurants in the country. Currently, there are no private businesses employing inspectors through government contracts.

Although food inspectors have a major effect on public health, the job of inspector is among the lowest classified in the Ministry of Civil Service (Ministry of Civil Service, 2014). The salary for an inspector starts at \$ 800 and can reach \$ 2288 only after serving 15 years. Clearly, such a salary is such low to motivate inspectors to perform their jobs better. Additionally, given the low pay, there is a danger of accepting bribes from restaurants in violation of regulations.

Obtaining a diploma after intermediate or high school is generally the main requirement for working as an inspector. In addition to the shortage of inspectors, low salaries, and insufficient education/training, the real number of violating restaurants and quality of

inspections performed are questionable. When no official government jobs openings are available, inspectors are hired by the government on a "paid contract" basis. This type of hiring requires fewer qualifications and pays lower salaries and benefits.

In Riyadh, 400 inspectors have applied to a training program sponsored by the Saudi Oil Company. Applicants attended one day of training followed by knowledge assessment. This was followed by 20 days of training in which 200 inspectors qualified for 3 more days of training (Riyadh Province Municipality, 2014). The fact that not all inspectors were qualified for the training is an indication of the lack of sufficient training for most inspectors currently working in the country.

Salaries and benefits vary for inspectors throughout government positions even if they are similarly qualified. Inspectors employed by MOH receive better pay and benefits more than those employed by MOMRA. These unequal differences have resulted in lawsuits filed against the SCCS by MOMRA's inspectors. If MOMRA inspector job pay and benefits are not improved, the inspector shortage is expected to grow in the future. Expansion of the foodservice sector by more than 5% a year will result in requirements for more workers and inspectors (Saudi Arabian Monetary Agency, 2013). To maximize efforts toward better food safety in the country, inspector qualifications must be enhanced and job benefits improved.

1.9. Worker training.

High-quality training is essential to obtaining the desired improvement. Improper or inadequate information given by insufficiently qualified instructors or the wrong information given to trainees can result in more improper food handling (Rennie, 1994). Basic knowledge about food safety can be affected by the source of the training, certification, and experience (Lynch *et al.*, 2003). Quality, not quantity, is considered to be more important for understanding issues related to food safety (Lynch *et al.*, 2003).

Promoting food safety practices can be attained by worker training and enforcement and implementation of management systems (Mitchell *et al.*, 2007; Rennie, 1995). Factors influencing employees' food-handling practices have been addressed by many studies (Arendt and Sneed, 2008; Ellis *et al.*, 2010). Identified factors include but are not limited to time constraints, resource shortages, and management and coworker attitudes, generational differences, language, lack of motivation, and illiteracy (Green *et al.*, 2006; Howells *et al.*, 2008; Pragle *et al.*, 2007). Such factors extend beyond food safety knowledge; researchers found that food service employee's practices do not always reflect demonstrated

knowledge of food safety (Giampaoli *et al.*, 2002; Henroid, and Sneed, 2004; Strohhahn *et al.*, 2011). Transfer of obtained food safety knowledge, skills, attitudes, and behavior during training can be limited by the factors mentioned above. Approximately 85% of respondents with training certification admitted that they do not apply their knowledge in practice (Clayton *et al.*, 2002).

Compared to restaurants with certified food handlers, more food safety infractions were observed in restaurants without such handlers (Kassa *et al.*, 2001). At least one critical infraction was observed in almost all food service establishments operating without certified handlers (Kassa *et al.*, 2001).

In studies investigating the effect of food safety training on employees, overall enhancements of food safety knowledge were observed (Costello *et al.*, 1997; Finch and Daniel, 2005; Howes *et al.*, 1996; Lynch *et al.*, 2003). These observations were not consistent with those of other studies that reported a minimal effect of training on knowledge improvement (Luby *et al.*, 1993; Pilling *et al.*, 2008; Wright and Feun, 1986).

Increased proper practice among employees, better microbial food quality, higher food-inspection scores, and hygienic self-reported behavior were noticed among those who received food safety training (Thompson *et al.*, 2005). During an inspection, a foodservice operation with at least one certified food handler was more likely to obtain a passing grade (Thompson *et al.*, 2005). Because food safety training may not be possible for all employees, training establishment supervisors has been reported to have a positive effect on employees' food safety practices.

In the KSA, the plan for training restaurant employees initially started in 2009 in the eastern province of the KSA. By 2013, the staff of 171 (out of 440) restaurants had been trained and designated "qualified". The effect of training on these restaurant employees remains to be determined. For training restaurant employees to have better outcomes or even be applied by employees, it is necessary to improve salary, benefits, and work conditions.

1.10. Foodborne disease surveillance.

The objectives of foodborne disease surveillance programs include rapid response to outbreaks, applying measures to prevent illness, identifying contributing factors, outbreak trends monitoring, increasing knowledge about foodborne disease, and preventing future outbreaks (Council to Improve Foodborne Outbreak Response, 2014). Irrespective of the outbreak scale, a full investigation should include an epidemiological investigation, food and environmental investigations, and laboratory

investigations. (Council to Improve Foodborne Outbreak Response, 2014).

In 2008, a study was carried out regarding foodborne investigation in the KSA (AlButhi, 2008). The findings indicated that the methods and procedures applied during an outbreak investigation were incorrect or inadequate. Since that study was conducted, there has been no significant improvement regarding training and regulations related to outbreak investigation. However, the situation is expected to be corrected when the SFDA completely brings all issues regarding food safety under its supervision. Special departments have been established within the SFDA to investigate foodborne outbreaks (Saudi Food and Drug Authority, 2014). When it is fully staffed with specialists and operational, obtaining more accurate epidemiological information about outbreaks may be possible.

1.11. Consumer protection.

The Consumer Protection Association (CPA) was not established until 2007. The CPA was established as a non-legislative association without an annual governmental budget. Currently, the main roles for the CPA include receiving consumer complaints about products or services, informing other government's authorities about consumer concerns, performing research related to consumer protection, and representing consumers in related conferences and events (Consumer Protection Association, 2008).

To be able to have an effective role in protecting consumers' rights when affected by a foodborne outbreak, CPA status shall be a legislative authority with an annually guaranteed budget. Although there is a royal decree demanding that commerce chambers contribute to CPA's expenses, the CPA has not yet received its expected funding (Makkah Commerce Chamber, 2014).

1.12. Consumer awareness.

The websites of government authorities involved in food safety issues were searched for information concerning consumer education about food safety in restaurants. Only 2 results related to advice about plastic ware used in restaurants and eating while traveling were found on the SFDA's website (Saudi Food and Drug Authority, 2014). On the CPA's website, only one result was found, but it was important; it covered a call to boycott an international franchise restaurant indicted on attempt to use expired and spoiled material in preparing meals. Specifically, CPA named the restaurant, which was not possible in the past (Consumer Protection Association, 2012). A search on MOMRA's website found 52 publications related to food safety. These publication can benefit consumers, investors, restaurants workers (if translated), and inspectors (Ministry of Municipality and Rural Affairs, 2014). The only restaurant-

awareness advice posting was found from the Food Safety Program, which is a part of the MOH (Food Safety Program, 2014).

Because studies found that offering public access to restaurant inspection reports can cause restaurants to improve their food safety practices (Filion, and Powell, 2009; Henson *et al.*, 2006; Worsfold and Worsfold, 2008), it is recommended that the SFDA,

CPA, MOMRA, MOH, and MOCI utilize the internet to communicate with consumers regarding restaurant inspections and advise them when dining out. For increased awareness to be effective, generic prescriptive messages should be avoided. Consumer education needs to be specified for the target audience (Chapman *et al.*, 2011).

Table 1: Food safety Infractions and fraud observed in restaurants in KSA.

Food safety Infractions and fraud
- Poor personal hygiene.
- Insects and pest in premises.
- Illegal or without certificates workers.
- Spoiled and rotten raw materials and foods.
- Lack of overall hygiene on the premises.
- Improper food handling.
- Insufficient food cold holding practices/equipment.
- Food preparation/storage in worker housing.
- Unsuitable food preparation/cooking utensils.
- Unsuitable food transportation vehicles/practices.
- Unsuitable storage facilities.
- Raw materials/food from unknown source.
- Selling expired products; re-packaging and alteration of the expiration date.
- Selling leftover foods.
- Selling/using chilled meats as fresh.
- Brands name alteration to increase prices for low-quality products.

Table 2: Fines for violations in restaurants.

Violation	Fine (\$)	Action for repeated violations
Building	133	Double fine and 3 days closure
Equipment	133	Double fine and 7 days closure
Restaurants' workers		
Without valid health certificate	133/ worker	Double fine for every worker
Workers with visible sign of a disease	266/ worker	Double fine and 7 days closure
Poor personal hygiene	80/ worker	Double fine
Not wearing designated uniform	26/ worker	Double fine
Food, water, and drinks		
Use of expired materials	2666	Double fine
Improper storage	266	Double fine
Improper transportation and packaging	533	Double fine
Use of leftover foods	533	Double fine
Food from unknown source	533	Double fine
Food with visible spoilage	533	Double fine
Inspection process		
Obstructing inspectors work	133	Double fine
Removal of "closed due to food poisoning" sign	1333	Double fine
Assisting escape of illegal workers before inspection	266/ worker	illegal Double fine
Food preparation outside the premises	133	Double fine
General hygiene		
Overall poor hygiene	52	Double fine
Permit		
Operation without permit	533	2666 and closure
Foodborne illness incidence	266-2666/ person	Closure for 30 days, and for 5 years after second incidence

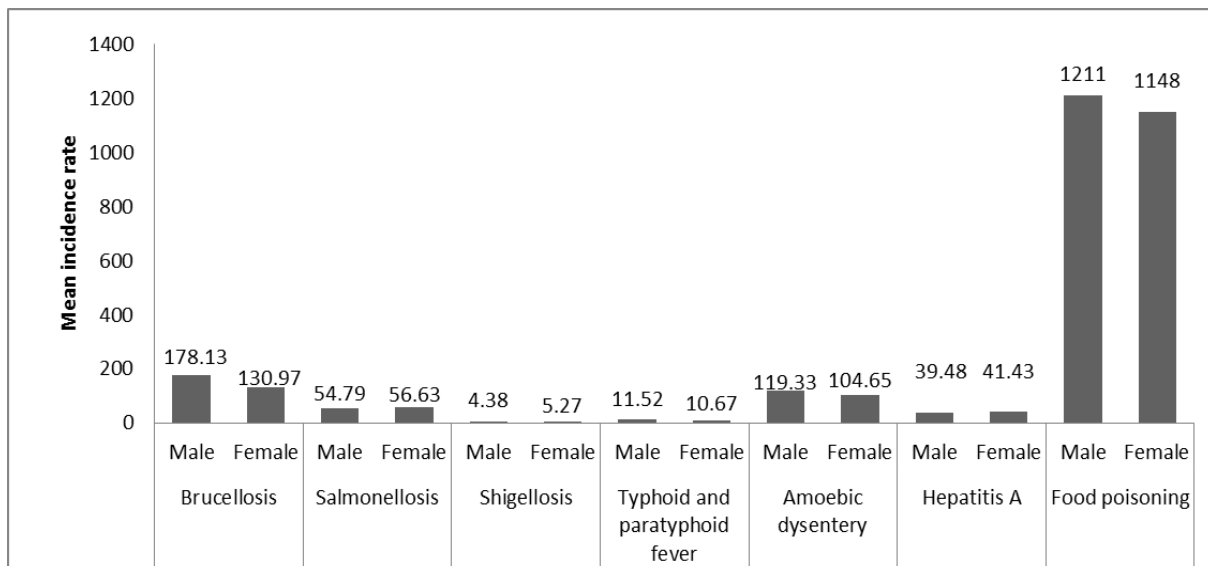
Table 3: KSA related statistics.

Population (annual growth %)	29994272 (2.7)
Size (km ²)	2.25 million
% of non-Saudi residents	32.41
Illiterate %	5.6
GDP	\$ 710.93 billion
Imported food products	22 billion (7.65% increase from previous year)\$
Highways (under preparation)	60336 km (22000 km)
Railways (km)	1380
Number of non-Saudi male workers (% in private sector)	8050457 (88.27)
Education	%
Higher education	8.6
High school or less	32
With training after high school	7.26
Limited skills (and may be illiterate)	52.14
Language spoken	%
Arabic	28.1
Non-Arabic	71.9
Number of workers in restaurants	
Non-Saudi	250343
Saudi	91183
Estimated annual increase in number of workers (%)	5.54%

Table 4: Authorities involved in food safety and their roles in the KSA.

Authority	Responsibilities
MOMRA	Licenses foodservice establishments, food inspection, participation in outbreak investigation.
MOA	Farm food production issues, analysis of imported animals and vegetables.
MOH	Foodborne outbreaks (investigation, training staff, consumer education).
MOCI	Participation in food safety and quality, fraud prevention, examination of imported food, local food inspection.
SSMO	Participation in licensing of food premises; sets standards for product safety and quality.
CCA	Prevent fraudulent product entry.
SFDA	Establish and enforce a centralized food and drug control system, assurance of imported and local food safety, consumer awareness and education.

Figure 1: Notifiable foodborne diseases and food poisoning incidence rate means.



CONCLUSIONS

Serious food safety infractions and fraud are repeatedly observed in many restaurants in the KSA. Factors that may lead to these violations include illegal labor, low salaries for workers/inspectors, insufficient education for workers/inspectors, and governmental shortcomings (e.g., low fines, disease surveillance issues, and consumer awareness). To improve food safety in the country, effort needs to be made to minimize restaurant violations by eliminating these contributing factors.

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العوامل الممكنة لإستمرار مخالفات سلامة الأغذية والاحتيايل في المطاعم في المملكة العربية السعودية

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تمثل الأمراض المنقولة عن طريق الأغذية التي يمكن الوقاية منها عبنا على الصحة العامة في جميع أنحاء العالم. وتشير التقديرات أن غالبية حالات تفشي الأمراض المنقولة عن طريق الأغذية نشأت في المطاعم حيث ارتكبت مخالفات سلامة الأغذية. ويلاحظ في المملكة العربية السعودية مخالفات السلامة الغذائية والاحتيايل بشكل متكرر في المطاعم. هذه الورقة تناقش العوامل التي قد تؤدي إلى استمرار هذه الانتهاكات. متضمنة العمال ومفتشي الأغذية، والعوامل التنظيمية والقضايا التي تحتاج إلى إعادة نظر لتحسين سلامة الأغذية في المطاعم وفي المملكة العربية السعودية بشكل عام.