Penalties for Foodborne Illness:
Jury Decisions and Awards in Foodborne Illness Lawsuits

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Abstract

This study examined how case attributes impact plaintiff success and payouts in jury settled foodborne illness (FBI) lawsuits. Given the risk to firms in terms of potentially large payouts, future litigation, and lost reputation, the results may provide economic incentives for food firms and others in the supply chain to produce safer and better quality foods. Legal databases were systematically searched to identify cases of FBI, which were resolved through the U.S. court system. Reviewing the outcomes of 511 FBI jury trials between 1979 and 2014, plaintiffs won 34.8% of cases, and received a median award of $32,264. The Heckman two-step estimation procedure was used to examine the effects of various factors on plaintiff success rates and subsequent amounts awarded. Plaintiff chances of victory increased if lawsuits involved a child, foodborne pathogen was identified and pain and suffering was claimed, and decreased if defendants used of one or more expert witnesses or had "deep pockets". Cases involving a child, chronic complications, or defendants with "deep pockets" resulted in higher awards. Corporate and policy implications of these findings are considered.

Dedication

I would like to dedicate this thesis to my wife for her unconditional love and support over the years. You have been a great source of motivation and inspiration and I am grateful for your patience, understanding, and constant words of encouragement. To my mother who taught me never to leave for tomorrow what can be done today and to my father for ensuring my academic endeavors were realized. To my brother and sister for their loyalty and friendship over my academic career and in my times of need. You have all contribute to my growth and development as a person and my achievements could not have been possible without your commitment, guidance, and involvement. In one way or the other you have enabled me to achieve so much in such a short period of time.

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TABLE OF CONTENTS

List of Figures

List of Tables

Chapter 1: Introduction

In recent years, the trend in product liability[1] lawsuits suggests an increase in large jury awards are being levied against U.S. firms that place defective products in the stream of commerce. Product liability law places legal responsibility on manufacturers and sellers to compensate consumers for personal injury or property damage caused by defects in goods they produced or damaged during sale (Green, 1996). A 1986 study conducted by Jury Verdict Research Inc. found that the median jury award in product liability cases had increased from $121,475 in 1975 to $550,000 in 1986 (Skoppek, 1989)[2]. The study also highlighted that the average jury verdict in product liability cases had increase from $393,580 to $1,850,452 during the same period (Skoppek, 1989). A similar study covering the period 2002 through 2006 revealed that the median jury award in product liability cases was $1.5 million (Miller et al. 2011). Ten of the 50 largest jury verdicts in 2010 came from product defect cases (Fisk, 2011). In 2010, the total of the five largest product-liability verdicts was $1.1 billion, up from $620 million in 2009 and $408 million in 2008 (Fisk, 2011). Inflation aside, the economic cost of product liability has grown significantly over the years.

Foodborne illness (FBI) cases are a subset of product liability cases. Polinsky and Shavell (2010) noted "tens of thousands of product liability cases are filed annually in state and federal courts, including some as class or other mass tort actions that can involve thousands or even millions of individuals as plaintiffs."[3] The actual number of FBI product liability cases however is unknown because there is no national system documenting all such cases (Busby et al. 2001).

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[1] Restatement (Third) of Torts: Products Liability (1998) - "One engaged in the business of selling or otherwise distributing products who sells or distributes a defective product is subject to liability for harm to persons or property caused by the defect."

[2] Unless otherwise indicated, award amount referenced are not inflation adjusted.

[3] The most recent year for which relevant data are available is 2006 where 6,454 product liability

The 2013 annual report produced by the Foodborne Diseases Active Surveillance Network (FoodNet) shows that foodborne infections continues to be a major public health problem in the United States (CDC, 2014a). It is estimated that 48 million instances of FBI occur in the U.S. each year due to the consumption of contaminated food and beverage that result in 128,000 hospitalizations and 3,000 deaths (CDC, 2014b). FBI is defined as infections or irritations of the gastrointestinal (GI) tract caused by food or beverages that contain harmful bacteria, parasites, viruses or chemicals (NIDDK, 2014). Severe cases of FBI can lead to hospitalization, prolonged illness and even death. Food contamination resulting from microbial pathogens in the form of bacteria, parasites, fungi and other toxins can occur at any step along the food chain from farm to fork (Reinburg, 2013). These numbers are based on estimates of illnesses caused by one of 31 identified pathogens and thus does not account for the many illnesses caused by unidentified agents. The economic loss in terms of medical costs, productivity losses, and illness-related mortality arising from FBI is staggering. The estimated cost of illnesses attributable to 15 FBIs in the United States amounted to $15.6 billion annually (Hoffmann, 2015).[4] Importantly, these estimates do not include transaction and information costs associated with legal fees, court-filing fees, expert testimony, travel costs or any monetization of the emotional distress associated with the illness.

The impact of FBI on firms is also significant. The costs of a FBI incident to an operation include an increase in negative publicity and media attention, lawsuits and legal fees, insurance premiums, staff absences, employee retraining costs, and a decrease in customers and sales, and

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cases were filed in the nine states studied by the National Center for State Courts (Polinsky and Shavell, 2010).

[4] These values are conservative. Using a basic cost-of-illness model, Scharff (2012) estimated that the aggregate costs of FBI in the United States amount to $51 billion annually. These estimated cost increased to $77.7 billion annually after values for pain, suffering, and functional disabilities were monetized and included.

negative impacts on a firm's reputation and staff morale (NRA, 2015). Furthermore, unsuccessful defense by food firms and their insurers against FBI lawsuits often leads to jury or settlement awards that not only impact the future profitability but may also open the door to other potential lawsuits.

A prime example of a FBI case was an *E. coli* breakout that resulted in more than 600 illnesses and four deaths in January 1993 due to undercooked hamburgers consumed at Jack in the Box restaurants in California, Idaho, Washington, and Nevada. In the 18 months following the outbreak, the company lost approximately $160 million due to lawsuits from ill customers, stockholders suits against the company for court costs, and lost sales due to adverse publicity (Marler, 2014). The last personal injury case due to this incident was finally settled in 1997 when a $3 million settlement was accepted (Voris, 1997). More recently, in 2009, a FBI case attributable to the Peanut Corporation of America (PCA) resulted in nine deaths among the more than 700 victims in 45 states due to contaminated peanut products. After a two-month trial, PCA's owners and quality assurance manager were found guilty of 98 federal felony counts that included specific food safety violations (Flynn, 2014) and are currently awaiting sentencing. PCA did more harm to humans and damage to property than any other outbreak on record (Flynn, 2014). Many additional lawsuits are anticipated even though the company is now bankrupt (Nelson, 2012).

1.1 Specific Problem

Under US product liability law, consumers harmed by unsafe products can take legal action to obtain compensation for their injuries (Busby et al. 2001). As such, product liability law plays an essential role to help restore tort victims to their pre-injury condition (Shepherd, 2013), and

specifies when firms are liable and are required to pay compensatory damages to injured persons or their survivors. In the case of contaminated food, product liability is a powerful mechanism to compensate consumers for economic losses resulting from FBI, while simultaneously encouraging firms to provide safer food products (Busby et al. 2001).

Despite its economic implications to both individuals and businesses, limited research has been undertaken to examine the factors that affect outcomes in FBI product liability lawsuits. To date there has been only one study, which has examined this issue. Busby et al. (2001) studied FBI jury verdicts in 32 states from 1988 through 1997 to determine the effects of defendant, plaintiff and lawsuit characteristics on product liability case verdicts and amounts awarded. From among the 175 cases examined, they found that 31.4 percent resulted in some compensation paid by firms with a median award was $25,560 (1998 dollars). They also found that the ability of plaintiffs to link their illnesses to a specific pathogen increased their chances of winning, while more severe illnesses that resulted in hospitalization, chronic complications, or death resulted in higher awards. Defendants that used medical expert testimony (those with "deep pockets") decreased the odds of a plaintiff win (Busby et al. 2001).

While the original research by Busby et al. (2001) offered important insights regarding FBI lawsuits, the long intervening period since this study encourages a reexamination of the issue. Recent high-profile cases of FBI, increased regulatory action, and improvements in traceability practices have changed public perception and expectations concerning firm food safety performance. As such, it is expected that the probability and amount of financial awards in FBI cases have increased, and the factors, which affect these outcomes, will have changed in recent years. Research in this area is needed to further identify the economic ramifications of jury decisions and damages awarded in FBI lawsuits. The factors that influence the extent a firm

is liable and the financial payout associated with adopting operational changes can help influence food firms decision concerning adopting more advance and proactive food safety practices. This latter issue is now even more relevant given the wider adoption and improvements in traceability systems in the intervening years.

1.2 Study Objectives and Hypotheses

The objective of this study is to assess what case attributes impact plaintiff success and payouts in jury settled FBI cases, and how the relative importance of these attributes has changed over time. As such, this study updates the original work conducted by Busby et al. (2001) by expanding the sample of FBI cases to include cases that reached a verdict between 1979 and 2014. Regional and inter-temporal considerations will be incorporated into the model specification to enhance the analysis.

This research assumes that firms seek to minimize payouts associated with FBI product liability lawsuits while injured consumers or their survivors seek to maximize the amount awarded as compensation for injuries sustained. Research hypotheses related to the probability of a plaintiff winning a FBI case settled through jury-trials are as follows:

$H1_0$: FBI lawsuits that do not involve a public health authority decrease plaintiff(s) chance of winning.

$H1_a$: FBI lawsuits that involved a public health authority increase plaintiff(s) chance of winning.

$H2_0$: Plaintiff(s) that did not employ a medical witness during their case decrease chance of winning.

$H2_a$: Plaintiff(s) that employ a medical witness increase chance of winning.

$H3_0$: Plaintiff(s) who are unable to link their illnesses to a specific pathogen have a reduced probability of winning.

$H3_a$: Plaintiff(s) ability to link their illnesses to a specific pathogen increases the probability of winning.

$H4_0$: Lawsuits involving "deep pocket" firms decrease the probability of a plaintiff(s) winning.

$H4_a$: Lawsuits involving "deep pocket" firms are expected to increase the probability of plaintiff(s) winning.

$H5_0$: FBI cases involving death will increase the probability of plaintiff(s) winning.

$H5_a$: FBI cases not involving death will decrease the probability of plaintiff(s) winning.

$H6_0$: FBI cases involving children will increase the probability of plaintiff(s) winning.

$H6_a$: FBI cases not involving children will decrease the probability of plaintiff(s) winning.

More severe FBI cases are likely to result in a higher payout amount if the defendant food firm is found responsible. As such, research hypotheses related to the amount awarded are as follows:

$H7_0$: FBI cases involving death will result in higher awards.

$H7_a$: FBI cases not involving death will result in lower awards.

$H8_0$: FBI cases in which the plaintiff does not have chronic complications or mental or physical disabilities will be awarded lower amounts.

$H8_a$: FBI cases involving chronic complications or mental or physical disabilities will be awarded higher amounts.

$H9_0$: FBI cases involving children will receive a higher award

$H9_a$: FBI cases not involving children will receive a lower award.

$H10_0$: "Deep pocket" firms are expected to pay lower award amounts if found guilty.

$H10_a$: "Deep pocket" firms are expected to pay higher award amounts if found guilty.

1.3 Contributions and Anticipated Impact

This study will provide interesting insights regarding the factors that influence whether a plaintiff wins a FBI case and the amount subsequently awarded. Given the risk to firms in terms of potentially large payouts, future litigation, and lost reputation, these findings can help inform the decision of whether to pursue litigation or settle out of court. In addition, results may provide incentives for food firms and others in the supply chain to improve their operations and produce safer and better quality foods thereby reducing the costs shared by economic sectors.[5] This research will be of particular interest to those with interest in agribusiness, risk management,

[5] Employers, private health insurers, and government.

food safety, and food policy. From a consumer perspective, the findings of this study highlight the causes of action available and the type of evidence needed to be successful in a lawsuit. Additionally, the findings can help inform consumer decisions regarding whether to pursue litigation or accept a settlement offered by food firms.

1.4 Study Overview

Key findings of this study include the frequency and size of awards for FBI cases decided between 1979 and 2014. Approximately 34.8% of cases decided between 1979 and 2014 resulted in positive outcomes and subsequent monetary awards for the party injured by FBI. Compensation to successful plaintiffs ranged from $151 to $6.2M, with average and median awards of $276,148 and $32,264 respectively. More than half of the cases resolved through jury trials did not implicate a specific pathogen responsible for illness; success rates of plaintiffs that alleged illness from a specific pathogen (44.4%) or causal agent (44.8%) were significantly greater than in cases where the cause of illness was not identified (27.1%). Plaintiff success rates in cases that alleged illness from a specific food (32.6%) was lower than cases that did not identify a specific food as the source illness (39.5%). Plaintiff chances of winning increased if lawsuits involved a child, foodborne pathogen was identified, and pain and suffering was claimed, and decreased if defendants used of one or more expert witnesses or had "deep pockets". Cases involving a child, chronic complications and defendants with "deep pockets" increase the amount awarded to plaintiffs by $393,266, $1,108,751 and, $255,529 respectively.

A general introduction to FBI, including key types of foodborne pathogens, causes, and underlying characteristics of FBI, and the economic implications of foodborne pathogens is presented in Chapter 2. Chapter 3 provides a historical account of product liability law and its

intersection with food safety and economics. The role of innovation in food safety and an overview of food safety laws, and regulations are discussed. Chapter 4 presents the conceptual model, data source and collection, and econometric methods used in this analysis. Descriptive statistics and results from the econometric analysis are presented and discussed in Chapter 5. Chapter 6 concludes by exploring the overall implications of this study's findings and identifying opportunities for future research.

Chapter 2: Review of Literature - Foodborne Illness

In antiquity, most FBI occurrences could be attributed to poor sanitation that infiltrated food and water supplies (Bjorklund, 2006). As civilizations developed, many ancient societies began to recognize the importance of sanitation and made concerted efforts to protect food and water supplies by building water pipes and basic sewers to separate fresh from dirty water (Bjorklund, 2006). The ancient Greek physician Hippocrates noted that clean water tasted better and began boiling water for his patients. He also designed a primitive water filter to remove impurities from water he had boiled (Landau, 2011).

With the passage of time, humans learned to protect and preserve foods with salt, natural chemicals, dry heat, ice, and smoke (Bjorklund, 2006). For instance, the Romans carried ice from the Alps to the lowlands to store food longer (Bjorklund, 2006) while the Egyptians dried fish and poultry using the hot dessert sun (Shepard, 2000). Despite such efforts, however, FBI continued to afflict early societies to the extent that wealthy people and royalty often employed personal food tasters to sample foods to test for toxins (Bjorklund, 2006). Satin (2007) noted that the consumption of moldy wheat due to poor storage conditions, coupled with the use of lead coated pots by Greek and Roman upper classes, further contributed to chronic poisoning and partially led to the demise of these individuals.

Although much of the early efforts to prevent FBI focused on water, a 12th century Egyptian doctor advised people not to partake in foods of irregular taste or bad odor without first examining their safeness for human consumption (Bjorklund, 2006). During the Middle Ages (476-1453), people became aware that molds, parasites, and other imperfections spoiled their food but were not cognizant that tiny microbes, invisible to the naked eyes, caused infections

(Bjorklund, 2006). For instance, Northern Europeans were stricken by ergotism[6] that caused mental confusion, muscle spasms, gangrene (death of body tissue), and sometimes death (Bjorklund, 2006). The invention of the microscope (1674) enabled people to see bacteria in food and water but did little to improve or prevent foodborne diseases from occurring (Landau, 2011).

Mechanized agriculture introduced during the industrial revolution (1760-1840) led to a realignment of agriculture production and trade patterns that established the potential conditions for mass food poisoning (Satin, 2007). In addition, demand for foods that would not readily spoil prompted the development of new food processing and preservation technologies such as canning (1795), pasteurization (1856), and refrigeration (1859) (Mueller and Thiemann, 2009). Pasteurization is perhaps the first significant effort to make food and beverages safer and would save millions of lives in time to come.

At the turn of the 20th century, the majority of consumers ate home-cooked meals prepared from locally produced meat and seasonable vegetables (Satin, 2007). However, the understanding of food and beverage spoilage gained during the latter half of the nineteenth century, coupled with the advent of new technologies, led to the proliferation of processed foods (Satin, 2007). For instance, rapid advances in food preservation technology allowed for more food to be processed and resulted in a wide variety of foods available in convenient forms and available throughout the year (Satin, 2007). The introduction of fast food (1940) and technologies such as the microwave (1945), dry freezing and irradiation (1968) (Mueller and Thiemann, 2009) enabled food to be cooked at home (Satin, 2007). In this transition, the responsibility for food safety shifted from homemakers to commercial processors, and

[6]Poisoning caused by consuming ergot-infected grain or grain products (American Heritage Medical Dictionary, 2007). Ergot is a fungus that grows on rye wheat in cold, wet climates (Bjorklund, 2006).

consumers became potentially exposed to a wider variety of foodborne illness causal agents. Before the introduction of modern sanitation practices, both Cholera and Typhoid were responsible for great many FBIs across the world. Cholera spread primarily through contaminated water brought onto vessels that unintentionally carried the disease to distant ports (Landau, 2011). Typhoid fever was one of the most common foodborne diseases in the U.S. and spread through food and water contaminated with the waste of infected humans (Landau, 2011). Today, changes in food and transportation infrastructure mean that many people are less isolated from FBI outbreaks. Regardless, advances in food safety technology coupled with better traceability practices are paving the way towards a safer food supply.

2.1 Types of Foodborne Pathogen Identified and Tracked

Today, more than 250 pathogens including bacteria, parasites, viruses, fungi and their toxins are known to cause FBI (CDC, 2014c). In estimating the total burden of FBI, the Centers for Disease Control and Prevention (CDC) estimates the number of illness caused by both known and unspecified agents. Currently, there are 31 pathogens known to cause FBI and which are tracked by many public health systems. Unspecified agents are those whose health effects or symptoms are most likely to cause acute gastroenteritis but which effort has not been made to identify them and their incidence is not tracked (Scallan et al. 2011). Such agents include those for which there is insufficient data to estimate specific burden; known agents not yet identified as causing foodborne illness; microbes, chemicals, or other substances known to be in food whose ability to cause illness is unproven; and agents not yet identified (CDC, 2014d). Table 2.1 presents the estimated annual number of U.S. illnesses due to pathogens and unspecified agents.

Table 2.1. Estimated annual number of domestically acquired foodborne illnesses, hospitalizations and deaths due to 31 pathogens and unspecified agents, United States, 2011

Foodborne Agents	Estimated annual number of illnesses (90% credible interval)	%	Estimated annual number of hospitalizations (90% credible interval)	%	Estimated annual number of deaths (90% credible interval)	%
31 known pathogens	9.4 million (6.6 -12.7 million)	20	55,961 (39,534 - 75,741)	44	1,351 (712 - 2,268)	44
Unspecified agents	38.4 million (19.8 - 61.2 million)	80	71,878 (9,924 - 157,340)	56	1,686 (369 - 3,338)	56

Source: (CDC, 2014b).

Surveillance of FBIs is an important part of identifying opportunities to improve overall food safety and reduce morbidity and mortality. The CDC defines surveillance as "ongoing, systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and to improve health" (German et al. 2001). According to Gould et al. (2013), outbreak surveillance provides valuable insights into the foods, germs, and settings linked to foodborne diseases. In the U.S., there are many surveillance systems that play a role in detecting and preventing foodborne disease and outbreaks (CDC, 2015a). The CDC uses the national surveillance system, PulseNet, to detect and define outbreaks. PulseNet is a sophisticated outbreak detection system that compares the "DNA fingerprints" of bacteria from patients to find clusters of disease that might represent unrecognized outbreaks (CDC, 2013a).

Surveillance systems are able to capture and analyze foodborne outbreak data by relying on routine monitoring of foodborne diseases conducted by local and state public health departments. Among the numerous surveillance systems the CDC provides leadership for, the Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne disease

component of the CDC's Emerging Infections Program (CDC, 2015a)[7]. FoodNet is a collaborative program among the CDC, 10 state health departments, the U.S. Department of Agriculture Food Safety and Inspection Service (USDA-FSIS), and the Food and Drug Administration (FDA) (CDC, 2015b). This system estimates the number of FBIs, monitors trends in incidence of specific FBIs over time, attributes illnesses to specific foods and settings, disseminates this information, and provides data required as a foundation for food safety policy and prevention efforts. Currently, this surveillance system collects information on *Campylobacter, Cryptosporidium, Cyclospora, Listeria, Salmonella, Escherichia coli* O157 and non-O157, *Shigella, Vibrio, and Yersinia* by seeking out laboratory confirmed cases from sites across the 10 participating states (CDC, 2015b).

[7] Other surveillance programs include the National Antimicrobial Resistance Monitoring System (NARMS) that monitors antimicrobial resistance in enteric (intestinal) bacteria isolated from humans, retail meats, and food animals; the National Electronic Norovirus Outbreak Network (CaliciNet) that rapidly links norovirus clusters to outbreaks with a common food source; the National Molecular Subtyping Network for Foodborne Disease Surveillance (PulseNet) that connects cases of illness nationwide to quickly identify outbreaks; the National Surveillance for Enteric Disease that provides a national picture of the occurrence of infections and their impact on human health; the Foodborne Disease Outbreak Surveillance System (FDOSS) that captures outbreak data on agents, foods, and settings responsible for illness; the National Voluntary Environmental Assessment Information System (NVEAIS) that systematically collect, analyze, interpret, and disseminate environmental data from FBI outbreak investigations; DPDx: Laboratory Identification of Parasites of Public Health Concern that strengthens diagnosis of parasitic diseases in the U.S. and around the world; and the National Notifiable Diseases Surveillance System (NNDSS) that tracks notifiable infectious diseases across the U.S. (CDC, 2015a).

Table 2.2. Estimated Annual Foodborne Illnesses, Hospitalizations and Deaths Due to the Most Prevalent Pathogens Tracked, United States, 2011

Pathogen	Illnesses	Hospitalizations	Deaths	Type
	Number			
Norovirus	5,461,731	14,663	149	Virus
Salmonella, nontyphoidal	1,027,561	19,336	378	Bacteria
Clostridium perfringens	965,958	432	26	Bacteria
Campylobacter spp.	845,024	8,463	76	Bacteria
Staphylococcus aureus	241,148	1,064	6	Bacteria
Toxoplasma gondii	86,686	4,428	327	Parasite

Source: (CDC, 2014b).

Table 2.2 presents the estimated annual cases of FBI and number of hospitalizations and deaths due to the most prevalent pathogens currently tracked. Although tens of thousands of cases are reported each year (CDC, 2014e), since a vast majority of FBIs are never reported to local, state, and or federal agencies (Knechtges, 2012), the actual number of FBI and diseases are not accurately reflected in surveillance systems. This is because many individuals may not seek medical treatment, their illness may be misdiagnosed (Weber, 2005), or their health care professional may not make a specific diagnosis to link their illness to a specific causal agent. In addition, each state decides which pathogens should be under surveillance within their state (CDC, 2014e). As a result, infection due to a particular FBI may go undiagnosed and or unreported if it is not tracked in the state medical treatment was sought. Also, infections with some microbes such as norovirus are not reported unless they are associated with a recognized outbreak (CDC, 2014e).

2.2 Causes of Foodborne Illness

Determining the cause of FBIs is an important step in identifying opportunities to improve overall food safety. FBIs have a wide variety of causes because almost any food can become

contaminated at any point from where it is grown or raised to where it is consumed (Nakaya, 2012). Most FBIs are caused by eating food that contains harmful bacteria, viruses, parasites and chemicals or foreign objects/matter such as bones, metals or human blood. Nakaya (2012) cites evidence that FBI can be caused by improper food handling at home or in a restaurant (leading to microbial or chemical contamination), chemical and toxins in the environment, and antibiotics used in animals and large-scale farming. The following discussion briefly introduces the major causes of FBI.

Bacteria are tiny microorganisms that can cause infections of the gastrointestinal tract. Raw foods such as meat, poultry, fish and shellfish, eggs, unpasteurized milk and dairy products, and fresh produce may contain bacteria that cause gastrointestinal illness. Although harmful bacteria may be present in the production environment, foods may also be contaminated with bacteria during harvesting or slaughter, processing, storage, and shipping (NIDDK, 2014). For instance, *Salmonella* and *Campylobacter* are normally found in warm-blooded animals such as cattle, poultry and pigs (Medieros et al. 2000); meat and poultry can also become contaminated with foodborne pathogens during slaughter.

Viruses are extremely small pathogens that reproduce only within a living host cell and can be transmitted by food or water (Medieros et al. 2000) or contact with contaminated surfaces. Viruses cause infections that can lead to sickness and may be passed from person to person. Common sources of foodborne viruses include, food prepared by a person infected with a virus, shellfish from contaminated water and produce irrigated with contaminated water (NIDDK, 2014). Norovirus is transmitted from foods contaminated at their source or through contact with someone who is infected. This virus causes inflammation of the stomach and intestines (NIDDK, 2014) and is the most common cause of foodborne illness in the U.S.

(Medieros et al. 2000).

Parasites are small, primitive animals that live within the bodies of other animals (Medieros et al. 2000) or in water. Foods that come into contact with contaminated water during growth or preparation can become contaminated with parasites. Similarly food preparers who are infected with parasites can also contaminate foods if they fail to practice proper personal hygiene before handling food (NIDDK, 2014). Several types of parasites can be found in food and water including *Toxoplasma*, which is found in meat animals, *Trichinella* that is found in raw or undercooked pork, and *Cryptosporidium* that is found in contaminated water (Medieros et al. 2000). Due to good water treatment and sanitation programs, parasites infection due to food and water are relatively rare in the U.S.

Chemicals and toxins in the environment, or chemicals occurring naturally in some foods may also contaminate foods. A large number of pesticides, heavy metals, cleaning solutions, and other chemicals make their way into the food supply and can cause illness once ingested (Nakaya, 2012). Pesticides are any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest (EPA, 2014)[8]. Pesticides applied directly to crops can remain on the plant and become residues in food. Also, pesticides can travel from application sites by overspray, drift, runoff, and spills (pollutant) and may contaminate foodstuffs (Knechtges, 2012). Unwashed fruits and vegetables that contain high concentrations of pesticide residue may cause serious health problems (NIDDK, 2014).

Depending on the type of pesticide and the amount of exposure, short-term illness may include diarrhea, pinpoint pupils, rashes, nausea, headache, and vomiting, long-term illness may include aggravated asthma symptoms, certain types of cancer, birth defects and damage to the

[8] Pesticides include insecticides (insects), herbicides (weeds), rodenticides (rodent), fungicides (fungi), nematicides (nematodes) and various substances use to control pests (Knechtges, 2012).

genetic and immune systems (CDPH, 2015). However, levels of pesticide residues in the U.S. food supply are well below established safety standards (FDA, 2015a). Winter (2001) notes that health risks posed by pesticide residues in foods are much less than those posed by microbial contaminants, naturally produced toxins, and environmental pollutants.

Environmental chemicals associated with human activity and geologic processes may also find their way into the human food chain through soil, air, or water (Knechtges, 2012). Metals such as arsenic, lead, mercury and methylmercury occur naturally in the environment or through many types of human activity such as mining (FDA, 2015b). Arsenic found in water, air, food, and soil in organic and inorganic forms may contaminate grains, fruits, and vegetables through absorption (FDA, 2015b). Long-term exposure to high levels of arsenic may lead to higher rates of skin, bladder, and lung cancer and heart disease (FDA, 2015b). Similarly, lead can be deposited on or absorbed by plants grown for food, and exposure to large amounts may lead to health issues relating to the central nervous system, kidneys, and the immune system (FDA, 2015b). In children, long-term lead exposure, irrespective of the quantity, has been implicated in impaired cognitive function, including reduced IQ, behavior difficulties and other problems (FDA, 2015b). Mercury accumulated in streams, lakes and oceans converts into methylmercury that is absorbed by fish during feeding. Methylmercury is a neurotoxin and exposure to large quantities can be harmful to the brain and nervous system (FDA, 2015b).

Industrial chemicals such as dioxins, cooking or heating related chemicals such as acrylamide, and other chemicals such as benzene, ethyl carbamate, perchorate, and melamine may also contaminate the food supply leading to serious health risks (FDA, 2014a). Naturally occurring toxins in certain plants and animals may also lead to FBI. For instance, large reef fish may accumulate ciguatera toxin through their diet and, when eaten, may cause nausea, vomiting,

diarrhea, joint and muscle aches, headache, dizziness and muscle weakness (FDA, 2015c). In addition, some types of fish including tuna and mahi mahi, may be contaminated with bacteria that produce toxins if the fish are not properly refrigerated before they are cooked or served (NIDDK, 2014).

In addition to the causes of FBI noted above, consideration must also be given to contributory factors that allow pathogens to contaminate food. Errors in food production, distribution, storage, and preparation allow contamination of foods and the survival and/or proliferation of etiologic agents. Busby et al. (2001) noted that some food handling errors introduce pathogens to uncontaminated food while other errors permit pathogenic organisms already present in raw food to survive or multiply to dangerous levels once food is prepared. Bryan et al. (1997) report that potential errors may include the use of contaminated raw food, cross contamination of prepared foods by contaminated raw food, poor personal hygiene by infected food handlers, inadequate cleaning of equipment, inadequate cooking or reheating, improper holding temperatures, cooling food too slowly after heating, eating food too long after preparation, and insufficient fermentation, acidification, salting or sweetening during processing. Many FBIs are attributed to sequential errors made by food firms and consumers where food initially contaminated somewhere along production and distribution is, in turn, improperly handled by consumers (Busby et al. 2001).[9]

[9] For example, fresh produce packagers that failed to prevent pre-package salads from being contaminated by *Salmonella* bacteria, and consumers that subsequently fail to wash the lettuce leaves, causing those who eat the salad to become ill.

2.3 Characteristics of Foodborne Illness

Most incidents of foodborne illness are self-limiting or nonfatal conditions (Knechtges, 2012) that result in symptoms that can include diarrhea, vomiting, or other gastrointestinal manifestations such as dysentery (Lindsay, 1997). However, non-specific symptoms and neurologic symptoms may also occur (MMWR, 2004). Symptoms of FBI depend on the source, and can range from mild to serious and last from a few hours to several days (MMWR, 2004). Characteristics of a specific case of FBI may affect the extent of legal liability for illness and injuries sustained by consumers. Alternatively, cases suspected as being part of a mass outbreak are likely to exhibit similar features that subsequently affect the extent of legal liability for illness and injuries sustained by consumers individually or as part of a class action lawsuit. Characteristics of potential importance to assigning liability and award amounts include the incubation period, whether the incidence was part of a mass outbreak, an individual's susceptibility, diagnosis, treatment, and whether the illness results in chronic health issues. The importance of these illness attributes is explored below.

2.3.1 Incubation Period

The amount of time that elapses between ingesting a pathogen and the appearance of the first symptoms of illness is called the incubation period (Lew, 2011). The incubation period for most FBIs can range from several hours to several weeks depending on the type of pathogen. Table 2.3 provides a summary of the incubation period for selected etiologic agents.

Table 2.3. Incubation period ranges for selected foodborne illness

Etiologic Agent	Incubation Period
Bacillus cereus - Vomiting toxin	1-6 hrs
Bacillus cereus - Diarrheal toxin	6-24 hrs
Campylobacter jejuni/coli	2-10 days; usually 2-5 days
Clostridium botulinum	2 hrs-8 days; usually 12-48 hours
Clostridium perfringens	6-24 hours
Escherichia coli - Enterohemorrhagic (E. coli O157:H7 and others)	1-10 days; usually 3-4 days
Listeria monocytogenes - Invasive disease	2-6 weeks
Nontyphoidal Salmonella	6 hrs-10 days; usually 6-48 hours
Shigella spp.	12 hrs-6 days; usually 2-4 days
Staphylococcus aureus	30 min-8 hours; usually 2-4 hours
Vibrio parahaemolyticus	4-30 hours
Marine toxins - Ciguatoxin	1-48 hours; usually 2-8 hours
Cryptosporidium spp.	2-28 days; median: 7 days
Trichinella spp.	1-2 days for intestinal phase; 2-4 weeks for systemic phase
Source: (CDC, 2015f).	

In FBI lawsuits, the incubation period plays a crucial role in identifying the pathogen responsible for the illness claimed. Busby et al. (2001) found that lawsuits in which a specific foodborne pathogen had been identified had a statistically significant effect on plaintiff's chance of winning. Since illness could have been triggered by a variety of other causes, a plaintiff's ability to make this identification is often largely dependent on whether they can show that his or her symptoms are consistent with the incubation period of a specific pathogen. For example, the incubation period for non-typhoidal *Salmonella* ranges from six hours to 10 days; a plaintiff claiming FBI due to non-typhoidal *Salmonella* must present evidence that the time between exposure and the onset of symptoms falls within this range. Evidence is usually provided through testimony of a medical expert (e.g. a gastroenterologist) that conclusively rules out other potential causes of the plaintiff's illness. Failure to show that their symptoms are consistent with the incubation period of the implicated pathogen may result in a weaker case.

2.3.2 Mass Outbreaks

Changes in human demographic characteristics and food preferences, coupled with increased integration and consolidation of global food production and distribution systems, and microbial adaptation, has created opportunities for contaminated food to be distributed over a much wider geographic area, and thus lead to illness outbreaks (MMWR, 2004). The CDC defines a foodborne-disease outbreak (FBDO) as an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food. Mead et al. (1999) noted that the majority of FBIs are not detected as part of an outbreak[10].

Outbreaks in FBI can range greatly in the size and distribution of cases (Knechtges, 2012), and can be due to any of the more than 250 pathogens and toxins known to cause FBI (CDC, 2013b). Local outbreaks typically involve a common meal or food item from a common place in the local community, while larger outbreaks can occur as part of a wider distribution of the same food item(s) across large areas (i.e. a region, multiple states). In 2014, more than 220 food poisoning outbreaks or related clusters across the U.S. were investigated. This resulted in 68 confirmed or suspected vehicles of transmission, and recalls of a variety of foods (CDC, 2015c). Recent multi-state foodborne outbreak investigations have implicated bean sprouts (*Salmonella*), cilantro (*Cyclospora),* peanut butter (*Salmonella*), organic sprout chia powder (*Salmonella*), and raw clover sprouts (*E. coli*) (CDC, 2015d) as the vehicles for pathogen transmission. The most recent major FBI outbreak was in 2011 when "Rocky Ford" cantaloupes contaminated with *Listeria* sickened at least 146 in 28 states and killed 36 people (Flynn, 2012). In recent years, large multi-state or nationwide foodborne outbreaks have become more

[10] Illnesses that are not part of an outbreak are called "sporadic" (CDC, 2013b).

commonly recognized. More than 1,000 foodborne outbreaks investigated by local and state health departments are reported each year (CDC, 2014a).

Most FBI outbreaks are identified and investigated by local and state health departments. The CDC provides consultation and assistance on outbreak investigations that are particularly large, unusual, or severe (CDC, 2015e). In addition, the CDC serves as a lead coordinator between public health partners, and maintains and monitors several disease surveillance and outbreak detection systems. FBI lawsuits involving outbreaks such as incidents attributed to a particular restaurant, cruise ship, or a common food source are typically easier for plaintiffs to establish the proximate cause because evidence of multiple injuries resulting from a common source helps to validate plaintiff claims. In addition, plaintiffs in outbreak cases also benefit from the involvement of public health authority investigation as public health officials can be called upon to provide expert testimony concerning the outcome of their investigations.

2.3.3 Susceptibility and Persons at Risk

Consumers with weakened or undeveloped immune systems are less capable of fighting off infections due to foodborne pathogens. Populations highly susceptible to this type of illness include infants and children, the elderly, pregnant women, and immune suppressed individuals. The incidence of infection caused by nearly all the tracked pathogens was highest among children under 5 years old, and adults 65 years and older (MMWR, 2014). Vulnerable people are at an increased risk of contracting a foodborne illness, experience the illness more severely, and for a longer duration than less vulnerable groups. Such individuals are more likely to require hospitalization or even die from a FBI (FDA, 2015d).

Because their immune systems are still developing, young children are more at risk for FBI (FDA, 2015d). Potter (2006) noted that infants and children are more highly susceptible to infections because of their immunological naivety, and that repeated exposure to pathogens or immunization creates antigenic memory as adaptive immunity matures making children less able to mount a productive response to prevent illness from occurring. Children under the age of 5 are at particular risk for FBI because they have immature immune systems, a lower body weight, they produce less stomach acid[11], and have significantly less awareness and control over food safety risks (Pelton, 2011). In addition, as children consume more food in proportion to their weight than adults, they absorb proportionally more toxins and contaminants (WHO, 2000). Approximately half of all reported FBIs occur in children, with the majority of these cases occurring in those under 15 years of age (Eskin, 2009; Food Safety News, 2013).

The elderly also tend to have weaker immune systems. As people age, factors such as poor nutrition, dehydration, or chronic illness may increase FBI susceptibility. Also, immune function and other barriers to infection start to wane in older adults and as a result, these individuals are less effective in recognizing and fighting pathogens (Klontz, 2013). Complicating matters, many older adults may be diagnosed with one or more chronic conditions such as diabetes, arthritis, cancer, or cardiovascular disease, and are taking at least one medication (FDA, 2015d). The chronic disease process, coupled with side effects of some medications, may also weaken the immune system. In addition, as people age, stomach acid production decreases, which further contributes to the risk of illness.

Pregnant women are also at greater risk of being affected by FBI. During pregnancy, a woman's immune system is altered to enable co-existence with the fetus (Klontz, 2013). Such

[11] Stomach acid plays an important role in reducing the number of bacteria in the intestinal track (FDA, 2015d).

alterations, however, make the body more susceptible to infection from FBI. In addition, harmful bacteria can cross the placenta barrier and infect an unborn baby whose immune system is under-developed and incapable of fighting infections. Such instances may lead to miscarriage, premature delivery, stillbirth, sickness or death of a newborn baby (FDA, 2015d).

People with immune systems weakened by disease or medical treatment such as those with HIV/AIDs, cancer, liver disease, and diabetes are also at higher risk of contracting FBI. Both a disease and the side effects of certain treatments such as chemotherapy may cause immune suppression and make individuals more susceptible to many types of infections (Klontz, 2013). In the case of diabetes, the disease may slow the rate food passes through the stomach and intestines, and allow foodborne pathogens an opportunity to multiply (FDA, 2015d).

2.3.4 Medical Diagnosis and Treatment

Diagnosing the actual cause of a FBI is made more difficult by the fact that numerous pathogens can induce similar symptoms. As diarrhea, abdominal cramps, and nausea commonly occur in FBI cases, it is often challenging to pinpoint the pathogen responsible for a given illness without laboratory tests (MMWR, 2004). Kass and Reimann (2006) note that even with modern, sophisticated techniques, approximately half of all outbreak investigations fail to implicate a cause. Failure of identification may occur because the agent is truly unknown (Mead et al. 1999) or because of inaccurate laboratory procedures or mishandling of samples (Kass and Reimann, 2006).

FBIs are generally acute in nature and most people recover on their own. Only a fraction of those who experience gastrointestinal tract symptoms from FBI seek medical treatment (MMWR, 2004). Those who do seek medical care and submit specimens for testing are more

likely to be diagnosed with a bacterial infection even though viral, parasitic and chemical infections are also common causes of FBI (MMWR, 2004). This is because tests for other etiologies of diarrheal disease are rarely done in clinical practice (MMWR, 2004). To identify the etiology of a FBI, physicians and other health care professionals may rely on the incubation period, duration of the resultant illness, and the predominant clinical symptoms (MMWR, 2004). They may also enquire about the consumption of raw or poorly cooked foods, unpasteurized milk or juices, home canned goods, and fresh produce. Information regarding occupation, foreign travel, group gatherings, pet contact, daycare attendance and farm visits of the affected individuals may also provide important clues (MMWR, 2004).

Medical diagnoses of FBI that is mild in nature and last only a few days do not usually undergo testing. Because many FBIs exhibit similar symptoms, medical professionals may use differential diagnosis and/or clinical microbiological testing to systematically identify the actual cause, or to eliminate potential causes of illness in more serious cases. The extent of diagnostic evaluation depends on the clinical signs, the differential diagnosis considered and clinical judgment (MMWR, 2004). It must be noted, however, that routine laboratory testing may not identify many specific foodborne infections. Specialized, experimental, and expensive tests that are not generally available may be required for some diagnoses.

Treatment of FBI caused by bacteria, viral, and parasitic infections depends on the clinical signs and symptoms, the implicated organism, antimicrobial susceptibility tests, and the appropriateness of treating with an antibiotic (MMWR, 2004). Symptoms that are primarily mild or moderate (diarrhea and vomiting) may result in dehydration, and may require replacing lost fluids and electrolytes through oral rehydration (CDC, 2014g). Intravenous therapy may be required for more severe dehydration (MMWR, 2004). In infants and young children, special

care should be taken to avoid serious adverse effects of antidiarrheal medication. For FBI caused by chemicals and toxins, supportive care is usually advised (MMWR, 2004). Table 2.4 summarizes the signs, symptoms, and treatment for foodborne illness due to selected etiologic agents.

2.3.5 Foodborne Illness and Chronic Health Issues

The majority of people affected by a FBI usually make a full recovery without any lasting illness impacts. The long-term effects of FBI, however, can be life changing. Several pathogens or their toxins are cable of triggering chronic diseases including permanent tissue and organ damage, which may lead to disability and death. For instance, Moss (2009) relates the story of a consumer that initially experienced stomach cramps and diarrhea but eventually suffered from bloody diarrhea, kidney failure and convulsions after consuming a hamburger infected with *E. coli.*

A number of chronic sequelae[12] may result from foodborne infection complications (Lindsay, 1997) including rheumatoid disease, inflammatory bowel syndrome (IBS), haemolytic uraemic syndrome (HUS), Guillain-Barre syndrome (GBS), and autoimmune thyroid disorders. Table 2.5 summarizes the potential severe acute complications and long-term consequences of selected foodborne pathogens.

[12] Any abnormal condition resulting from FBI.

Table 2.4. Signs, Symptoms, and Treatment for Foodborne Illness due to Specific Microbial Agents

Etiologic Agent	Signs/Symptoms	Treatment
Bacillus cereus - Vomiting toxin	Sudden onset of severe nausea and vomiting. Diarrhea may be present.	Supportive care.
Bacillus cereus - Diarrheal toxin	Abdominal cramps, watery diarrhea, nausea.	Supportive care.
Campylobacter jejuni/coli	Diarrhea, cramps, fever, and vomiting; diarrhea may be bloody.	Supportive care. For severe cases, antibiotics such as erythromycin and quinolones may be indicated early in the diarrheal disease. Guillain-Barré syndrome can be a sequela.
Clostridium botulinum	Vomiting, diarrhea, blurred vision, diplopia, dysphagia, and descending muscle weakness.	Supportive care.
Clostridium perfringens	Watery diarrhea, nausea, abdominal cramps; fever is rare.	Supportive care.
Escherichia coli - Enterohemorrhagic (E. coli O157:H7 and others*)*	Severe diarrhea that is often bloody, abdominal pain and vomiting. Usually, little or no fever is present.	Supportive care, monitor renal function, hemoglobin, and platelets closely.
Listeria monocytogenes - Invasive disease	Fever, muscle aches, and nausea or diarrhea. Pregnant women may have mild flu-like illness, and infection can lead to premature delivery or stillbirth. Elderly or Immune-compromised patients may have bacteremia or meningitis.	Supportive care and antibiotics; Intravenous ampicillin, penicillin, or TMPSMX are recommended for invasive disease.
Nontyphoidal *Salmonella*	Diarrhea, fever, abdominal cramps, vomiting.	Supportive care.
Shigella spp.	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus.	Supportive care. TMP-SMX recommended in the US if organism is susceptible.
Staphylococcus aureus	Sudden onset of severe nausea and vomiting. Abdominal cramps. Diarrhea and fever may be present.	Supportive care.
Vibrio parahaemolyticus	Watery diarrhea, abdominal cramps, nausea, vomiting.	Supportive care. Antibiotics are recommended in severe cases.
Marine toxins - Ciguatoxin	GI: abdominal pain, nausea, vomiting, diarrhea.	Supportive care, IV mannitol.
Cryptosporidium spp.	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever.	Supportive care, self-limited. If severe consider paromomycin for 7 days. For children aged 1–11 years, consider nitazoxanide for 3 days.
Trichinella spp.	Acute: nausea, diarrhea, vomiting, fatigue, fever, abdominal discomfort followed by muscle soreness, weakness, and occasional cardiac and neurologic complications.	Supportive care plus mebendazole or albendazole.
Hepatitis A	Diarrhea, dark urine, jaundice, and flu-like symptoms, i.e., fever,	Supportive care. Prevention with immunization

	headache, nausea, and abdominal pain.	
Norovirus (NoV*)*	Nausea, vomiting, abdominal cramping, diarrhea, fever, myalgia, and some headache.	Supportive care such as rehydration. Good hygiene.
Cyclospora cayetanensis	Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue.	TMP-SMX for 7 days.
Yersinia enterocolitica	Appendicitis-like symptoms, diarrhea and vomiting, fever, and abdominal pain.	Supportive care.
Source: (CDC - MMWR, 2004).		

Table 2.5. Severe acute complications and long-term consequences of selected etiologic agents

Etiologic Agent	Severe Acute complications	Long-term Consequences
Campylobacter	Sepsis, meningitis, carditis, endocarditis, Hepatitis, cholecystitis, pancreatitis	Chronic diarrhea, Guillain-Barré syndrome, irritable bowel syndrome, dyspepsia, inflammatory bowel disease, reactive arthritis, renal diseases
Escherichia coli - O157:H7	Hemolytic uremic syndrome, renal failure, coma, seizures	Kidney dysfunction, hypertension, cardiovascular disease, stroke, endothelial injury, pancreatitis diabetes, splenic abscesses, gallstones, seizures, hemiplegia, cortical blindness, psychomotor retardation, irritable bowel syndrome, dyspepsia, reactive arthritis
Listeria	Preterm birth, encephalitis, meningitis, seizures, bacteremia, sepsis, endocarditis, pulmonary infection, septic arthritis	Cerebral palsy, epilepsy, vision and hearing loss, cognitive and attention deficits, chronic lung disease
Salmonella	Bacteremia, sepsis, meningitis, septic arthritis, spondylitis, cholangitis, pneumonia, septic metastases, arterial infection, aortitis, aortic aneurysm, endocarditis, osteomyelitis and bone sequelae, splenic abscesses, pancreatitis, hemolytic uremic syndrome, renal failure, coma, seizures	Chronic diarrhea, irritable bowel syndrome, dyspepsia, inflammatory bowel disease, reactive arthritis
Shigella	Intestinal perforation, toxic megacolon, bacteremia, sepsis, hemolytic uremic syndrome, renal failure, coma, seizures	Kidney dysfunction, hypertension, cardiovascular disease, endothelial injury, pancreatitis, diabetes, splenic abscesses, gallstones, coma, seizures, hemiplegia, cortical blindness, psychomotor retardation, irritable bowel syndrome, dyspepsia, inflammatory bowel disease, reactive arthritis
Norovirus (NoV)	None	Irritable bowel syndrome
Yersinia enterocolitica	Intestinal perforation; intussusception; toxic megacolon; mesenteric vein thrombosis; osteomyelitis; sinusitis; pneumonia; empyema; bacteremia; sepsis; endocarditis; meningitis; abscesses in kidney, lung, liver, or spleen	Chronic diarrhea, Graves' disease (autoimmune thyroid disease); reactive arthritis

Source: Batz et al. (2013).

2.4 Food Safety Standards and Certifications

Concerns related to food safety scandals over the last two decades coupled with changes to the structure of the global food market and consumer demand for safer food have contributed to the development of many public and private standards on food safety and quality. According to Henson and Humphrey (2009), public and private food safety standards establish controls and conformance in the production, transport and processing of food.

Food safety standards may be classified as standards which define required characteristics of food products such as contaminant or maximum residue limits, process standards that define how food should be produced including verifiable performance objectives and process standards that define the requirements of the management system such as documentation requirements (Clarke, 2010). In many cases, public food safety standards establish the basic requirements of a food safety system, while private food safety standards elaborate on what this system should encompass in order to be more effective (Henson and Humphrey, 2009). Regardless of their type, a common (implicit) goal of these standards is to reduce the incidence of FBI.

Private food safety standards are developed and owned by non-governmental entities (Liu, 2009), and are often considered more stringent and extensive than public standards. Such standards aim to improve food safety and facilitate supply chain management within an increasingly globalized and competitive international food market (Clarke, 2010). Private food safety standards include Global Good Agricultural Practices (GlobalGAP), which is a food safety certification program for agriculture and aquaculture producers (GlobalGap, 2015), and the ISO 22000 standard, which is designed for use by food processors to establish and maintain food safety management procedures (ISO, 2015). Other private standards include British Retail

Consortium (BRC), International Featured Standard (IFS), Food Safety System Certification (FSSC) 22000, Safe Quality Food (SQF), and Best Aquaculture Practice (BAP) (Clarke, 2010).

Food safety standards are both developed and adopted by private food companies, predominantly, major food retailers and food service companies (Henson and Humphrey, 2009). For example, Walmart implemented a standard that requires all deli meats to be produced with a natural inhibitor that ensures *Listeria* counts could not increase by more than a log during the product's shelf-life (Lupo, 2013). Food standards set and adopted by individual food firms can be used to distinguish and differentiate these firms on the market (Clarke, 2010). Ranville (2009) posited that private food safety certification has become a *de facto* mandatory condition of supply contracts for many large food retailers throughout the world.

In the U.S., public food safety standards are developed and overseen by federal government agencies responsible. For example, the Food Safety Modernization Act (FSMA) mandates that the Food and Drug Administration (FDA) establish science-based, minimum standards for the safe growing, harvesting, packing and holding of produce on farms to minimize contamination that could cause serious health consequences or death (FDA, 2014b). Internationally, the Food and Agriculture Organization (FAO) and World Health Organization (WHO) address food safety issues through the CODEX Hygiene Principles and other relevant codes (Trienekens and Zuurbier, 2007).

2.5 Economic Costs of Foodborne Illness

The economic costs of FBIs encompass cost incurred by victims and their families, food firms, and third parties. As most FBIs are mild in nature, and require no medical care, the economic cost incurred by ill consumers and their families are likely to be small. However, more severe

illnesses can lead to significant monetary losses due to medical costs, productivity loss, as well as non-monetary losses such as pain and suffering (Busby et al. 2001). Henson and Traill (1993) distinguish between tangible and intangible costs of FBI. Tangible costs include those requiring direct monetary outlays such as employment loss, travel, doctors' visit, medicine, costs of hospital care, and, in the case of outbreaks, the administrative costs of setting up a system for investigating, managing, and publicizing outbreak information (Riston and Mai, 1998). On the other hand, intangible costs include costs related to the value of loss of leisure and life, and are more difficult to quantify (Riston and Mai, 1998).

Perhaps of greater importance than the impact on individually affected consumers is the social cost of FBI. Swinbank (1993) noted that such cost can include: (1) losses in production over and above the income loss incurred by the suffer, (2) state-funded medical and hospital expenses, over and above those directly borne by the sufferer, and (3) pain and distress suffered by others that sympathize with the sufferer. While identifying these costs sources may seem forthright, determining the costs incurred under each type of cost is difficult to ascertain because of data limitations and costs shifting between parties. Busby et al. (2001) noted that cost shifting could include insured medical expenses being shifted to private or public insurers; health care providers absorbing uninsured medical expenses as a business loss; time loss from work due to sick leave becomes costs of employers, and medical expenses covered under government health plans are picked up by tax payers. Consumers and their families bear relatively little out of pocket expense of the true cost of FBI and thus have less incentive to seek compensation from responsible parties.

Aggregate estimates of FBI costs vary widely. This is due to differences in the number of diseases included, the valuation methods used (Hoffmann and Anekwe, 2013), and the time

period considered. In addition, assumptions concerning the burden of illness and economic components may further contribute to differences in estimates (Scharff, 2011). There is also the cost associated with someone infected with a FBI that becomes a risk to the wider community. For instance, someone infected with Hepatitis may inadvertently infect unsuspecting restaurant patrons. FBI also affects market movements and prices. Consumers react to news of FBI by changing their buying patterns and reducing consumption of implicated product (Palma et al. 2010). As a result, the reduction in sales may lead to market shutdown in the short run. Voluntary and involuntary food recalls also contributes to the economic cost of FBI. Although some food firms may possess recall insurance, frequently only mandatory rather than voluntary recalls are covered. As such, proactive firms often end up paying for their recall expenses.

Recent estimates by Hoffmann et al. (2015) shows that 9.4 million illnesses impose over $15.5 billion in economic burden annually. These estimates are conservative and measure only the major costs of medical treatment, lost productivity and individuals' willingness to pay to reduce risk of death. Table 3 present the cost estimates of 15 foodborne pathogens.

Table 2.6. Cost Estimates of 15 Foodborne Illnesses

Etiologic Agent	Estimated Costs
Campylobacter (all species)	$1,928,787,166.23
Clostridium perfringens	$342,668,497.88
Cryptosporidium parvum	$51,813,651.77
Cyclospora cayetanensis	$2,301,422.92
Escherichia coli O157	$271,418,689.72
Non-O157 Shiga toxin-producing *Escherichia coli*	$27,364,560.51
Listeria monocytogenes	$2,834,444,202.28
Norovirus	$2,255,827,318.28
Salmonella (nontyphoidal)	$3,666,600,031.17
Shigella (all species)	$137,965,962.14
Toxoplasma gondii	$3,303,984,477.77
Vibrio parahaemolyticus	$40,682,311.84
Vibrio vulnificus	$319,850,292.60
Vibrio (all other non-cholera species)	$142,086,208.87
Yersinia enterocolitica	$278,111,168.08
Total	**$15,603,905,962.06**
Source: Hoffmann et al. 2015.	

Relying on Scallan et al. (2011) estimates of 30 known and all unknown pathogens, Scharff (2011) estimated the economic burden from health losses due to FBI in the U.S. using a basic and an enhanced cost-of-illness model. Both models account for health-related economic costs associated with FBI in addition to assigning a value of statistical life (VSL) based on individuals' trade-offs between fatality risk and money (Scharff, 2011). In the basic model, economic costs from FBI included both financial losses due to medical expenditures and lost productivity and utility (well-being) due to illness related mortality (Scharff, 2011). Medical expenditures included costs of hospital services, inpatient and outpatient physician care including cost of laboratory tests, and pharmaceutical costs while productivity loss included financial losses incurred when individuals are not able to work as a result of either their own illnesses or illnesses of their children (Scharff, 2011). In the enhanced cost-of-illness model, productivity loss estimates was replaced with a more inclusive measure of pain, suffering, and functional disability based on monetized quality-adjusted life year (QALYs) estimates (Scharff, 2011). QALYs are calculated considering the loss of well-being from a condition, the number of days with the condition, and the economic value of one day derived from the value of statistical life (Viscusi and Aldy, 2004). This measure represents an ill consumer's willingness to pay to avoid these pain and suffering losses (Scharff, 2011) and more fully accounts for economic costs associated with FBI (Scharff, 2011).

Using the basic model, Scharff (2011) estimated the average cost per case of FBIs to be $1,068 (90% Confidence Interval (CI), $683 to $1,646) and $1,626 (90% CI, $607 to $3,073) for the enhanced model. The aggregated annual cost of illness was $51.0 billion (90% CI, $31.2 to $76.1 billion) and $77.7 billion (90% CI, $28.6 to $144.6 billion) for the basic and enhance model respectively (Scharff, 2011).

The difference in cost estimates between Hoffmann et al. (2015) and Scharff (2011) were primarily due to two factors: the number of pathogen-specific diseases included and the valuation methods employed. The source of greatest difference between the two estimates revolves around the inclusion of estimates for unknown pathogens that caused FBI. Scharff (2011) basic and enhance estimates included the costs associated with 30 known and all unknown pathogens, while Hoffmann et al. (2015) estimates included the costs of illness attributable to 15 known pathogens. According to Hoffman and Anekwe (2013), illnesses due to pathogens of unknown origin are estimated to cause 80% of all foodborne illness. In terms of included expenses, Scharff's (2011) basic estimates includes lost wages for parents of sick children as well as for employed victims of illness, while Hoffmann et al. (2015) estimates only captures productivity loss of employed victims of illness. Additionally, the Scharff (2011) enhanced model include estimates for monetized quality-adjusted life years (QALYs) which is not used by Hoffmann et al. (2015).

Chapter 3: Review of Literature - Product Liability Law, Economics, and Insurance

3.1 Origins of Product Liability

First considered another branch of negligence in tort law, modern product liability law evolved into a body of law unto itself through case law development (Zollers et al. 2000). In the United States product liability finds its roots in the English common law and the principles of *caveat emptor* "let the buyer beware" and privity of contract. Under *caveat emptor*, sellers were not responsible for product defects and buyers bore the risk for product related injuries (Shepherd, 2013). Consumers had no recourse for injuries sustained from either obvious or hidden defects in the products they consumed until the Uniform Sales Act of 1906 compelled an implied warranty of quality that made sellers responsible for many product defects (Shepherd, 2013). Despite the implied warranty of quality requirement, however, manufacturers were still able to avoid liability by invoking privity of contract (Shepherd, 2013). Consistent with realities of the pre-industrialized economy, this doctrine required the manufacturer and injured party be in a face-to-face contractual transaction for a product liability claim to be valid (Zollers et al. 2000). Before they could receive compensation an injured party still had to prove that the manufacturer did not take reasonable care in producing the product and their lack of care caused the subsequent injuries (Zollers et al. 2000).

The advent of the industrial era ushered in important liability changes. The case of MacPherson v. Buick Motors (1916) saw the disappearance of the privity requirement and laid the foundation of modern product liability law (Shepherd, 2013). This case created the rule of manufacturers' negligence where a duty of care is expected of a manufacturer as it relates to injury that is reasonably foreseeable (Rogers, 1996).

Beginning in the 1960s, the explosion of punitive damages resulting from increased product liability trails and awards significantly changed the balance of power between manufacturers and consumers. In time this power shift led to the call for reform from business community, insurance industry, the judiciary, politicians and legal academics to limit the amount of punitive damages being awarded (Rustad, 1992) that would reduce business exposure to liability and limit the avenues of recovery for injured plaintiffs (Zollers et al. 2000). Ultimately, this led to a restatement[13] of product liability law in 1997 by the American Law Institute.

3.2 Products Liability and Foodborne Illness

Prior the passage of food safety laws at the turn of the 19th century, product liability lawsuits predominantly involved (non-food) consumer products. With the passage of time, however, litigation involving the food industry became more prevalent. The case of Donaldson v. Great Atlantic & Pacific Tea Company (1938), and Klein v. Duchess Sandwich Company (1939), are two of the earliest cases involving food poisoning. However, these were not isolated cases. Schultz (1981) cites several examples of product liability litigation between 1930 and 1969 involving the presence of foreign objects in food products that cause injuries to unsuspecting consumers

Under current law, a person injured by a defective product that is unreasonably dangerous or unsafe may have a claim or cause of action under product liability law. The injurer may be

[13] The Restatement of the Law Third, Torts: Products Liability addressed contemporary issues that became points of serious contention. It created three categories of product defects: manufacturing, design, and inadequate instructions or warnings and advocated that plaintiffs make a unified claim of product defect instead of separate claims for negligence, breach of warranty, and misrepresentation. It also eliminated the consumer expectation test and now requires the plaintiff to provide a reasonable alternative design to the product in question (Owen, 1998).

liable to the injured person for his or her medical costs and related expenses, lost income, pain and suffering, and may be required to pay damages. In the case of FBI, legal action may be pursued against firms that produce, process, distribute, cook, or sell the food product that allegedly caused the illness. Hensler et al. (1991) notes that an injured person could attempt to obtain compensation by directly contacting the injurer, the injurer's insurer, consulting an attorney about pursuing litigation, or some combination of these actions. A claim is any effort by an individual or group to obtain compensation for injuries or illness suffered (Busby et al. 2001).

Claims involving litigation, the nature and extent of compensation depends on the jurisdiction within which the claim is based. Liability law falls within the jurisdiction of individual states. Since there is no uniform or comprehensive Federal law governing product liability in the U.S., many states have enacted comprehensive product liability statutes. In most jurisdictions a person injured by a product may base his or her recovery of damages on one of three legal arguments: strict product liability, negligence, and breach of express or implied warranty.

Strict Product Liability is liability without fault for an injury caused by a product that is defective and not reasonably safe (Stearns, 2001). When the cause of action is strict liability, the focus of the case is on the product rather that the conduct of the injurer since it does not matter whether the manufacturer took every possible precaution. As a result, strict liability applies to manufacturing defects, design defects, and a failure to warn. It must be noted, however, while some states apply strict liability to everyone in the supply chain of production to distribution, many states now protect retailers from strict liability unless the injurer can prove the retailer was negligent (Stearns, 2001).

Busby et al. (2001) notes that strict liability is usually unsuccessful in FBI litigation since

the courts recognize that most foods cannot be made risk free. For example, ciguatera is an illness caused by Ciguatoxin found in reef fish; it cannot be detoxified through conventional cooking because it is heat resistant (Swift and Swift, 1993). Similarly, *Campylobacter* is a naturally occurring bacterium found in poultry and may contaminate poultry products (Busby et al. 2001). Consumers that voluntarily consume certain foods despite being aware of known health risks are deemed responsible and do not have any grounds for legal recourse (Busby et al. 2001). For example, consuming raw fish found in sushi, or unpasteurized milk or juice is generally understood to increase the risk of FBI. In the case of restaurants, patrons are not responsible for microbial contamination since they have little control over food preparation; they are, however, expected to take reasonable care in examining their food for obvious physical hazards (Busby et al. 2001).

Negligence is the failure to exercise ordinary care regarding the fitness of a product. Ordinary care is the level of care that a reasonable person would take based on known circumstances to avoid injuries (Stearns, 2001). A defendant that fails to exercise reasonable care in producing, marketing, or selling food products that causes FBI is considered negligent (Busby et al. 2001). In proving a defendant is negligent, a plaintiff must prove three elements: (1) the defendant had a legal duty to exercise "reasonable care" in producing, growing, handling, storing or transporting the food product and to warn all users of foreseeable dangers; (2) the defendant failed to perform this duty; and (3) the defendant's failure to perform this duty caused the plaintiff's injury (Harl, 1997; Connally, 2009; Stearns, 2001).

Case law outcomes suggest that manufacturers and processors of food and beverages are expected to exercise more than ordinary care in the preparation of food products. According to Schultz (1981), the presence of foreign objects in foods, or spoilage or contaminated foods are

interpreted as resulting from acts of negligence even though specific acts of negligence may not be proven.

Negligence due to failure to warn consumers arises when the manufacturer knows, or reasonably should know, of a danger arising from use of its products (Brannen and Daly, 2008), and insufficient warnings, instructions or labels accompany the product. For certain products, manufacturers are legally compelled to provide warning labels to alert consumers about potential dangers (Busby et al. 2001). For example, laws require labels warning of foreign objects in foods; instructions on safe handling and cooking of meat; and health warnings regarding raw milk and shellfish. Furthermore, the Food Allergen Labeling and Consumer Protection Act of 2004 requires that food labels to include a plain language listing if they contain common food allergens[14] (FDA, 2015e).

In addition, a plaintiff may pursue a "negligent per se" cause of action if the defendant violates a statue or regulation designed to prevent the type of illness or injury suffered by the plaintiff (Connally, 2009). Defendants could be automatically liable if it can be proven that they deviated from Good Food Safety Practices[15] that follow food safety and health practices (Connally, 2009). For example, in the food processing industry, not adhering to Hazard Analysis and Critical Control Points (HACCP)[16] practices provides suitable grounds for pursuing a negligent per se cause of action (Connally, 2009). Busby et al. 2001 noted that a firm that has not implemented a HACCP plan, or failed to follow its own internal rules, standards, or procedures,

[14] Common food allergens, which require labeling, include soy, egg, dairy, wheat, fish, shellfish, tree nuts and peanuts (FDA, 2015e).
[15] Guidance for Industry; Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables; Good Agricultural Practices (GAPs), Good Manufacturing Practices (GMPs) and Hazard Analysis and Critical Control Points (HACCP).
[16] HACCP is a systematic, preventative, approach to food safety that requires formalized food safety and sanitation programs to be implemented with documentation supporting that they are being followed.

is at risk of a negligent per se claim.

Breach of Warranty under the Uniform Commercial Code (UCC) provides a warranty of merchantability that applies to food sold. A plaintiff may claim breach of warranty in a FBI case if the food did not confirm to an express or implied warranty (Connally, 2009). An express warranty can be created by an affirmation of fact made by the seller to the buyer that becomes part of the basis of bargain and is not mere puffery (Stearns, 2001). In the food industry, such affirmation of fact may be as a result of representations made about the food, pictures, or writing on food packages, menus or advertisement that persuades consumers to buy the food (Busby et al. 2001). If a food firm misrepresents these facts, the warranty is breached. For example, a food firm that advertises that its poultry is free from *Campylobacter* when in fact it is not (since it is difficult to eliminate naturally occurring bacteria) would amount to a breach of express warranty.

An implied warranty is presumed to exist, and requires food to be both merchantable and fit for consumption (Busby et al. 2001). Merchantability requires the product to fit the ordinary purposes for which it was sold and assures that it is reasonably safe for consumption. For example, hamburger meat is merchantable because its ordinary purpose is for human consumption after it is properly cooked at a specific temperature, for a specific time, to ensure traces of *E. coli* and other bacteria are destroyed. Implied warranty of fitness requires the product be suitable for a particular purpose, and the buyer relies on the seller's judgment or knowledge in selecting a suitable product. A plaintiff is not required to show that a food supplier was negligent or at fault to recover damages under the implied warranty argument; instead, a plaintiff must only prove that the seller sold a non-confirming product and that the non-conformance caused the plaintiff's injury (Busby et al. 2001).

3.3 Foodborne Illness and the Burden of Proof

The burden of proof in the law of evidence refers to the necessity or duty of affirmatively proving a fact or facts in dispute on an issue raised between the parties in a cause (Black's Law Dictionary, 2009). The burden of proof is often portrayed as comprising of two distinct but related concepts: the burden of production, and the burden of persuasion. In civil cases, the burden of production refers to the plaintiff's ability to produce sufficient evidence to support a particular claim, while the plaintiff's burden of persuasion is demonstrated by a preponderance of evidence (showing that it is more likely than not that an injury was caused by a specific condition; Legal Information Institute, 2015a).

In product liability litigation, the burden of proof rests with the plaintiff. As such, plaintiff(s) must prove that the product was defective and unreasonably dangerous when it left the food firm's control and that the defect was the proximate cause of the plaintiff's injury (Harl, 1997). Proximate or actual cause refers to a factor without which a result in question could not happen (Legal Information Institute, 2015b). Thus, proximate cause seeks to link a specific food product to the FBI or injury claimed.

Central to showing proximate cause is the concept of causation. Plaintiff(s) in FBI lawsuits must show that the food in question caused rather than was simply correlated with their illness. In the absence of specific evidence of causation, plaintiff(s) often fail to show that the food in question had directly and proximately caused their illness and as such usually results in the plaintiff(s) failing to meet the burden of proof that their FBI was attributable to food produced by the defendant firm.

3.4 Economic Impact of Product Liability Law

The economic impact of product liability law is far reaching in terms of overall costs and benefits to society. A key function of product liability law is that it compensates consumers for injuries resulting from defective products with the aim of restoring them to their pre-injury condition. Shepherd (2013) argued that manufactures and producers are in a better position than consumers to bear the compensatory burden since they can spread the costs of compensation over an array of products. However, this may not always be the case for manufacturers of a single product or component.

Product liability law may also contribute to overall product safety. Since manufacturers and others in the food supply chain are held liable for harm caused by defective products, it gives them financial incentives to reduce or eliminate risky products (Shepherd, 2013). As a result, more care may be taken during design, manufacture, marketing and distribution of products. In the end, manufacturer risk is reduced, and consumers benefit from safer products in the marketplace. Similarly, product liability law benefits uninformed consumers by reducing socially undesirable purchase of risky products (Shepherd, 2013).

The economic costs of product liability law are also important. Product liability law in some ways enhances and in some ways undermines economic efficiency (Garber, 1998). Product liability law may limit the impact of market failure resulting from inadequate consumer knowledge of risk (Viscusi, 2012). By setting an adequate level of product risk for uninformed consumers, economic efficiency may be enhanced (Hylton, 2013). At the other end of the spectrum, economic efficiency may be undermined by inducing excessive increases in safety (Garber, 1998) that result in a higher per unit product costs for a product (Viscusi, 2012). In addition, Shepherd (2013) argued that product liability law can reduce economic activity through

impacts of production, employment, innovation and business openings. Due to the risk of litigation, manufacturers and others is the food supply chain have reduced incentive to engage in activities including research and development that could potentially benefit society but also increase risk (Garber, 1998).

Product liability law may also impact product prices and product availability (Herbig and Golden, 1992; Garber, 1998). Concerns over litigation may lead manufacturers and producers to withdraw relatively safe products from the marketplace. In addition, product liability law impacts transaction and information costs (discussed in Section 3.5), insurance premiums and may impact a firm's overall competitiveness.

3.4.1 Market Forces

Market forces can provide food firms with an incentive to improve product quality and overall safety. Although product liability can induce firms to improve product safety, firms are often motivated by market forces to enhance product safety because sales can decline if their products harm consumers (Polinsky and Shavell, 2010). By way of example, in the case of juice manufacturer Odwalla, sales of natural juices declined by 90 percent in 1996 due to *E. coli* bacteria contained in some of its products (Polinsky and Shavell, 2010). Following the FDA advisement against eating fresh and bagged spinach, U.S. spinach producers experienced a loss of sales following an *E. coli* outbreak in 2006 (ERS, 2012). Thus, the threat of lost sales has led to a market driven effort to provide safe food (ERS, 2012)

The economic consequences of FBI go far beyond the mere loss sales. Busby et al. (2001) noted that "firms risk losing business reputation, market share, and sales revenue if consumers become concerned about safety problems with a firm's products." Further, Thomsen

and McKenzie (2001) found that firms that voluntarily recalled contaminated meat and poultry products suffered a decline in long-term profitability that translated into falling stock prices, and Hussain and Dawson (2013) report that lost markets and loss of consumer demand can lead to business closure. High profile cases of FBI have resulted in significant decline in sales of agricultural products and thus caused some firms to go out of business (ERS, 2012).

The impact of food supply failures can also extend to similar firms, those up-or downstream in the supply chain or in related industries (Carrol, 2009). Contaminated ingredients used in the manufacture of other products can create a domino effect of recalls and sales losses. For instance, the deadly outbreak of *Salmonella* at the Peanut Corporation of America (PCA) in 2009 not only resulted in discontinued operations, bankruptcy and criminal convictions, but also led to significant losses to other companies. Crackers and cookies produced by Kellogg contained a peanut paste ingredient purchased from PCA and resulted in Kellogg incurring $70 million in recall-related losses (Hussain and Dawson, 2013). Forward Foods, the maker of Detour brand energy bars contained roasted peanuts purchased from PCA, ultimately declared bankruptcy due to this incidence (Bathon, 2009).

Food firms whose products are wrongly implicated in FBI outbreaks may also suffer lost reputation and financial loses linked to recalls and consumption changes. The domestic strawberry industry was twice affected (1996, 1998). Prevor (2007) noted that strawberries were wrongly implicated in *Cyclospora* and Hepatitis A outbreaks which were later traced to imported raspberries and strawberries respectively. Both cases resulted in lost sales and the industry's reputation being damaged (Prevor, 2007). Similarly, a 2008 *Salmonella* outbreak that was ultimately linked to fresh jalapeno and serrano peppers initially implicated and detrimentally impacted the tomato industry (Schnirring, 2008).

3.4.2 Profit Motive, Costs Savings, and Food Safety

Economic theory suggests that firms seek to maximize profits. Profit maximization entails identifying the most efficient and effective way of obtaining the highest rate of return from the goods and services produced within the legal and ethical mores of the community (Primeaux and Stieber, 1994).In their efforts to maximize profits, managers in the food industry have an incentive to experiment with, or modify, aspects of a firm's operation with the aim to minimize costs. These actions, however, may conflict with overall food safety. For instance, changes to food preparation, preservation and storage practices, training or sanitation procedures, or equipment maintenance may reduce a food manufacturer's operating expenses. Such initiatives, however, also may reduce in food quality and safety.

Measures to improve a firm's bottom-line must balance with maintaining the desired level food safety. Demonstrating that a firm was driven by profit motives while overlooking the risk associated with its products may enhance a plaintiff's claim at trial. This can be reflected in a firm's failure to perform basic due diligence, use safe ingredients, conduct reasonable inspections, and above all, take corrective measures when (potential) problems are identified. Robinson and Calcagnie (2015) noted that evidence showing a defendant that failed to alter its conduct despite substantial risk of harm, demonstrates a willful and conscious disregard for safety.

3.4.3 Foodborne Illness and Innovation

Central to a discussion of food safety is the role of innovation. Today, concerns over FBI have prompted increasingly aware and health conscious consumers to demand greater protection against food health risks. This market pressure, coupled with changes in government regulations

and competitive pressure, has forced firms throughout the food industry to continually innovate and embrace new technologies.

Innovation is described as all scientific, technological, organizational, financial and commercial activities needed to implement a new or significantly improved product or process (OECD, 2005). While food safety innovation may occur anywhere along the food supply chain, most commonly products, processing and packaging innovation are undertaken. Product innovation is the introduction of a product that is new or significantly improved with respect to its characteristics or intended uses, and provides consumers better matches for their particular taste and preferences thus leading to improved social welfare (Golan et al., 2004). In the food industry, common types of product innovation may include fortifying foods with added nutrients, reducing sugar, salt and fat content (Desmarchelier and Szabo, 2008).

Process innovation involves the implementation of a new or significantly improved production or delivery method (OECD, 2005).[17] Advances in processing technology often leads to a more convenient and efficient food production that in turn, contributes to higher quality and safety levels. The meat industry provides several useful examples. The Beef Steam Pasteurization System (BSPS) is a technology designed to kill pathogens on the exterior of beef carcasses through the application of steam and icy water (Roberts and Salay, 2005). Similarly, Beef Products Inc. (BPI) developed a processing cycle that drastically elevates the pH (a measure of acidity) in ground meat products by adding a minute amount of ammonia hydroxide to help reduce pathogens (Langman, 2002). In these examples, process innovation helps reduce pathogens and thus contributes to safer food products.

[17] Product and process innovation are closely related concepts in that technological advances in processing usually lead to safer and better quality foods. There is no clear distinction between product and process innovation for food safety (Golan et al. 2004).

Food-processing technology relating to traditional thermal processing has also resulted in such developments as commercial sterilization, quality preservation, shelf-life extension and safety enhancement (Han, 2005). In addition many other thermal and non-thermal processing technologies have been developed in recent years including irradiation, high-pressure processes, pulsed electric fields, UV treatments and antimicrobial packaging (Han, 2005). The use of these innovations may not only lower food firm's production costs but also contribute to overall food safety.

Advances in packaging technology also play an important role in food safety. Traditionally, packaging innovation centered on preventing quality deterioration and facilitating marketing. Contemporary food packaging innovation can also contribute to extending shelf-life and maintaining quality and safety of food products through technology such as oxygen scavenging, carbon dioxide absorbing, moisture scavenging and antimicrobial systems (Han, 2005). These technologies prevent the growth of aerobic bacteria, mold, and thus defer spoilage. In addition, casting and coating technologies in the form of edible films and coatings formulated with natural antibacterial oils (McHugh and Avena-Bustillos, 2011) may be used to enhance the quality of food products by protecting them from the natural atmosphere and microbial growth.

In addition, advances in sanitation, antimicrobial, and hygiene driven technology also contribute to overall food safety; this is especially true in the food service industry. Antimicrobial solutions can be used to treat the surfaces of food service equipment such as refrigerators to protect against single cell organisms, while heat treatment technologies can sanitize food-processing machines (Levin, 2006). Touch free hand washing systems can also help prevent FBI by reducing the risk of cross contamination (Levin, 2006).

3.4.4 Food Safety Laws and Regulations

In the United States, food safety regulations exist at the federal, state and local levels. At the federal level, responsibility for food safety is shared by more than 15 federal agencies (Knechtges, 2012). In particular, agencies under the United States Department of Agriculture (USDA), and the Department of Health and Human Services (HHS), have primary responsibility for the safety of the nation's food supply. The USDA, through the Food Safety and Inspection Service (FSIS), Animal and Plant Health Inspection Service (APHIS), Grains Inspection, Packers and Stockyards Administration (GIPSA) and Agricultural Marketing Service (AMS) is responsible for the inspection and quality of meat and meat products, poultry, dairy products, eggs and egg products, grains, fruits and vegetables shipped across state lines. In addition, the Agricultural Research Service (ARS), Economic Research Service (ERS), National Agricultural Statistics Service (NASS) and Cooperative State Research, Education and Extension Service (CSREES) are responsible for supporting and or conducting research, education and economic analysis concerning food safety (GAO, 2005). Under HHS, the Food and Drugs Administration (FDA) is responsible for all domestic and imported food products with the exception of meat, poultry and processed egg products, while the Center for Disease Control and Prevention (CDC) is responsible for protecting the nation's public health through, among other programs FBI surveillance. Table 3.1 presents a summary of U.S. federal government agencies responsible for food safety.

Table 3.1. U.S. Federal Government Agencies Responsible for Food Safety

Department	Agency	Area of Responsibility Related to Food Safety
U.S. Department of Agriculture (USDA)	Food Safety and Inspection Service (FSIS)	Inspect domestic and imported meat, poultry, and processed egg products
	Animal and Plant Health Inspection Service (APHIS)	Protect the health and value of U.S. agricultural resources (e.g., animals and plants)
	Grain Inspection, Packers and Stockyards Administration (GIPSA)	Establishing quality standards, inspection procedures, and marketing of grain and other related products
	Agricultural Marketing Service (AMS)	Establish quality and condition standards for dairy, fruit, vegetable, livestock, meat, poultry, and egg products
	Agricultural Research Service (ARS)	Conduct food safety research
	Economic Research Service (ERS)	Provide analyses of the economic issues affecting the safety of the U.S. food supply
	National Agricultural Statistics Service (NASS)	Provide statistical data, including agricultural chemical use data, related to the safety of the food supply
	Cooperative State Research, Education and Extension Service (CSREES)	Support food safety research, education, and extension programs in the land-grant university system and other partner organizations
U.S. Department of Health and Human Services (DHHS)	Food and Drug Administration (FDA)	Inspect domestic and imported food products except meat, poultry, or processed egg products
	Centers for Disease Control and Prevention (CDC)	Protect the nation's public health, including foodborne illness surveillance
U.S. Department of Commerce (DOC)	National Marine Fisheries Service (NMFS)	Voluntary, fee-for-service examinations of seafood for safety and quality
U.S. Environmental Protection Agency (EPA)		Regulate the use of pesticides and maximum allowable residue levels on food commodities and animal feed
U.S. Department of Treasury (DOT)	Alcohol and Tobacco Tax and Trade Bureau (ATTTB)	Enforce laws covering the production, use, and distribution of alcoholic beverages

Source: Knechtges, 2012.

The authority and responsibilities of these agencies are rooted in multiple federal laws, which were frequently enacted in response to historical food safety concerns. Upton Sinclair's 1906 novel "The Jungle" exposed health violations and insanitary conditions at U.S. meat packing plants in Chicago and initiated a transformation of the industry (PBS, 2006). In response, the Pure Food and Drugs Act and the Meat Inspection Act of 1906 were passed, and

are the earliest examples of U.S. national consumer food protection legislation (FDA, 2014c). The Pure Food and Drugs Act prohibited interstate commerce of misbranded and adulterated foods, drinks, and drugs, while the Meat Inspection Act required the inspection of all meat processed for interstate shipping (FDA, 2014c). In response to growing concerns over public health and safety, the Federal Food, Drug and Cosmetic Action of 1938 included additional provisions that prevented deleterious, adulterated or misbranded articles entering interstate commerce (Marler, 2009). Since the late 1930s, several additional laws addressing a myriad of food safety concerns ranging from pesticide residues to food and color additives have been passed.[18]

Mounting concerns over FBI outbreaks in the last two decades, led to the enactment of the Food Safety Modernization Act (FSMA) of 2011. The overall goal of FSMA is to achieve higher rates of compliance with preventative and risk-based food safety standards and to better respond to and contain food safety problems as they occur (FDA, 2015f). In doing so, FSMA offers the most comprehensive food safety legislation in the U.S. to date. The law enables the FDA to better protect public health through the strengthening of the food safety system by focusing more on preventing food safety problems rather than reacting to them. As a result, FSMA provides the FDA with new enforcement authorities, regulatory oversight over aspects of how food is grown, harvested and processed, and authority to ensure that imported foods are held to the same standards as domestically produce food (FDA, 2015f).

Among the greatest extension of FDA responsibility granted under FSMA is that it permits the inspection of a food firm's records if there is reasonable probability of serious health

[18] Examples: The Federal Food, Drug, and Cosmetic Act of 1938; Fair Packaging and Labeling Act of 1966; Federal Meat Inspection Act of 1967; Wholesome Poultry Products Act of 1968; Eggs Product Inspection Act of 1970; Food Quality Protection Act of 1996 etc.

consequences or death (Ribera and Knutson, 2011), and grants the FDA mandatory recall authority for contaminated food. FSMA also establishes whistleblower protection for employees of entities involved in the manufacturing, processing, packing, transporting, distribution, reception, holding or importation of food (Ribera and Knutson, 2011). Furthermore, FSMA directs the FDA to build an integrated national food safety system in partnership with state and local authorities.

State and local food safety regulations and programs are largely designed to complement federal regulations. For food items that are not shipped across state lines, responsibility for food quality and safety rests largely with the state Departments of Agriculture. In addition, some states operate food safety programs that focus exclusively on particular types of foods. For instance, 27 states operate meat and poultry inspection programs while three states operate meat only inspection programs (National Conference for State Legislatures, 2015). Similarly, states that are major producers of fresh fruits and vegetables have state programs that test produce for pesticide residues. Further, state Departments of Health plays a crucial role in FBI surveillance activities and investigate reported FBI outbreaks, thus contributing the overall traceability efforts. According to the National Conference for State Legislatures, more than 80% of food establishment inspections and food product testing for bacteriological or chemical contamination are done under state and local government food safety programs (NCSL, 2015). Table 3.2 presents a list of state Departments of Public Health and Agriculture with responsibility for food safety.

Table 3.2. State Departments of Public Health and Agriculture Responsible for Food Safety

State	Public Health	Agriculture
Alabama	Department of Public Health	Department of Agriculture and Industries
Alaska	Health and Social Services	Division of Agriculture
Arizona	Department of Health Services	Department of Agriculture
Arkansas	Arkansas Department of Health	Agriculture Department
California	Department of Health Services	Department of Food and Agriculture
Colorado	Colorado Department of Public Health and Environment	Department of Agriculture
Connecticut	Department of Public Health	Department of Agriculture
Delaware	Division of Public Health	Department of Agriculture
District of Columbia	Department of Health	–
Florida	Department of Health	Department of Agriculture and Consumer Services
Georgia	Division of Public Health	Department of Agriculture and Industries
Hawaii	State Department of Health	Department of Agriculture
Idaho	Department of Health and Welfare	State Department of Agriculture
Illinois	Department of Public Health	Department of Agriculture
Indiana	State Department of Health	State Department of Agriculture
Iowa	Department of Public Health	Department of Agriculture and Land Stewardship
Kansas	Department of Health and Environment	Department of Agriculture
Kentucky	Cabinet for Health and Family Services	Department of Agriculture
Louisiana	Department of Health and Hospitals	Department of Agriculture and Forestry
Maine	Center for Disease Control and Prevention	Department of Agriculture, Food and Rural Resources
Maryland	Department of Health and Mental Hygiene	Department of Agriculture
Massachusetts	Department of Public Health	Department of Agricultural Resources
Michigan	Department of Community Health	Department of Agriculture
Minnesota	Department of Health	Department of Agriculture
Mississippi	State Department of Health	Department of Agriculture and Commerce
Missouri	Department of Health and Senior Services	Department of Agriculture
Montana	Department of Public Health and Human Services	Department of Agriculture
Nebraska	Department of Health and Human Services	Department of Agriculture
Nevada	Health Division	Department of Agriculture
New Hampshire	Department of Health and Human Services	Department of Agriculture, Markets, and Food
New Jersey	Department of Health and Senior Services	Department of Agriculture
New Mexico	Department of Health	Department of Agriculture
New York	Department of Health	Department of Agriculture and Markets
North Carolina	Department of Health and Human Services	Department of Agriculture and Consumer Services
North Dakota	Department of Health	Department of Agriculture
Ohio	Department of Health	Department of Agriculture
Oklahoma	State Department of Health	Department of Agriculture, Food &

		Forestry
Oregon	Public Health Division	Department of Agriculture
Pennsylvania	Department of Health	Department of Agriculture
Rhode Island	Department of Health	Division of Agriculture
South Carolina	Department of Health and Human Services	Department of Agriculture
South Dakota	Department of Health	Department of Agriculture
Tennessee	Department of Health	Department of Agriculture
Texas	Department of State Health Services	Department of Agriculture
Utah	Department of Health	Department of Agriculture and Food
Vermont	Department of Health	Agency of Agriculture, Food and Markets
Virginia	Department of Health	Department of Agriculture and Consumer Services
Washington	State Department of Health	State Department of Agriculture
West Virginia	Department of Health and Human Resources	Department of Agriculture
Wisconsin	Department of Health and Family Services	Department of Agriculture, Trade and Consumer Protection
Wyoming	Department of Health	Department of Agriculture

State Departments of Public Health and Agriculture (2015).

While the 1967 Federal Meat Inspection Act and the 1968 Wholesome Poultry Products Act prohibits some state-inspected meat products (beef, poultry, pork, lamb and goat) from being sold in interstate commerce, there is no equivalent restriction on the sale of other state-inspected meats. Apart from a voluntary, fee-based inspection offered by FSIS, meats such as venison, pheasant, quail, rabbit and alligator may be shipped across state lines without federal inspection. Other food commodities such as milk, dairy products, fruits, vegetables, fish, shellfish, and complex canned products fall under state jurisdiction and can be marketed across the U.S. (NCSL, 2015).

At the local level, food safety efforts are focused on restaurants and other retail food establishments. There are more than 3000 state, local and tribal agencies that have primary responsibility to regulate the retail food and foodservice industries in the U.S. (FDA, 2015g). While most foodservice regulations are written by state agencies with guidance from the FDA Food Code, local health departments facilitate enforcement of such regulations. These

regulations often require inspection by city, county, or state inspectors to ensure that local food establishments are in compliance with building design, construction, and maintenance of buildings, cleaning and sanitation, utilities and waste management services, equipment and utensils, food handling best practices, and food handler certification regulatory requirements (Fraser, 2003).

3.4.5 Insurance and Foodborne Illness

As consumers tend to be risk averse, frequently they obtain insurance to provide financial support in the event of an accident, injury or illness. The insurance industry is a key stakeholder in impacting consumers' propensity to pursue litigation. Although product liability law permits compensation of product-related accident victims, this benefit is only partial since insurers frequently compensate victims (Polinsky and Shavell, 2010). Private or public insurance may cover a variety of expenses such as medical, disability, loss of life, and property damage resulting from accidents, including those related to products. In addition, individuals benefit implicitly from public insurance against accidents through the ability to deduct causality losses and medical expenses from taxable income. Polinsky and Shavell (2010) contend that such deductions themselves function as insurance because they reduce the loss that a person suffers from an accident.

The collective impact of private and public insurance coverage has led to a considerable decline in out-of-pocket health care spending. In 1987, out-of-pocket payments by patients amount to 56% of all national health care expenditures (Levit and Freeland, 1988). As of 2013[19], out-of-pocket expenditures were found to account for 12% of U.S. national health care

[19] 2013 is the last year data was available.

expenditure; this value is projected to fall to 9.1% by 2022 (Center for Medicare and Medicaid Services, 2015). Busby et al. (2001) point out that since the majority of health care costs are cover by third party payers, consumers have reduced incentive to pursue legal claims.

While private and public health care insurance can provide coverage for medical costs incurred by consumers during times of illness, product liability insurance may provide coverage to risk averse firms whose products enter the marketplace as part of their risk management strategy (Shapiro (1991); Busby et al. (2001). To mitigate the risk associated with product liability, manufacturers, wholesalers, retailers, restaurants, bottlers, packagers and any firm involved in products reaching the public procure product liability insurance. Development of product liability insurance protection began to rise to prominence in the late 1930s due to the development of modern tort principal of products liability and with the passage of time evolved as means of managing the costs of lawsuit risks (Harvey, 1980).

Coverage through an insurance policy does not guarantee a reduction in exposure to financial, legal and other risks. General farm liability coverage for fresh produce growers does not cover foodborne illness since injuries occur off the farm premises (Hamilton 1999). Connally (2009) stressed the importance of determining if claims from FBI are covered by a particular policy and, if so, whether the insurance coverage is sufficient to satisfy potential risks. Regardless of this care, manufacturers and other food firms often seek to further insulate themselves against lawsuits. Clark (2000) as cited by Busby et al. (2001) indicated that large corporations typically have layers of excess insurance that is reinsured allowing them to recoup the majority of any losses they incur. In addition, insurance companies are usually duty bound to defend and indemnify their clients assuming claims are within the scope of the policy (Connally, 2009). An insurance company provides a legal defense (at their own cost), and pays any resultant

settlement or judgment when a company is sued. Thus, the option to pursue litigation and any settlements is determined by the insurer and not the defendant (Clark, 2000).

Increasing consumer awareness of safety and quality has led to a recent increase in liability claims against manufacturers in the consumer products and food industries (Kertesz, 2012). Contractual requirements are being used to bolster the use of food safety related insurance. Connally (2009) and Boys (2013), for example report that an increasing number of upstream buyers (processors, packagers and distributers) are now requiring food suppliers to carry food product liability insurance (FPLI) to provide them an additional layer of protection in the event of a food product safety incident.

Despite its importance, the information available to assess FBI risk, and thus determine appropriate insurance premiums, is limited. Busby et al. (2001) suggested that comprehensive information on product liability insurance in the food industry is not readily accessible due, in part, to the highly competitive nature of the industry which causes data about premiums and claims paid to be market information. The lack of specific information may also be attributed to the difference in products and across firms. Since premiums are based on an insurers assessment of the risk posed by individual firms and their products, comparable information may be difficult to obtain. There is no standard rates for farm FPLI policies since premiums are often based on factors such gross sales, annual payroll, prior claims, level of coverage, characteristics of a specific product, the type of market, and whether they have a recall plan (Holland, 2007).

For those outside the insurance industry, insurance premiums paid for FPLI may be difficult to identify because this insurance product is usually bundled with general liability coverage. Based on data collected in 1998, Holland (2007) found that annual premiums for FPLI cost an average of $3000, and their cost ranged from $500 to $20,000 for a $1 million annual

policy. Boys (2013) also notes that there is a large amount of variability in premiums charged for FPLI. FPLI premiums are dependent on many factors including specific characteristics of the product, the firm, specific risk reduction and good agricultural practices adopted by the firm, and the channels through which the product is marketed.

Irrespective of the whether consumers are compensated by healthcare or liability insurance, there is little disagreement that insurance as a whole provides disincentives for firms to produce safer foods (Busby et al. 2001). Due to the lack of cost effectiveness, healthcare insurers rarely seek to recover medical costs from food firms responsible for infections (Busby et al. 2001). Due to the reluctance to recoup medical costs of patients diagnosed with FBI, the extent to which the food industry receives the appropriate signals to produce safer food (Busby et al. 2001) is limited. Similarly, liability insurance may provide a disincentive to produce safer foods since it provides compensation to consumers that either lack insurance coverage or whose coverage is substantially less than loses suffered. Disincentives are further amplified if insurers are involved in settlements before or during trials since this information is frequently required to be kept confidential and thus others cannot be made aware of a firm's previous food safety violations.

3.5 Transaction and Information Costs

Coase (1960) suggested that in a perfectly competitive marketplace where transaction costs are low, efficient outcomes would prevail. However, transaction and information costs in tort liability are seldom low enough to allow an efficient outcome between competing interests and as such, may be seen as an effective deterrent to pursuing lawsuits. High transaction and information costs create disincentives for plaintiffs to pursue lawsuits and/or decide to a settle

instead of exhausting considerable resources under a trial. Payments may be distorted since defendants may choose to settle wholly illegitimate claims simply because the costs of litigation exceed the settlement payments (Kozel and Rosenberg, 2004). Characteristics of transaction and information costs, and their impact on FBI lawsuit outcomes are examined below.

3.5.1 Transaction Costs

Transaction costs consist of legal, administrative, and third party expenses incurred by both plaintiffs and defendants. Transaction costs incurred by plaintiffs are primarily the costs of a product liability lawsuit and include legal fees, court-filing fees, expert witness fees, and costs relating to emotional stress, travel, lost productivity, and other costs incurred by the plaintiffs and their families as part of the preparation and appearance at trial (Busby et al. 2001). Expenditures to support the phalanx of lawyers, insurance adjusters, expert witnesses and law professors involved in the litigation process places a significant burden on the community (Ackerman, 1995). Shepherd (2013), concluded that the U.S. tort system has become an inefficient way to transfer money from injurers to victims. By comparison, in 1960, tort system transaction costs totaled $5.4 billion or $218 per citizen when adjusted for inflation (Shepherd, 2013). By 2009, tort system transaction costs totaled $248.1 billion or $808 per citizen (Shepherd, 2013).

For defendant firms, transaction costs include legal fees, expert witness fees and time lost from usual business activities due to discovery requests, rehearsal of employee witnesses and courtroom appearances (Busby et al. 2001). A litigation cost survey of major companies revealed that the average outside litigation cost per respondent increased from $66 million in 2000 to approximately $115 million in 2008 and average annual litigation costs as a percent of revenues

increased 78% over this period (Searle Center on Law, Regulation and Economic Growth, 2010). In addition, Discovery, which includes searching, retrieving, reviewing and producing electronic information, costs an average of $621,880 to $2,993,567 per case between 2006 and 2008 (Searle Center on Law, Regulation and Economic Growth, 2010).

Increasing transaction costs is a direct result of the increase in costs of legal representation (Shepherd, 2013). Inflation adjusted hourly rates of tort plaintiffs lawyers increases as much as 1400% between 1960 and 2001 (Brickman, 2003). A common measure of legal costs is the percentage of total payments made by the defendant that is retained by the plaintiff; a lower percentage indicates higher legal costs (Polinsky and Shavell, 2010). Several studies have explored this issue. Using the Commercial Liability Insurance Closed Claim database for the years 1988–2004, Herch and Viscusi (2007) observed that plaintiffs received fifty-seven cents for every dollar paid by defendants in tort litigation in Texas. A nationwide survey of the tort system by Tillinghast-Towers (2003) reported that victims received forty-six cents of every dollar paid by defendants.[20] In short, large transaction costs of the tort system and thus the product liability system is a very expensive way to compensate injury victims because a large portion of the money extracted from injurers by the tort process are consumed by the tort process itself (Galanter, 1996).

Despite these findings, however, the legal costs incurred by plaintiffs often depend on the fee arrangement between the plaintiff and his or her attorney. A common arrangement involves a contingent fee where the cost of legal representation is tied to outcome of the trial and any subsequent amount awarded. Cooter (1991) noted that plaintiffs routinely pay attorneys at least

[20] Polinsky and Shavell (2010) warn that some studies may over estimate the amount obtained by victims since the administrative costs of insurers, loss productivity of litigants and operating costs of the judicial system are not taken into account.

a third of any award or settlement. Under such arrangements, the attorney incurs the financial costs associated with filing and pursuing the lawsuit, and accepts the risk related to the outcome. In such situations, transaction costs directly incurred by plaintiffs may be limited to time lost from work and other disruption to daily activities (Busby et al. 2001). Fee arrangements are often based on an attorneys' assessment of the strength of the case; litigators are less likely to accept a case on a contingent fee basis if they believe that the case is weak or circumstantial, or if modest amounts were awarded in the past.[21] Alternatively, due to their assessment of the strength of the case, attorneys may accept a case on a fixed fee or an hourly rate basis. Such fee arrangements may burden plaintiffs especially in situations that require a consultation fee or an upfront deposit to file initial paperwork. Plaintiffs are often forced to reconsider legal action if they cannot afford to pay attorney fees and other costs relating to pursuing a lawsuit.

3.5.2 Information Costs

High information requirements of FBI lawsuits may also deter potential plaintiffs from pursuing legal recourse. Plaintiffs may lack the information needed to link an illness to the consumption of a food that was contaminated with a specific pathogen, and that this contamination was due to a specific action or failure. Further, assuming that plaintiffs are financially capable of acquiring information to support their claims, there is no guarantee that such information will be available. While there are more than 250 different foodborne diseases caused by a variety of bacteria, viruses and parasites (CDC, 2014a), tracking by the Foodborne Diseases Active Surveillance

[21] Busby and Frenzen (1999) found that the median compensation in FBI cases was only $2000 before legal fees.

Network (Foodnet) is limited to only nine foodborne microbes.[22] As a result, infection relating to a particular foodborne disease may go unreported if it is not being tracked.

The most important issue in FBI product liability litigation is that of causation. The outcome of a trial and any subsequent compensation is dependent on issues of causation that require detail and complete investigation. Even if plaintiffs are armed with detailed information regarding the source of their illness and the specific pathogen responsible, they may be unable to meet the burden of establishing causation due to evidentiary requirements and scientific limitations. Busby et al. (2001) note that plaintiffs usually employ an epidemiologist and other medical professionals to support their claims. In addition, in cases of outbreaks, food-pathogen linkages determined by local public health authorities and the CDC, may provide plaintiffs information needed to support their claims.[23] The challenge of identifying the specific cause of illness is compounded when victims may have consumed food from several sources.

Improvements in traceability practices have permitted more information to be available regarding common FBI pathogens. As a result, it is often easier to link food poisoning victim symptoms with information available for a particular pathogen and to link multiple victims to the same contaminated source. Further, while comparing symptoms of multiple victims with available information may not pinpoint a specific pathogen, it can serve to eliminate specific pathogens as a possible cause.

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[22] *Campylobacter*, *Listeria*, *Salmonella*, STEC O157, *Shigella*, *Vibro*, and *Yersina* since 1996; *Cryptosporidium* and *Cyclospora* since 1997; and STEC non-O157 since 2000.

[23] Public health authorizes are often called upon to give a deposition or testify in court regarding the findings of food safety related investigations. Rosenbaum (2000) as cited by Busby et al. (2001) note that such evidence is provided as part of their jobs, and that conflict of interest prevents then from being expert witnesses. However, other public health officials who are far removed from the investigation may be used as expert witnesses (Rosenbaum, 2000).

Imbalanced access to information (Bell, 1990) and informational barriers (Hersch and Viscusi, 2010) also hinder potential plaintiffs. While implicated firms learn about injuries through consumer complaints, consumers are often not aware of other victims' injuries unless they are widely publicized. Draper (1994) noted that evidence that other people became ill after eating the same food can lay the foundation for proving the food was unwholesome. The defendant often controls access to information required to document liability claims because such information may be internal to the firm, or because the firm has a vested interest in the implicated product (Hersch and Viscusi, 2010). In addition, confidentiality agreements can enable defendants to hide information regarding previous FBI complaints, reports and settlements. The very nature of such agreements deprives potential plaintiffs, which may help establish causation.

Other information cost challenges stem from the difficulty in quantifying and predicting costs. Information about medical expenses and the costs of lost productivity may help support a plaintiff's claim (Busby et al. 2001). However, such information may be difficult to estimate especially when the victim is a child that may require long-term care, and/or may never be able to work. Information regarding the costs of preventative measures that could have been adopted by defendants could demonstrate a lack of due care (Viscusi, 1989). Generating the information needed to prove causation may lead to significant information costs for potential plaintiffs. Information available through public research groups, media or public health authorities that investigate outbreaks may help lower this expense (Busby et al. 2001).

Viscusi (1989) argued that high transaction and information costs of tort liability lead to an underproduction of health and safety in the United States. Busby et al. (2001) relate that a similar case can be made for FBI since high transaction and information costs often discourages

victims of FBI from seeking restitution through the courts. Both circumstances limit the feedback food firms receive and cause them to be rarely penalized for producing unsafe food. Consequently, food firms are less incentivized to adopt better operational practices and they may be generating sub-optimal levels of food safety.

Chapter 4: Data and Methods

One purpose of this research is to offer insight into the impact of specific case attributes on the probability of a plaintiff winning and any subsequent amount awarded in jury settled FBI cases. The discussion that follows presents the underlying theoretical and empirical framework that will be used to explore the relationship between case attribute characteristics of the defendant and plaintiff and trial outcomes. First, an overview of the underlying theory and a theoretical model is presented. The data source, the data collection process, and coding and construction of each variable are then presented. The final section presents the Heckman two-step model, which is used for data analysis.

4.1 Theoretical Model

There are many factors that influence the outcome in product liability lawsuits. The existence of these factors individually or collectively may determine the outcome of trials, and may be the basis on which firm penalties are determined. Supported by case law, Robinon and Calcagnie (2015) identified several categories of proof that increase the probability of successful outcomes and the award of punitive damages in product liability lawsuits: proof of defect, proof of causation, proof of notice, proof of feasibility of safer alternate designs, and proof of conscious disregard for safety. Within these broad categories, defendant factors such as corporate knowledge concerning potential injury or death resulting from a particular course of action or inaction, profit and/or cost savings motives, corporate authorization or ratification of wrongful conduct, and employee testimony coupled with external factors such as expert testimony, government action, false representation and concealment, business promotion and marketing are at the heart of product liability litigation (Robinon and Calcagnie, 2015). Garber et al. (2009)

proposed a conceptual framework for analyzing the roles of social, institutional, economic, and legal factors that affect mass litigation. Exogenous events such as legal doctrines and process, other litigation, regulation, media reports, and market factors (product demand, stock prices, business reputation, goodwill) can directly or indirectly affect litigation through defendant behavior (Garber et al. 2009).

To gain insight into how juries operate and the factors that determine deliberation outcomes, Devine et al. (2001) reviewed 206 empirical studies on jury decision-making between 1955 and 1999. These authors concluded that outcomes were influenced by procedural characteristics, participant characteristics, case characteristics, and deliberation characteristics. Within these categories, they identified numerous factors had a consistent effect on jury decisions. Deliberation outcomes were affected by "definitions of key legal terms, verdict/sentence options, trial structure, jury-defendant demographic similarity, jury personality composition related to authoritarianism/dogmatism, jury attitude composition, defendant criminal history, evidence strength, pretrial publicity, inadmissible evidence, case type, and the initial distribution of juror verdict preferences during deliberation" (Devine et al. 2001). Similar factors have been found to potentially affect FBI jury verdicts and awards. Busby et al. (2001) explore the impact that lawsuit, plaintiff, and defendant characteristics, the legal environment, media coverage, jury, procedural, and deliberation characteristics influence the outcome and subsequent awards in FBI cases.

The model used in this study explores the relationship between lawsuit, plaintiff, and defendant characteristics that potentially affect FBI jury verdicts and awards. Although legal environment, procedural, deliberation, and jury characteristics, and media coverage may also affect FBI jury verdicts and awards, these are not considered in this study.

Plaintiff Success = *f* (Lawsuit Characteristics, Plaintiff Characteristics, and Defendant Characteristics) [4.1]

Jury Awards = *f* (Lawsuit Characteristics, Plaintiff Characteristics, and Defendant Characteristics) [4.2]

Lawsuit Characteristics

Lawsuit characteristics included in this analysis are analogous to those identified by Busby et al. (2001): public health authority involvement, the plaintiff's ability to link their illness to a specific pathogen, and the use of expert witnesses by either plaintiffs or defendants. In addition, characteristics of the jurisdiction were also included: jurisdiction encompasses the county, city, State or Federal (the territory over which authority is exercised); the type of court (Federal, State, county), and the violation of which legal principal the case is filed under (contract, property, torts).

Hazelwood and Brigham (1998) found that the strength of evidence presented had a very large effect on jury verdicts. The plaintiff's ability to prove that the illness sustained resulted from exposure to a particular food sold or produced by the defendant is crucial to persuading a jury of the defendant's fault. As such, the involvement of one or more public health authorities such as a local or State department of health, the U.S. Department of Agriculture, or the Center for Disease Control and Prevention (CDC) can play a key role in determining causation. Busby et al. (2001) stated that plaintiffs often depend on a public health authority to provide an epidemiological link, thereby strengthening the plaintiff's case particularly when FBI is

attributed to an outbreak, public health authorities play an important role in testing food, and/or inspection of the defendant's place of business, and provide relevant evidence.

Similarly, plaintiffs and/or defendants can use other expert witnesses to support their case. Testimony from physicians, epidemiologists, microbiologists and other experts are used to provide material evidence regarding FBI. The importance of this testimony was evident in the case of Marzocco v. Taco Bell Corp., (2000) where the case was dismissed for lack of expert testimony. Merrit and Barry (1999) found that plaintiffs were more likely than defendants to employ expert witnesses in product liability lawsuits. Busby et al. (2001) agreed since the burden of proof rest with the plaintiff.

Differences in plaintiff success rate and the amount awarded have also been shown to exist across different jurisdictions and case types (Gross and Syverud, 1991; Daniels and Martin, 1995; Ostrom et al., 1996; Vidmar, 1998; Moller et al., 1999). Busby et al. (2001) noted, "geographic variations may arise because of differences in propensity to sue, access to lawyers, and the legal system, or State laws". Relying on Federal district court civil cases data (1978-2000) compiled by Eisenberg and Clermont (2000), Busby et al. (2001) found that plaintiff success rate and the amount awarded in personal injury subcategory of product liability varied when aggregated by State. Assuming that similar findings occur for the FBI subset of personal injury lawsuits, one can expect differences in plaintiff success rate and the amount awarded to exist across regions of the United States.

Plaintiff Characteristics

Plaintiff characteristics thought to be important to the outcome of a case include the plaintiffs' age, the severity of illness, medical costs and lost productivity. FBI posed a greater threat of severe complications in children and the elderly (Busby et al. 2001). The severity of illness experienced, as reflected by length of hospitalization and rehabilitation, and potentially chronic complications (i.e. brain or kidney damage) may also play a role in plaintiff success rate and the amount awarded. Cases in which plaintiffs are hospitalized provide better medical documentation (tests, treatment) to support a plaintiff's claims (Busby et al. 2001). Plaintiff success rates and the amount of damage awards were positively related to injury severity (up to death) (Daniels and Martin (1995); Bovbjerg et al. 1989; Taragin et al. 1992, and Vidmar, 1998).

Other authors noted that liability and responsibility judgments were moderately related to severity of plaintiff injury (i.e. Greene et al. 1999). This is supported by Merrit and Barry (1999) whose research found that in medical malpractice and product liability cases, the severity of plaintiff injury was moderately related to receiving an award and strongly related to the award amount. Most severely injured plaintiffs were less likely to win in court (Merrit and Barry (1999). Busby et al. (2001) theorized that the severity of illness might attract larger payouts thus creating greater incentive for defendants and their insurers to vigorously contest the lawsuit.

Apart from the severity of illness, plaintiffs often seek compensation for lost wages, medical costs, expected future medical expenses, lost productivity, emotional distress, loss of consortium (loss services and affection of a spouse), pain, and suffering (Busby et al. 2001). Although medical costs and lost wages can be reasonably quantified in the case of adults, this may not be the case for younger plaintiffs. Furthermore, the subjective nature of emotional distress, loss of consortium, and pain and suffering makes arriving at a dollar value challenging.

Busby et al. (2001) noted awards could be higher if plaintiffs offer persuasive evidence of such complications with reasonable estimates of their value.

Defendant Characteristics

Defendant characteristics that may influence jury verdicts and award amounts include the defendant having "deep pockets", a defendant's failure to warn consumers, and a defendant's breach of warranty. There is the general believe that firms focused on revenue maximization and costs savings while having little regard for the safety and wellbeing of ordinary consumers. According to one hypothesis, juries are likely to make larger awards if they perceive certain defendants can afford to pay more (Busby et al. 2001). In the case of awards paid to plaintiffs after post-trial award adjustment, Shanley (1991) appears to support this hypothesis, Vidmar (1997) questions its validity and probes whether alternative explanations such as severity of injury or chronic complications are likely.

In cases where defendants failed to warn of dangers associated with the consumption of specific food, it is anticipated that juries are more likely to find in favor of the plaintiff. In the case of restaurant defendants, menus that do not alert to the danger of eating uncooked food (oysters), juries are likely to conclude the defendant failed to take due care and, as such, is responsible for patrons' illness. Similarly, a breach of implied or express warranty of fitness for human consumption poses more concerns for defendants. Specifically, if a food product fails the consumer expectation test, then defendants may be liable to consumers for breach of warranty under the Uniform Commercial Code (UCC).

4.2 Data Description

Due to the absence of a comprehensive national recording system, Busby et al. (2001) noted that the actual population of FBI product liability cases in the United States is unknown. In particular, information on FBI product liability cases dropped or settled out of court is not available, in part due to the confidentiality agreements usually agreed to by the parties involved. Skoppek (1989) noted that settlements to avoid large awards, regardless of the fault, are closely guarded by corporate attorneys; this further complicates the difficulty involved in gathering information on out-of-court settlements.

In the absence of a national system that documents product liability cases, this study made use of Westlaw Jury Verdicts and Settlements database (West Group, Inc., Eagan, Minnesota) and the Lexis Nexis Verdicts Library (Reed Elsevier PLC, London) to identify FBI cases, which were legally resolve through the court system. Both databases included descriptive summaries of civil jury verdicts gathered by jury verdict reporting firms that collect and sell information about legal cases for use by practicing attorneys (Busby et al. 2001). Cases adjudicated between 1979 and 2014 are included in this analysis.

All new cases were reviewed and added to the original dataset used by Busby et al. (2001). Cases from the original dataset (1988-1997) were also reviewed and new information added as necessary to extend the analysis. Information added to that included in the original database included a brief case description, database case was found, database case identification number, plaintiffs' gender, prisoner related cases, summary judgment due to lack of jurisdiction, statute of limitations, sovereign immunity, and regional variables based on the U.S. Court of Appeals classification.

4.2.1 Outline of the Data Collection

The Jury Verdicts and Settlements database available through WestLaw and the Federal and State Cases content type under Lexis Nexis Academic was used to conduct the search for cases involving FBI. Searches were done without refining or restricting the search by date or product liability subcategory to ensure that all relevant cases would be identified.

The search made use of general classification terms "food poisoning" and "foodborne illness", or one of an extensive list of foodborne pathogens and related illnesses: Botulism, *Campylobacter*, Campylobacteriosis, Ciguatera, Ciguatoxin, *Clostridium*, *Cryptosporidium*, *Cyclospora*, *E. coli*, Hepatitis, *Listeria*, Listeriosis, *Salmonella*, *Shigella*, *Staphyloccocus, Toxoplasma*, Toxoplasmosis, *Trichinella*, Trichinosis, *Vibrio, Yersinia* and Norovirus. To ensure the completeness of the data collection process, advanced searches were also conducted using multiple terms. For instance, searches for "food poisoning" AND "Botulism"; "food poisoning" AND "*Salmonella"*; and "food poisoning" AND "Hepatitis" were conducted.

To document the search process, the number of hits returned for each search, the database searched, and the date of the search was recorded. Initially, 1,002 candidate cases were identified through WestLaw and 3,639 cases were identified through Lexis Nexis. Appendix E summarizes this search process. During this initial search process, for each identified case, the case title, a case description and the date of final resolution was extracted and entered into an Excel database. Separate worksheets were maintained for each search term.

Review of case descriptions contained in the Excel database was then undertaken to ensure the identified cases included met the criteria of a FBI case. That is, the plaintiff illness (1) produced symptoms consistent with gastrointestinal distress, (2) was linked to food or drink and (3) claimed to have resulted from pathogens or foreign objects embedded in the food or drink

(Busby et al. 2001). Not all cases reviewed related to FBI. For example, cases involving Hepatitis may be attributed to sources other than food. Cases meeting these criteria were deemed relevant and reviewed to remove duplicate cases. Duplicates of cases occurred as the same case may have been found under multiple search terms.[24] Through this process a complete and cleaned preliminary list of 798 FBI cases was developed.

Summaries of each case were then downloaded to be reviewed to facilitate extraction and coding of case characteristics. Appendix F outlines the coding and construction for each variable included in the final database. This process provides a complete audit trail of how the population of FBI lawsuits cases was derived. It must be noted, however, that not all cases included in the final database reached legal resolution through the courts. Cases that involved arbitration, mediation or were settled prior to the completion of the trial were documented by ultimately excluded from this analysis. Of the 798 cases relating to FBI, 512 were resolved through a jury trial.

Table 4.1. Search Results

Description	Case Count
Initial Search	4,641
Number of Duplicates	432
Number that did not fit FBI Case Criteria	3,411
Subtotal	798
Case Review Process	
Cases Resolved by Arbitration	82
Cases Resolved by Mediation	8
Cases Resolved by Settlement	196
Final Number of Cases	512

[24] For example, a case may have been found under the general classification "food poisoning" and also during a search for a specific pathogen.

4.2.2 Coding and Tabulation Process

Summaries of cases resolved through jury trials were each examined to identify and extract characteristics relevant to the FBI lawsuit. The important characteristics of each FBI lawsuit were coded and entered into an Excel database; the organization of this database is presented in Appendix G. For many characteristics, binary explanatory variables were used. The resolution year is coded, as the actual year a case was resolved. Furthermore, the amounts awarded were updated to 2012 dollars using the Bureau of Labor Statistics' annual Consumer Price Index for all urban consumers to ensure comparability across amounts awarded. Defendants were coded as acting negligently in cases where the plaintiff alleged failure to train or supervise staff, failure to properly store food at correct temperatures, failure to ensure proper hygiene of staff, failed to take due care or any other similarly phrased claims that is tantamount to negligence. A description of the variables and respective coding is summarized in Table 4.2.

Descriptive information provided in the published WestLaw and Lexis Nexis verdict summaries varied by case. As such, much of the needed information was not explicitly stated in case summaries. For example, the gender of the plaintiff was not always stated. However, if the summary narrative referenced the plaintiff with a pronoun (he, she, him, her), or the name of the plaintiff indicated a gender, this variable was coded accordingly. In cases where there was more than one plaintiff, unless it was clear that the gender of all plaintiffs was the same, the coding "MU – Multiple Male and Female" was used. In instances involving children whose identity and gender were kept private, "P-Private" was used for coding this variable. If the gender could not be otherwise determined, the code "NI – No Information" was used.

Information related to the plaintiff's age was also frequently incomplete. If the age was not specifically stated, other information referenced in the verdict summary such as "an adult of

undetermined age", or a "married female", a "retiree", an "infant" or a "minor" was used to classify the plaintiff as an adult or child. Several other data points were missing from a handful of cases. In many instances the date of the incident was not reported. As a result, the number of months that elapsed between the incident and trial dates was unknown and was coded as such. One of the cases (WestLaw 743977), indicated the plaintiff was successful, but the amount awarded was not stated.

Table 4.2. Independent and Dependent Variables Description

Variable Label	Variable Name	Variable Description/Coding
AMTAWARDED	Amount Awarded	The amount awarded to the plaintiff that prevailed in a lawsuit
WIN	Plaintiff Success	1 if the plaintiff was successful in a lawsuit; 0 otherwise
YEAR 1993	Year Lawsuit Resolved	1 if the lawsuit was resolved in 1993 or later; 0 otherwise
CHILD	Plaintiff(s) was a Child	1 if one or more of the plaintiff was a child; 0 otherwise
HOSPITAL	Plaintiff(s) was Hospitalized	1 if the plaintiff(s) was hospitalized; 0 otherwise
DEATH	Plaintiff(s) Died	1 if the lawsuit involved a death; 0 otherwise
DISTRESS	Plaintiff Emotional Distress	1 if the plaintiff claimed emotional distress; 0 otherwise
REST	Defendant was a Restaurant	1 if one or more of the defendants was a restaurant; 0 otherwise
PAINSUFF	Plaintiff Claimed Pain and Suffering	1 if the plaintiff claimed pain and suffering; 0 otherwise
LOSSCONS	Plaintiff Abandoned	1 if the plaintiff claimed loss of consortium or abandonment by family; 0 otherwise
PUB	Public Health Authority Involved	1 if a public health authority was involved; 0 otherwise
PWITDOC	Plaintiff use Doctor as a Witness	1 if the plaintiff employed one or more doctors as expert witness; 0 otherwise
DWITDOC	Defendant use Doctor as a Witness	1 if the defendant employed one or more doctors as expert witness; 0 otherwise
PATHOGEN	Pathogen Identified	1 if a specific foodborne pathogen, toxin or illness was implicated; 0 otherwise
CHRONIC	Plaintiff Suffers Chronic Complications	1 if the plaintiff suffers from chronic complications; 0 otherwise
DEEPOCKET	Defendant Operations is Considered Large	1 if the defendant had "deep pockets", 0 otherwise
DEFNEG	Defendant Negligent	1 if the defendant was deem negligent; 0 otherwise
DFTWARN	Defendant Failed to Warn Consumers	1 if the defendant(s) fail to warn consumers; 0 otherwise
DBREWAR	Defendant Breached Implied or Expressed Warranty	1 if defendant breached implied or expressed warranty; 0 otherwise
STRICTLIAB	Defendant was Sued under Strict Liability	1 if defendant was sued under strict liability; 0 otherwise

REGCRT1 - REGCRT11	Geographic Boundaries of the U.S. Courts of Appeals	1 if case was tried in the respective region controlled for; 0 otherwise REGCRT1: Maine, New Hampshire, Massachusetts, Rhode Island REGCRT2: New York, Connecticut, Vermont REGCRT3: Pennsylvania, New Jersey, Delaware REGCRT4: West Virginia, Virginia, District of Columbia, Maryland, North Carolina, South Carolina REGCRT5: Texas, Louisiana, Mississippi REGCRT6: Michigan, Ohio, Kentucky, Tennessee REGCRT7: Wisconsin, Illinois, Indiana REGCRT8: North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Missouri, Arkansas REGCRT9: Washington State, Oregon, Montana, Idaho, Nevada, California, Arizona, Alaska, Hawaii REGCRT10: Wyoming, Utah, Colorado, Kansas, Oklahoma, New Mexico REGCRT11: Alabama, Georgia, Florida
RESOLYEAR	Year of Final Resolution	Year the case was settled

4.3 Model Specification

Since the amount awarded is only observed if the plaintiff is successful in a lawsuit, the Heckman two-step consistent estimator was used for statistical estimation. This approach offers a more computationally efficient means of correcting for non-randomly selected samples. Stata version 12 was use to generate the presented results. This section introduces the theoretical model used for statistical estimation. An overview of the Heckman two-step model is present along with key assumptions.

4.3.1 Theoretical Model: Heckman Model

The Heckman two-step estimator was used for statistical estimation. This estimator was considered appropriate given that the truncation of the amount awarded is incidental and is only observed if the plaintiff is successful in a lawsuit. This estimator is appropriate given that sample selection bias is likely to occur where observations of amount awarded is equal to zero. To

appropriately treat these cases, it is necessary to add an explicit selection equation to the population model of interest.

The Heckman's sample selection model is based on the sequential estimation of two latent dependent variable models: a probit model for selection (choice model), followed by the insertion of a correction factor –the Inverse Mills Ratio (IMR), which is calculated from the probit model - into a second OLS model (Bushway et al. 2007). As the usual approach to incidental truncation is to add an explicit selection equation to the population model of interest (Wooldridge, 2013), a probit model for selection (choice model) is estimated first. The Heckman sample selection model can be presented as

$$s = 1[z\gamma + v \geq 0] \qquad [4.3]$$

$$y = x\beta + u \qquad [4.4]$$

Equation [4.3] is the selection equation where the dependent variable (s) is the latent variable measuring the probability of plaintiff's success, (z) is a vector of variables and (γ) is the parameter estimate that affect selection, and (v) is the error term (Wooldridge, 2013). Equation [4.4] is the equation of primary interest, where the dependent variable (y) is the amount awarded, (x) is a vector of variables and (β) is the parameter estimates that affect the amount awarded, (u) is the error term (Wooldridge, 2013). The expected value (E) of the error term (u) given the independent variables (x) is equal to zero (Wooldridge, 2013).

Equation [4.3] is the selection equation where the dependent variable (s) is the latent variable measuring the plaintiff's success in a lawsuit. This is illustrated as follows:

$$\text{Plaintiff Success} = \begin{cases} 1 \text{ if probability of the plaintiff winning } \geq 0 \\ 0 \text{ if proability of the plaintiff winning } < 0 \end{cases} \qquad [4.5]$$

Equation [4.4] is the equation of primary interest, where the dependent variable (y) is the outcome of interest or the amount awarded. This is illustrated as follows:

$$\text{Amount Awarded} = \begin{cases} x\beta + u, & \text{if Plaintiff Success} = 1 \\ \text{Unobserved} & \text{if Plaintiff Success} = 0 \end{cases} \quad [4.6]$$

4.3.2 Assumptions of the Heckman Model

Several key assumptions underlie the use of the Heckman model. A standard assumption is that z is exogenous in the equation of primary interest (Wooldridge, 2013). That is, the expected value of u given x and z is equal zero ($E[u|x,z] = 0$). This requires x to be a subset of z and any x is also an element of z (Wooldridge, 2013). We also assume that the error term v in the selection equation [4.3] is independent of z and therefore x and has a standard normal distribution (Wooldridge, 2013). Further assumptions are that the expected value of the error term in both equations has a mean of zero ($E[v] = 0 \; and \; E[u] = 0$) and is not correlated with z while the expected value of u given v is correlated ($E[u|v] = \rho v$) (Wooldridge, 2013). Considering the assumptions noted above, we arrive at the following equations:

$$E[y|z, s = 1] = x\beta + \rho E[v|z, s = 1] = x\beta + \rho\lambda(zy) \quad [4.7]$$

Where $\lambda(zy)$ is the Inverse Mills Ratio (IMR) that is derived from estimating the selection equation through a probit model and is subsequently added to our estimation of y as an additional independent variable (Wooldridge, 2013).

4.3.3 Inverse Mills Ratio (IMR)

Estimation of the selection equation produces the Inverse Mills Ratio (IMR) that is subsequently added to the equation of primary interest as an independent variable. According to Wooldridge (2013), the IMR is a term that can be added to a multiple regression model to remove sample selection bias. Assuming the selection equation is correctly formulated, a statistically significant IMR coefficient provides evidence of a sample selection problem in estimating the amount awarded from the intensity equation. In the absence of statistical significance, the IMR computed suggests that there is no evidence of a sample selection problem.

4.4 Empirical Approach

The following sections present the empirical approach taken. The contents of selection and intensity equations are introduced and described. The anticipated impact of the independent variables contained in each equation on the respective dependent variable is highlighted.

4.4.1 Selection Equation

We first considered the factors that would affect the probability of the plaintiff winning a FBI product liability lawsuit using a probit model. Equation [4.8] comprises of those independent variables that are expected to affect the probability of winning a lawsuit.

$$
\begin{aligned}
WIN = \lambda_0 + \lambda_1 YEAR1993 + \lambda_2 CHILD + \lambda_3 HOSPITAL + \lambda_4 DEATH + \lambda_5 REST + \lambda_6 PUBLIC \\
+ \lambda_7 PWITDOC + \lambda_8 DWITDOC + \lambda_9 PATHOGEN + \lambda_{10} DEEPPOCK \\
+ \lambda_{11} DEFNEG + \lambda_{12} DFTWARN + \lambda_{13} DBREWAR \\
+ \lambda_{14} STRICTLIAB + \lambda_{15} REGCRT1 + \lambda_{16} REGCRT2 + \lambda_{17} REGCRT3 \\
+ \lambda_{18} REGCRT4 + \lambda_{19} REGCRT5 + \lambda_{20} REGCRT6 + \lambda_{21} REGCRT7 \\
+ \lambda_{22} REGCRT8 + \lambda_{23} REGCRT9 + \lambda_{24} REGCRT10 + \lambda_{25} REGCRT11 \\
+ \lambda_{26} RESOLYEAR + v
\end{aligned}
\qquad [4.8]
$$

Estimating this equation computes the probability of the plaintiff winning and allows the Inverse Mills Ratio (IMR) to be estimated. In the selection equation above, *WIN* is the probability that a plaintiff will be successful in a FBI product liability lawsuit. This probability is assumed to be a function of the following independent variables: the lawsuit was resolved in 1993 or later (*YEAR1993*); one or more plaintiff(s) was a child (*CHILD*); the plaintiff(s) was hospitalized **(***HOSPITAL*); the lawsuit involved a death **(***DEATH*); one or more defendant(s) was a restaurant (*REST*); public health authority was involved in the case (*PUBLIC*); the plaintiff employed one or more doctors as expert witness **(***PWITDOC*); the defendant employed one or more doctors as expert witness (*DWITDOC*); a specific foodborne pathogen, toxin or illness was implicated by the plaintiff (*PATHOGEN*); the defendant(s) had "deep pockets" (*DEEPPOCK*); the defendant was deemed negligent (*DEFNEG*); the defendant failed to warn consumers (*DFTWARN*); the defendant breached implied or expressed warranty of merchantability and fitness (*DBREWAR*); the defendant was sued under strict liability (*STRICTLIAB*); regional differences controlled for using geographic boundaries of the U.S. Courts of Appeals (*REGCRT1* through *REGCRT11*); and the year of final case resolution (*RESOLYEAR*).

For lawsuits resolved in 1993 or later (YEAR1993), plaintiffs are expected to be more likely to prevail because of the increase awareness of food poisoning created by the *E. coli* outbreak at Jack in the Box restaurants that year. Plaintiffs that were hospitalized (HOSPITAL) or died (DEATH), are expected to have a higher probability of winning and receive an award for damages since these variables measure the severity of the plaintiff's injuries. It is anticipated that lawsuits involving (CHILD) are likely to succeed because juries may be more sympathetic toward child plaintiffs. Plaintiffs under 18 years of age are considered a CHILD. Lawsuits where defendants are restaurants (REST) are thought to increase the plaintiff's chance of winning since the closeness of the relationship between restaurant and a customer would allow for easier identification of the source food. Public health officials' involvement (PUB) would provide substantiating information for a plaintiff's claim, thus increasing the probability of a plaintiff winning. It is also expected that the plaintiff's chances of prevailing would increase if a medical expert witness (PWITDOC) testifies, and decreases by defendant's use of a medical witness (DWITDOC). Lawsuits implicating specific pathogens (PATHOGEN) are more likely to result in a plaintiff winning because it would be easier to link the identified pathogen that caused the illness to a specific food the defendant firm produced.

In lawsuits where the defendant is claimed to be negligent (DEFNEG) and or failed to warn consumers (DFTWARN), it is expected that the probability of the plaintiff winning would increase because of the defendant's unethical and deceptive business practices. A defendant with "deep pockets" (DEEPPOCK), defined as those with three of more retail operations or 40 or more fulltime staff, it is unclear what sign this coefficient will take. Juries are expected to penalize "deep pocket" firms for FBI linked their operations. However, one would expect "deep pocket" firms to possess the financial and legal means needed to successfully defend lawsuits.

4.4.2 Intensity Equation

The intensity equation [4.9] contains only those factors that are likely to influence the amount awarded should the plaintiff win. These variables are directly related to the severity of the injuries sustained by plaintiffs and is estimated by ordinary least square (OLS). While there are factors that exclusively affect selection and outcome respectively, some factors are included in both equation [4.8] and [4.9]. The baseline version of the intensity equation is:

$$AMTAWARDED = \beta_0 + \beta_1 CHILD + \beta_2 DEATH + \beta_3 DISTRESS + \beta_4 PAINSUFF + \beta_5 LOSSCONS + \beta_6 CHRONIC + \beta_7 HOSPITAL + \beta_8 IMR + u \quad [4.9]$$

The dependent variable, *AMTAWARDED,* is the amount awarded to a plaintiff that wins a FBI product liability lawsuit. The independent variables include: one or more plaintiff(s) is a child (*CHILD*); the lawsuit involved a death **(***DEATH*); the plaintiff claimed emotional distress **(***DISTRESS*); the plaintiff claimed pain and suffering (*PAINSUFF*); the plaintiff claimed loss of consortium due to abandonment by family **(***LOSSCONS*); the plaintiff suffered from chronic complications **(***CHRONIC*); the plaintiff was hospitalized (*HOSPITAL*); and the Inverse Mills Ratio (*IMR*).

Chapter 5: Results and Discussion

The final dataset of 512 FBI cases drawn from across 41 states and the District of Columbia are used as the basis for the results presented in this chapter. Three main statistics are used to summarize award information: the mean, median, and expected awards. Calculations of both the mean and median statistics exclude cases won by defendants and cases won by plaintiffs for which no award information was available. The expected award reflects the amount consumers are likely to receive if they are successful in FBI litigation. This value is calculated as the mean plaintiff award multiplied by the percent of FBI jury trials won by plaintiffs. According to Busby et al. (2001), the expected award is the most relevant statistic since it shows the expected monetary payout resulting from FBI lawsuit between different parties in the chain of food production, distribution, and consumption. One case for which no award information (WestLaw 743977) was available is excluded from these analyses.

This chapter present a discussion of the results of the multivariate analyses performed on the court data and the subsequent tests conducted. The Heckman two-step procedure is used to explore the factors, which affect FBI case outcomes through estimate four alternative scenarios. This is followed by a discussion of the results of each scenario. The chapter concludes with a brief discussion on data limitations and limitation of data analysis.

5.1 Frequency and Size of Awards

Approximately one-third (34.8 %) of cases decided between 1979 and 2014 resulted in positive outcomes and subsequent monetary awards for the party injured by a FBI. In comparison, Busby et al. (2001) found that approximately 31.4% of the cases resolved between 1988 and 1997 resulted in monetary award for the consumer. Notwithstanding a slight increase in plaintiffs'

success rate, it can be reasonably concluded that most plaintiffs failed to convince juries that defendants were legally responsible for causing their illnesses.

For the 178 cases where plaintiffs were successful, compensation ranged from $151 to $6.2M with average and median awards of $276,148 and $32,264, respectively. Examining 55 cases won by plaintiffs between 1988 and 1997, Busby et al. (2001) found that compensation ranged from $2,256 to $2.4M with average and median awards of $133,280 and $25,560 respectively. Since the distribution of awards was highly skewed due to some large awards, the median award amount is a better measure of the typical compensation by juries in FBI lawsuits. In total $49.2 million was awarded to plaintiffs; among these 11 of the largest awards accounted for two thirds of this sum. In comparison, for cases won between 1988 and 1997, the total amount awarded was $7.3 million and the two largest awards accounted for 51% of this total (Busby et al. 2001). Figure 5.1 illustrates the trend in FBI lawsuits.

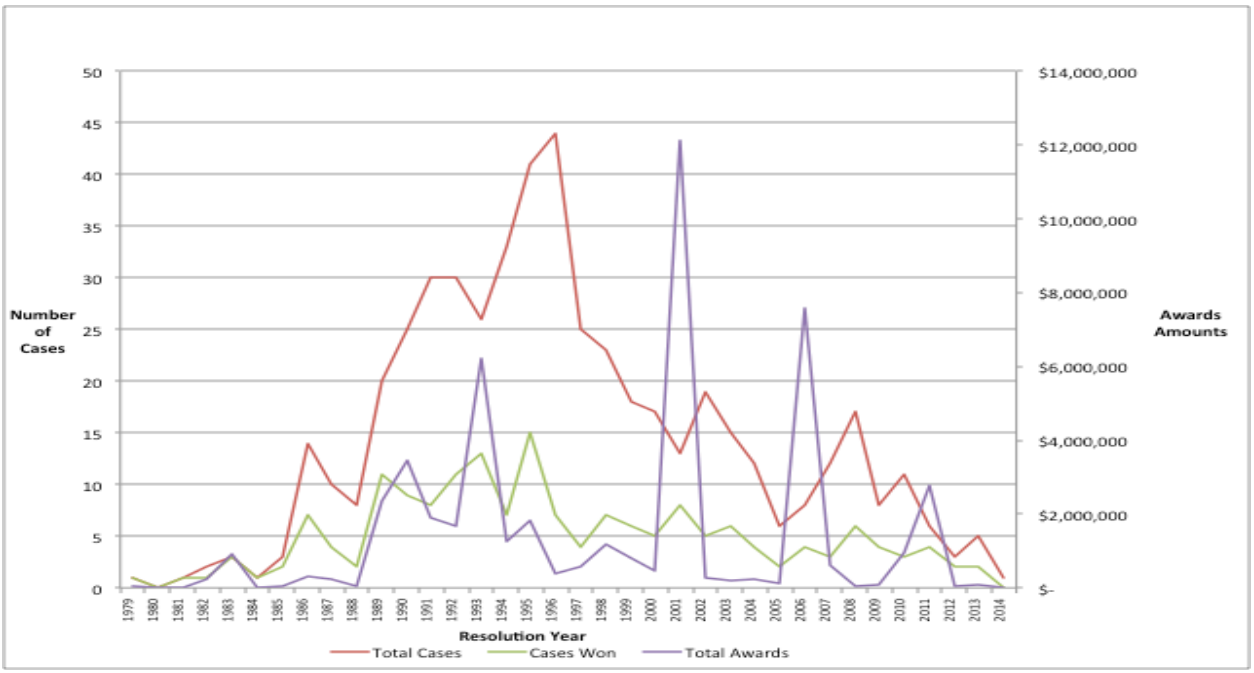

Figure 5.1. Foodborne Illness Cases and Awards (1979 – 2014)

The expected award for the 178 cases where plaintiffs prevailed during the full sample (1979-2014) was $26,525. In comparison, Busby et al. (2001) reported an expected award of $41,888 for 55 cases won by plaintiffs between 1988 and 1997(in 1998 USD). It must be noted, however, that the severity of cases in each period has changed. For cases examined between 1988 and 1997, 45.5% that received an award involved a death or hospitalization. In comparison, only 31.5% of cases that received an award between 1979 and 2014 involved a death or hospitalization. Regardless, consumers involved in FBI lawsuits can expect to receive a lower compensation than that which was previously reported if they decide to go to trial. Importantly, the actual amount received by plaintiffs would be much lower after legal expenses and court filing fees are taken into account. Food firms who lose FBI cases can expect to pay this amount plus the cost of legal defense and other legal fees and other indirect costs associated with a public trial including loss of sales and diminished business reputation. In some cases, defendants may also be expected to pay a plaintiff's legal fees. Table 5.1 summarizes compensation for consumer plaintiffs in FBI lawsuits.

Table 5.1. Compensation for Consumer Plaintiffs in Foodborne Illness Lawsuits Decided by Jury Verdicts, (1979 – 2014)[a]

Years	Number of Cases	Percent of Total Won by Plaintiffs (%)	Range of Compensation	Mean Award	Median Award	Expected Award[b]	Total Amount Compensated
			----------2012 Dollars----------				
1979-1989	63	52.4	550- 1,944,665	129,060	31,420	67,603	4,258,998
1990-1999	295	29.5	5,022-3,337,621	221,727	35,998	65,391	19,290,239
2000-2009	127	37.0	151-6,159,099	462,954	28,706	171,329	21,758,822
2010-2014	26	42.3	9,856-1,428,971	349,663	73,917	147,934	3,846,294
1979-2014	511	34.8	151-6,159,099	276,148	32,264	96,192	49,154,354

[a] Data updated to 2012 dollars using the Bureau of Labor Statistics Consumer Price Index for all urban consumers. Of the 512 court decisions, 511 had award information; thus award totals do not reflect all court awards.
[b] The expected award is the average award multiplied by the percent of foodborne illness jury trials won by plaintiffs.

One must be cognizant that the number of cases may have been influenced by key legislations and regulations introduced during a given time period. Between 1979 and 1989 no new food safety laws were introduced. Following the *E. coli* outbreak at Jack-in-the-Box in 1993, implementing Hazard Analysis and Critical Control Points (HACCP) became required in meat and poultry slaughter and processing plants. HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product (FDA, 2014d). In the aftermath of September 11, 2001, the Bioterrorism Act of 2002 sought to protect the U.S. food supply by requiring food facilities to be registered, and that advance notice be given to the FDA for imported food shipments. Increased food safety awareness coupled with the several high profile foodborne disease outbreaks led to the introduction of FSMA in 2011.

5.2 Court Cases and Awards by Severity Category

The 511 cases with award information were categorized into three severity categories: cases involving a premature death, cases where the plaintiff(s) was hospitalized and survived, and all other cases that involved less severe illnesses. Approximately 4.1% (21) of cases involved a death, while 20.9 % (107) of lawsuits involved nonfatal injuries that required some form of hospitalization. In comparison, Busby et al. (2001) reported 3% of the lawsuits involved a death, while 60% involved a plaintiff who was hospitalized. Despite a small increase in the percent of premature deaths, the percentage of plaintiffs hospitalized was 39% lower over the full period (1979 through 2014). This suggests that more recently court cases are being pursued by those with less severe cases of FBI where victims do not require hospitalization. Alternatively, greater

awareness by victims of FBI and healthcare professionals may lead to early detection and treatment and thus limit the need for hospitalization.

Injury severity is a major factor that is likely to affect an expected award. A third (33.3%) of the lawsuits involving premature death resulted in plaintiff victories, with an expected award of $228,945. This was higher than the expected award in FBI cases involving hospitalization ($170,804), and the expected award in all other cases ($68,069). In comparison, Busby et al. (2001) reported that the expected award in lawsuits involving a death was $183,053, which was significantly higher than cases involving hospitalization ($44,713), and the expected award in all other cases ($32,563).

While the severity of the plaintiff's injuries is a major factor affecting an expected award, it is less important in determining whether plaintiffs are successful in winning FBI lawsuits. That is, a plaintiff's success rate in FBI lawsuits involving a premature death is lower (33.3%), than the overall plaintiff success rate (34.8%) for all FBI lawsuits. Defendants may have a greater incentive to vehemently defend cases involving a death in order to protect their reputation. Furthermore, the plaintiff's success rate in FBI lawsuits involving hospitalization is higher (35.5%) than the overall plaintiff success rate for all FBI lawsuits. Table 5.2 summarizes FBI case by severity of illness award information.

Table 5.2. Plaintiff Compensation in Foodborne Illness Court Cases by Severity Category, (1979 – 2012)[a]

Illness Severity	Cases with Award Information	Percent Won by Plaintiff	Mean Award	Median Award	Expected Award[b]
	Number	%	----------2012 Dollars----------		
Premature Death	21	33.3	686,836	278,118	228,945
Hospitalized and Survived	107	35.5	480,947	54,244	170,804
Other Cases	383	34.7	196,019	26,358	68,069
Total	511	34.8	276,148	32,264	96,192

[a] Of the 512 court decisions, 511 had award information; thus award totals do not reflect all court awards.
[b] The expected award is the mean plaintiff award multiplied by the percent of foodborne illness jury trials won by plaintiffs. Information on awards was not available for one (excluded) case.

5.3 Court Awards by Implicated Causal Agent

The ability of plaintiffs to identify the specific pathogen and food item that made them ill is likely to have an important effect on the outcome of a trial (Busby et al. 2001). Approximately 43.2% of the jury summaries identified a specific pathogen, toxin, foreign object and/or matter as the cause of illness. Of the pathogens identified, *Salmonella* was the most frequently cited pathogen (16.6% of cases), followed by a foreign object and/or matter (5.27%), and Hepatitis (A, B and/or C; 4.49%). These results are also similar to Busby et al. (2001) who reported that *Salmonella,* followed by Hepatitis (all types) to be the most prevalent causal agents. Table 5.3 summaries the causal agents most frequently implicated in FBI lawsuits.

Traceability plays an important role in identifying the source and cause of a FBI. According to Souza-Monteiro (2013), a common feature of most U.S. based food safety outbreaks was the lag between the detection of the incident and the full assessment of its origin, cause(s), and spread. In outbreak situations, consumer plaintiffs may rely on traceability practices to provide information concerning the path of a pathogen through the various stages of production, processing, and distribution. Such information can be used to help identify a specific

causal pathogen and its source thus supporting their claims.

Table 5.3. Foodborne Pathogens, Toxins, or Agents Involved in Foodborne Illness lawsuits Decided by Jury Verdicts, (1979 – 2014)[a]

Pathogen	Lawsuits	
	Number	Percent of Total Cases
Salmonella	85	16.60
Foreign Object/Matter	27	5.27
Hepatitis (A, B & C)	23	4.49
E. coli	20	3.91
Vibrio	12	2.34
Shigella	11	2.15
Campylobacter	11	2.15
Ciguatera	9	1.76
Staphylococcus	9	1.76
Norovirus	4	0.78
Mold	2	0.39
Botulism	1	0.20
Cyclospora	1	0.20
Adverse reaction to protective immunization after exposure to foodborne Hepatitis	1	0.20
Trichinosis	1	0.20
Yersinia	1	0.20
Streptococcus	1	0.20
Typhoid	1	0.20
Cholera	1	0.20
Not Specified	291	56.84
Total	**512**	**100.0**

[a] Foreign Object/Matter includes blood, decaying bone, gasoline, lighter fluid, maggots, sulfites, rat poison, urine, saliva and other unspecified foreign object.

The success rate among plaintiffs that alleged illness from a specific pathogen or foreign object was 44.8 and 44.4 percent respectively. By contrast, plaintiffs that did not implicate a specific pathogen were successful in only 27.1% of cases. The expected award when a specific pathogen and foreign object and/or matter were identified was also significantly higher than in cases where the pathogen was unspecified (Table 5.4). These findings are consistent with that of Busby et al. (2001). In general, these findings suggest the importance of establishing a causal link between a FBI and a specific pathogen for a plaintiff to win in FBI jury trials.

Table 5.4. Compensation in Foodborne Illness Court Cases by Pathogen Category, (1979 – 2014)[a]

Pathogen Category	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	%	----------2012 Dollars----------		
Alleged Illness from a Specific Pathogen	194	44.8	432,660	83,331	100,014
Foreign Object/Matter[c]	27	44.4	307,738	14,806	136,772
Unspecified Pathogen	291	27.1	98,989	18,080	26,873
Total	511	34.8	276,148	32,264	96,192

[a] Of the 512 court decisions, 511 had award information; thus the award totals do not reflect all court awards.
[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs; one case is excluded since award information was not available.
[c] Foreign Object/Matter includes blood, decaying bone, gasoline, lighter fluid, maggots, sulfites, rat poison, urine, saliva and other unspecified foreign object.

5.4 Court Awards by Implicated Food

A large majority of FBI lawsuits (81.8%) identify a particular food or beverage as the source of the illness; this is a noticeable decline from 92% previously reported by Busby et al. (2001). Additionally, approximately one-fifth of the examined case summaries (19.3%) attributed the cause of illness to a source such as a restaurant meal, fast food, or lunch that can be reasonably assumed to consist of multiple items ("multiple vehicles") thus leaving some uncertainty in the food source.[25] Among the 62.5% of case summaries that identified a specific food ("single vehicle"), hamburgers and ground beef, different types of sandwiches and seafood (excluding oysters) were reported as the most frequent cause of illness. Only 7 cases involving packaged meals such as canned foods and frozen foods were found thus reflecting the lower food safety risk from these products. It is also possible that litigation involving these products or cases are more likely to be settled outside of court. Table 5.5 provides a summary of food items identified as the source of illness in the examined FBI cases.

[25] For example, a spare ribs and pork chops, or eggs and steak.

Table 5.5. Food Items Involved in Illness Lawsuits Decided by Jury Verdicts, (1979 – 2014)

Food Item	Lawsuits	
	Count	Percent of Total Cases
Hamburger and Ground Beef	39	7.6
Sandwiches (e.g. chicken, fish, ham)	39	7.6
Seafood (other than oysters)	39	7.6
Chicken	27	5.3
Salads (e.g., fruit, potato, chicken)	21	4.1
Mexican Food (e.g., burritos, tacos, quesadillas)	19	3.7
Other Beverage (e.g., soda, orange juice, sports drink)	17	3.3
Oysters	16	3.1
Beef (e.g., steak, sirloin, jerky)	14	2.7
Other Meat (e.g., duck, lamb, goat)	9	1.8
Milk (including raw milk)	8	1.5
Pork	8	1.5
Eggs	7	1.4
Packaged Meals (e.g., canned food)	7	1.4
Baked Goods (e.g., cookies, cake, doughnut)	6	1.2
Chinese Food	6	1.2
Sausages	6	1.2
Turkey	3	0.6
Water	3	0.6
Ice Cream	2	0.4
Other Single Vehicle Foods (e.g., ketchup, syrup, salad dressing)	24	4.7
Multiple Vehicles (e.g., restaurant food, fast food, lunch)[a]	99	19.3
Not Specified	93	18.2
Total	512	100.0

[a] For cases where multiple foods were identified, these were included under Multiple Vehicles.

In court cases where illness was attributed to an identified food item, plaintiffs won 32.6% of cases. In contrast, plaintiffs that did not identify a specific food item won approximately 39.5% of cases. A similar finding was made by Busby et al. (2001) where plaintiffs' success was 26.3% in cases that identified a specific food, and 41.0% in cases that did not identify a specific food leading them to conclude that such finding is counterintuitive given the importance of establishing a plaintiff's cause of illness. Part of this may be attributed to information shared with the jury but which was not included in the jury verdict summaries. Also, juries may not have been convinced that the food item identified was the actual source of the illness. Notwithstanding this finding, however, the expected award was higher ($125,438) in cases that identified a specific food item when compared to cases where the food item was not

specified ($36,166). Table 5.6 presents compensation awarded to successful plaintiffs by food category.

Table 5.6. Summary of Compensation in Foodborne Illness Court Cases by Food Category, (1979 – 2014)[a]

Food Category	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	%	----------2012 Dollars----------		
Alleged Illness From a Specific Food	344	32.6	385,275	41,453	125,438
Did not Specify a Food	167	39.5	91,511	27,070	36,166
Total	511	34.8	276,148	32,264	96,192

[a] Of the 512 court decisions, 511 had award information; thus award totals do not reflect all court awards.
[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

5.5 Court Awards by Type of Defendant

Tort law provides that plaintiffs may sue multiple defendants involved in the food supply chain even if there is a strong indication that a specific defendant is more at fault.[26] For example, a plaintiff that became ill from eating a prepackaged leafy green salad mix purchased from a supermarket may sue the supermarket, the distributor, the packaging firm, and the farm where the vegetables were grown. The rationale for such action may be due to the plaintiff's belief that the pathogen contamination occurred earlier in the food production chain (Rosenbaum, 2000). Clark (2000) noted however, suing multiple defendants maybe a sign that the plaintiff does not have sufficient evidence of causation to isolate and name one defendant.

Of the 512 lawsuits examined, 85% (453) named one defendant, 11.5% (59) named two defendants, and 3.5% (18) named three or more defendants. A total of 589 defendants were

[26] The Restatement of the Law Third, Torts: Apportionment of Liability allows a plaintiff to sue for and recover the entire amount of recoverable damages from any defendant regardless of a particular defendant's percentage share of fault under the concept of "joint and several" liability (Wilson Elser, 2013).

named across the 512 examined cases.[27] Restaurants (51.3%) made up the largest group of defendants followed by foodstores (13.2%), and manufacturers (8.3%). Table 5.7 presents a summary of FBI cases by defendant type. Of the 302 cases that claimed illness from a restaurant setting, 62 cases involved multiple vehicle foods, 175 cases involved single vehicle foods, and 65 cases did not specify the food involved.

Table 5.7. Summary of Defendants in Foodborne Illness Court Cases by Firm Type, (1979 – 2014)[a]

Defendant	First Defendant		Second Defendant		Third Defendant		All Defendant	
	Number	%	Number	%	Number	%	Number	%
Restaurant[b]	298	58.2	3	5.1	1	5.6	302	51.3
Foodstore	66	12.9	10	16.9	2	11.1	78	13.2
Manufacturer	34	6.6	8	13.6	7	38.9	49	8.3
Parent	39	7.6	6	10.2	3	16.7	48	8.1
Individuals	16	3.1	9	15.3	1	5.6	26	4.4
Distributors	6	1.2	14	23.7	4	22.2	24	4.1
Farms	9	1.8	0	0.0	0	0.0	9	1.5
Cruise	4	0.8	0	0.0	0	0.0	4	0.7
Other[c]	40	7.8	9	15.3	0	0.0	49	8.3
Total	512	100.0	59	100.0	18	100.0	589	100.0

[a] Of the 512 court cases, 59 had multiple defendants for an overall total of 589 defendants.
[b] Includes hotel restaurants
[c] Includes food service operators (6), insurance companies (5), casinos (4), delicatessens (4), churches (3), catering company (3), school (3), youth foundations (2), clubs (2), vending machine company (2), government entity (2), amusement park (1), department store (1), fair vendor (1), psychiatric institution (1), prison (1), railway (1), shelter (1), hospital (1), management company (1), oil and gas barge (1), and market (1).

5.6 Court Awards by Plaintiff

Of the 511 FBI lawsuits with award information, 453 cases involved a single plaintiff and 58 involved multiple plaintiffs. Cases involving multiple plaintiffs averaged 1.67 plaintiffs per case for a total of 96 plaintiffs. Single plaintiffs won 33.3% of their cases with an average award of $188,738 per plaintiff. By comparison, multiple plaintiffs won 50% of their cases with an average award of $215,155 per plaintiff. Similar claims by multiple individuals may help

[27] As the majority of the jury verdict summaries had three or fewer defendants, information was recorded for up to three defendants per case.

convince a jury that the defendant is at fault and hence explain the higher success rate for multiple plaintiffs. Table 5.8 summarizes compensation in FBI cases by plaintiff.

Table 5.8. Compensation in Foodborne Illness Court Cases by Plaintiffs, (1979 – 2014)[a]

Plaintiff	Court Cases with Award Information	Decision for Plaintiffs	Total Number of Plaintiffs	Total Awards	Average Award Per Plaintiff
	Number	%	Number	2012 Dollars	
Single Plaintiffs	453	33.3	151	28,499,498	188,738
Multiple Plaintiffs	58	50.0	96	20,654,855	215,155
Total	511	34.8	247	49,154,353	199,005

[a] Of the 512 court decisions, 511 had award information; thus award totals do not reflect all court awards.

5.7 Court Awards by Gender

The potential importance of gender in the outcome and subsequent amount awarded in FBI lawsuits was also considered. Of the 511 FBI lawsuits with award information, 233 (45.6%) cases had male plaintiffs and 225 (44.0%) cases had female plaintiffs. Additionally, 35 (6.8%) cases had multiple plaintiff(s) of mixed gender. While the success rate for male and female plaintiffs were similar, the median amount awarded for male plaintiffs was $4,628 more than female plaintiffs. Furthermore, the median award for cases comprising of multiple plaintiff(s) was $53,507. Table 5.9 presents a summary of awards by gender.

Table 5.9. Compensation in Foodborne Illness Court Cases by Gender, (1979 – 2014)[a]

Gender	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	%	----------2012 Dollars----------		
Male	233	34.3	134,193	33,037	46,075
Female	225	33.8	252,697	28,409	85,355
Multiple Plaintiffs (Males, Females)	35	37.1	1,380,574	53,507	512,785
Private	4	75.0	18,444	3,013	13,833
Not Specified	14	42.9	201,850	40,826	86,507
Total	511	34.8	276,148	32,264	96,192

[a] Of the 512 court decisions, 511 had award information; thus award totals do not reflect all court awards.
[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

5.8 Court Cases and Awards by Year

Over the 36-year period examined (1979 to 2014), there were an average of 14.6 cases per year with a median number of 12 cases. However, in the 15-year period (1989 to 2003) the average and median number of FBI cases was 25 cases per year with the highest number of cases (44) recorded in 1994. Figure 5.1 indicates that there has been a decline in FBI cases in recent years with a single case recorded in 2014. This does not necessarily mean, however, that the number of people and/or occurrence of FBIs have declined. The fact that there may be ongoing appeals by either party precludes the release of case information until final decisions has been made. This may also be due, at least in part to the length of time it takes to bring a lawsuit to trial and completion through the court system. A prime example is the 2009 Peanut Corporation of America *Salmonella* outbreak where hundreds of lawsuits have been filed which have no resolution as of yet. Also, the number of cases resolved through out-of-court settlements (196), Arbitration (82), and Mediation (8) may also help explain this finding. Appendix A presents federal FBI lawsuits by award year.

5.9 Court Cases and Awards by Geographic Location

More than half of all FBI lawsuits originate in 7 states: Florida (74), Texas (65), California (56), Pennsylvania (29), Ohio (23), New York (23), and New Jersey (22). A possible explanation for this trend may be the relative population size in each state. According to 2014 population estimates, California (1), Texas (2), and Florida (3) are the most populous states in the US (US Census Bureau, 2015). Furthermore, since product liability law is state law, consumer's propensity to pursue a case is likely to be influenced by the filing requirements, burden of proof and potential award available in each jurisdiction. Figure 5.2 presents the number of FBI cases filed in each state over the study period.

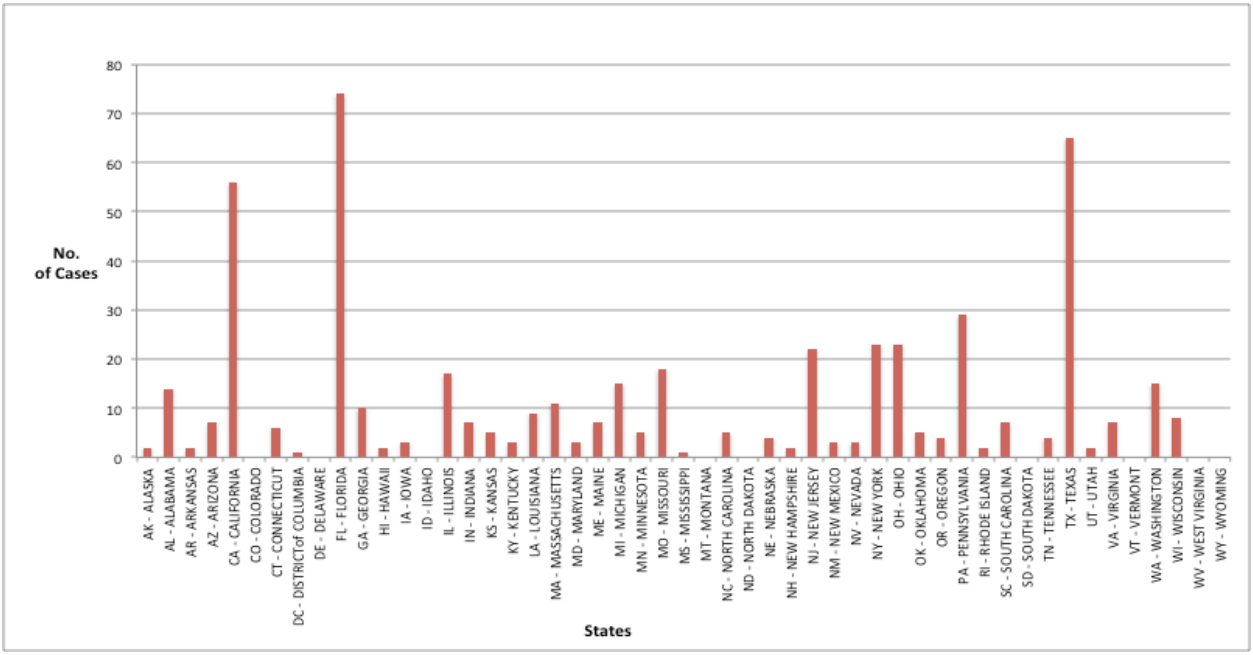

Figure 5.2. Foodborne Illness Cases by State (1979 – 2014)

5.10 Other Descriptive Results of Interest

Public health authorities from the state or local government that investigate a case or an outbreak may be called upon to testify as to their findings in court. Of the 511 cases with award information, public health authorities were involved in 7.0% (36) of these cases; of these plaintiffs were successful in 47.2% (17). In comparison, plaintiffs were successful in 33.9% of the cases where public health authorities were not involved. Testimony provided by public health authorities is likely important to plaintiff success.

Both plaintiffs and defendants employed expert witnesses such as physicians to support their respective claims. Plaintiffs called one or more expert witnesses in approximately 20.2% of the FBI cases while defendants used expert witnesses in 23.3% of the cases. This finding differs from that reported in of Busby et al. (2001) who reported that plaintiffs called one or more expert witnesses in 67.0% of FBI cases while 45.0% of defendants called on one or more expert witnesses to provide testimony. Since the burden of proof in civil cases rests with the plaintiff, the reduction in the use of expert witness over time is unexpected. However, it may be the case that expert witnesses used were simply not consistently reported in the jury verdict summaries examined. Alternatively, plaintiffs may have chosen not to call on an expert witness because testimony given may not support the plaintiff's claims.

In FBI lawsuits, three main causes of action are available to plaintiffs: strict product liability, negligence, and breach of express or implied warranty. Of the 511 cases with award information, plaintiffs claimed that the defendant was negligent in 56.9% (292) of cases; among these plaintiffs 36.3% (106) were successful. Plaintiffs claimed breach of express or implied warranty as the cause of action in 12.7% (65) of cases and were successful in 36.9% (24) of these cases. Claims of strict liability violations occurred in 7% (36) of cases, with the plaintiff being

successful in 38.9 % (14). Table 5.10 summarizes FBI cases by cause of action claimed by plaintiffs.

Table 5.10. FBI Cases by Cause of Action (1979 – 2014)[a]

Cause of Action	Court Cases	Decision for Plaintiffs
	Count	%
Strict Product Liability	36	38.9
Negligence	292	36.3
Breach of Express or Implied Warranty	65	36.9

[a] Of the 512 court cases, plaintiffs claimed multiple cause of action in 57 cases.

5.11 Results of the Econometric Analysis

Equation [4.8] and [4.9] were estimated using the Heckman two-step procedure. Four specification scenarios were estimated. In scenario 1, the selection equation contains only those characteristics that are expected to influence the probability of a plaintiff winning, while the outcome equation contains variables that may be related to the severity of the plaintiff's injuries. The variables contained in the selection and intensity equations for Scenario 1 are described under Chapter 4.6.1 and 4.6.2 respectively. Keeping the selection equation from Scenario 1, Scenario 2 introduces additional independent variables to the intensity equation. It was reasoned that including lawsuits resolved in 1993 or later (YEAR1993), a restaurant defendant (REST), and defendant that had "deep pockets" (DEEPPOCK) would affect the award amount received by plaintiffs.

According to Wooldridge (2013), while it may be appropriate to exclude certain independent variables from the selection equation, including all independent variables in the selection equation is not very costly. However, incorrectly excluding independent variables can lead to inconsistency in the estimates (Wooldridge, 2013). In Scenario 3, the selection equation was modified to include independent variables that reflect the severity of the plaintiff's injuries.

A plaintiff that claimed emotional distress (DISTRESS), pain and suffering (PAINSUFF), loss of consortium due to abandonment by family (LOSSCONS), chronic complications (CHRONIC) were added to the selection equation with the expectation that juries were more likely to be sympathetic after hearing testimony of plaintiffs' injuries and may be likely to submit a verdict in favor of the plaintiffs.

The intensity equation in Scenario 3 was expanded to include the various causes of actions brought by the plaintiff: defendant was negligent (DEFNEG), defendant breached implied or expressed warranty of merchantability and fitness (DBREWAR), cause of action was brought strict liability (STRICTLIAB), and defendant failed to warn consumers (DFTWARN). The award equation was also expanded to include independent variables that control for regional differences in the amount awarded. Based on the geographic boundaries of the U.S. Courts of Appeals, cases completed in REGCRT1 through REGCRT11 were included to explore whether cases concluded in different regions of the United States were likely to receive different awards. The discussion that follows provides a justification for each additional specification. Table. 5.11 present the definitions and mean values for the independent variables used in the analysis; the results of the Heckman analyses are presented in Table 5.12.

Table 5.11. Definitions and Mean Values of Independent Variables

Variable	Variable Description	Hypothesized Sign	Mean Values N = 511
YEAR 1993	The lawsuit was resolved in 1993 or later	+	0.7104
CHILD	One or more plaintiff(s) was a child	+	0.1076
HOSPITAL	One or more plaintiff(s) was hospitalized	+	0.2661
DEATH	The lawsuit involved a death	+	0.0411
DISTRESS	The plaintiff(s) claimed emotional distress	+	0.1292
REST	One or more of the defendant was a restaurant	+	0.5597
PAINSUFF	The plaintiff(s) claimed pain and suffering	+	0.1370
LOSSCONS	The plaintiff(s) claimed loss of consortium or family abandonment	+	0.0489
PUBLIC	A public health authority was involved	+	0.0705
PWITDOC	The plaintiff(s) employed one or more expert witness	+	0.3581
DWITDOC	The defendant employed one or more expert witness	-	0.2329
PATHOGEN	A specific foodborne pathogen, toxin, or agent was implicated	+	0.4305
CHRONIC	The plaintiff(s) suffered from chronic complications	+	0.0607
DEEPOCKET	The defendant(s) had “deep pockets”	+/-	0.6654
DEFNEG	The defendant(s) was deem negligent	+	0.5695
DFTWARN	The defendant(s) fail to warn consumers	+	0.0822
DBREWAR	The defendant(s) breached implied or expressed warranty	+	0.1272
STRICTLIAB	The defendant(s) was sued under strict liability	+	0.0705
REGCRT1	The case was tried in U.S. Appeals Court Region 1	+/-	0.0431
REGCRT2	The case was tried in U.S. Appeals Court Region 2	+/-	0.0568
REGCRT3	The case was tried in U.S. Appeals Court Region 3	+/-	0.0998
REGCRT4	The case was tried in U.S. Appeals Court Region 4	+/-	0.0450
REGCRT5	The case was tried in U.S. Appeals Court Region 5	+/-	0.1468
REGCRT6	The case was tried in U.S. Appeals Court Region 6	+/-	0.0881
REGCRT7	The case was tried in U.S. Appeals Court Region 7	+/-	0.0626
REGCRT8	The case was tried in U.S. Appeals Court Region 8	+/-	0.0626
REGCRT9	The case was tried in U.S. Appeals Court Region 9	+/-	0.1742
REGCRT10	The case was tried in U.S. Appeals Court Region 10	+/-	0.0294
REGCRT11	The case was tried in U.S. Appeals Court Region 11	+/-	0.1918
RESOLYEAR	The year the case was settled	+/-	1996.70

Table 5.12. Multivariate Analysis of Food Poisoning Jury Verdicts

Independent Variable	Predicted Relationship	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		Win	**Award**	**Win**	**Award**	**Win**	**Award**	**Win**	**Award**
		(Standard Errors)	(Standard Errors)	(Standard Errors)	(Standard Errors)	(Standard Errors)	(Standard Errors)	(Standard Errors)	(Standard Errors)
INTERCEPT		11.973 (27.179)	-262,011.3 (204,677.0)	11.973 (27.179)	-266,084.1 (214,416.0)	86.899 (30.591)	-270,135.4 (233,374.7)	86.899*** (30.591)	-66,700,000** (31,700,000)
CHILD	+	0.585*** (0.195)	528,334.3*** (169,905.4)	0.585*** (0.195)	406,237.0** (173,696.2)	0.613*** (0.217)	393,265.8** (174,101.0)	0.613*** (0.207)	126,691.6 (209,958.5)
HOSPITAL	+	-0.023 (0.153)	196,718.0 (129,667.5)	-0.023 (0.153)	212,656.1* (127,956.9)	0.026 (0.162)	193,274.8 (131,806.2)	0.026 (0.162)	117,880.3 (144,094.2)
DEATH	+	0.029 (0.319)	491,652.9* (295,310.3)	0.029 (0.319)	504,810.9* (289,984.3)	0.041 (0.349)	444,612.7 (289,090.4)	0.041 (0.350)	292,795.9 (314,681.1)
DISTRESS	+		-268,547.7* (157,283.5)		-243,901.0 (154,848.9)	-0.041 (0.208)	-248,979.5 (157,999.0)	-0.041 (0.208)	-292,234.3 (179,603.0)
CHRONIC	+		1,051,550.0*** (188,560.7)		1,058,655*** (186,114.2)	0.504* (0.275)	1,108,751.0*** (196,067.3)	0.504* (0.276)	768,934.5*** (238,423.5)
PAINSUFF	+		85,592.4 (123,718.8)		57,063.2 (124,767.6)	1.563*** (0.218)	88,164.5 (198,332.6)	1.563*** (0.218)	-600,695.6* (310,160.6)
LOSSCONS	+		279,069.3 (193,490.8)		279,930.3 (191,077.9)	0.757** (0.309)	266,551.5 (209,131.8)	0.757** (0.310)	-167,438.20 (265,831.7)
REST	+	0.012 (0.131)		0.012 (0.131)	-46,432.0 (116,480.0)	0.009 (0.139)	-50,961.22 (116,341.7)	0.009 (0.139)	-83,718.97 (129,345.4)
YEAR1993	+	-0.258 (0.203)		-0.257 (0.203)	142,792.1 (125,014.2)	0.015 (0.217)	86,185.7 (154,797.3)	0.015 (0.217)	-42,970.59 (208,425.4)
PUBLIC	+	0.260 (0.243)		0.260 (0.243)		0.308 (0.254)		0.308 (0.254)	
PWITDOC	+	0.055 (0.166)		0.055 (0.166)		0.012 (0.177)		0.012 (0.177)	
DWITDOC	-	-0.563*** (0.187)		-0.563*** (0.187)		-0.538*** (0.198)		-0.538*** (0.198)	
PATHOGEN	+	0.557*** (0.134)		0.56*** (0.13)		0.472*** (0.143)		0.472*** (0.144)	
DEEPPOCKET	+/-	-0.363*** (0.131)		-0.363*** (0.131)	243,767.7** (121,488.5)	-0.367*** (0.141)	255,528.9** (120,229.6)	-0.367*** (0.141)	398,270.0*** (144,649.5)
DEFNEG	+	0.124 (0.149)		0.124 (0.149)		0.109 (0.159)	44,307.8 (145,585.2)	0.109 (0.159)	69,209.9 (157,723.2)

STRICTLIAB	+	-0.011 (0.276)	-0.011 (0.276)	-0.063 (0.287)	9,526.1 (239,216.2)	-0.063 (0.287)	-169,167.8 (259,521.5)
DFTWARN	+	-0.289 (0.232)	-0.289 (0.232)	-0.367 (0.258)	112,003.8 (222,646.3)	-0.367 (0.258)	214,048.7 (242,513.2)
REGCOURT1	+/-	-0.119 (0.324)	-0.119 (0.324)	-0.254 (0.351)		-0.254 (0.351)	751,891.7** (326,676.7)
REGCOURT2	+/-	-0.239 (0.304)	-0.239 (0.304)	-0.316 (0.329)		-0.316 (0.330)	164,881.7 (303,048.2)
REGCOURT3	+/-	0.397* (0.238)	0.397* (0.238)	0.324 (0.255)		0.324 (0.255)	-267,753.9 (231,929.1)
REGCOURT4	+/-	0.927*** (0.319)	0.927*** (0.319)	0.738** (0.337)		0.738** (0.337)	-613,713.3** (300,887.6)
REGCOURT5	+/-	-0.325 (0.225)	-0.325 (0.225)	-0.405* (0.245)		-0.405* (0.245)	434,422.1* (256,604.3)
REGCOURT6	+/-	-0.149 (0.263)	-0.149 (0.263)	-0.072 (0.282)		-0.072 (0.282)	-28,968.7 (273,834.4)
REGCOURT7	+/-	0.531* (0.274)	0.531* (0.274)	0.616** (0.291)		0.616** (0.291)	-217,588.5 (266,967.3)
REGCOURT8	+/-	0.503* (0.272)	0.503* (0.272)	0.398 (0.297)		0.398 (0.297)	-238,064.9 (262,823.8)
REGCOURT9	+/-	0.049 (0.204)	0.049 (0.204)	0.122 (0.217)		0.122 (0.217)	500,439.7** (205,229.9)
REGCOURT10	+/-	-0.108 (0.391)	-0.108 (0.391)	-0.050 (0.405)		-0.050 (0.405)	376,332.6 (395,096.7)
RESOLYEAR	+/-	-0.006 (0.014)	-0.006 (0.014)	-0.044*** (0.015)		-0.044*** (0.015)	33,775.42** (16,061.5)
No. of Observation			511	511	511		511
IMR (lambda)			295,823.20* (178,782.4)	96,929.68 (193,806.0)	68,441.39 (205,671.6)		-768,771.5** (308,692.6)
Wald Test			48.37	55.81	58.90		74.88
Prob > Chi2			0.00	0.00	0.00		0.00
Rho			0.383	0.133	0.095		-0.876
Sigma			772,699.78	728,513.43	720,036.70		877,841.36

[a] REGCOURT11 has been dropped from the analysis
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

In the baseline model specified (Scenario 1), it can be observed that a plaintiff that is a child (CHILD) is an important determinant if a plaintiff won a lawsuit, and increases the probability of winning. When the case was won, child plaintiffs could expect to be awarded $410,657 more than a plaintiff who was not a child. Defendants that employed one or more expert witness (DWITDOC) and deemed to have "deep pockets" (DEEPPOCK) both had a negative effect on the probability of the plaintiff winning. Conversely, plaintiffs that identify a specific foodborne pathogen, toxin, or illness (PATHOGEN), and cases resolved in North Carolina, South Carolina, Virginia, and West Virginia (REGCOURT4) had a positive effect on whether a plaintiff was successful ($p \geq 0.99$).

In evaluating the amount awarded, a plaintiff claiming emotional distress (DISTRESS) had a negative effect, child plaintiffs (CHILD), and cases involving chronic complications (CHRONIC), were positive and statistically significant at the 1 percent level. The Wald Test testing the hypothesis that the coefficients in the model are zero was rejected at the 1 percent level; however, the inverse Mills ratio (IMR) suggests that there is evidence of a sample selection problem in estimating the amount awarded equation. ($t = 1.65$; $p \geq 0.098$).

Alternative model specifications were explored in scenarios two, three, and four. Under Heckman Scenario 2, the award equation was expanded to include lawsuits resolved in 1993 or later (YEAR1993), a restaurant defendant (REST), and defendant that had "deep pockets" (DEEPPOCK). It was reasoned that apart from including variables measuring severity in the award equation, a variable measuring greater public awareness of the potential health and financial impact of FBI subsequent to 1993 would lead to juries more inclined to punish defendants monetarily for injuring their customers. A lawsuit resolved in 1993 or later (YEAR1993) was selected to reflect the increase awareness of food poisoning created by the *E.*

coli outbreak at Jack in the Box restaurants in the same year. Although this variable was included in the multivariate analyses performed by Buzby et al. (2001), it was not found to be statistically significant.

Similarly, injuries due to restaurant meals, in particular, were thought likely to command higher awards because of a restaurants duty of care. Walczak and Reuter (2004) noted that unsafe food handling practice in restaurants in the United States is an example of corporate violence against customers. Although no harm is intended, decisions made by kitchen managers and supervisors out of negligence, the quest for profit, and willful violations of food codes put can customers at risk (Walczak and Reuter, 2004). Thus, juries may be more inclined to punish restaurants defendants for disregarding public safety. In addition, juries are thought to be more likely to view "deep pocket" defendants as caring more about the bottom line at the expense of public health and safety and thus be more apt to penalize them for their lack of compassion.

Lawsuits resolved in 1993 or later (YEAR1993) and "deep pocket" defendants (DEEPPOCK) had a positive impact while restaurant defendants (REST) had a negative effect on the amount awarded. The Wald Test indicated that the true value of the parameters were different from zero. However, the IMR with a t-statistic of 0.5 and corresponding p-value of 0.62 provided no evidence of a sample selection problem.

Building on Scenario 2, in Scenario 3 the selection equation was expanded to include emotional distress (DISTRESS), pain and suffering (PAINSUFF), loss of consortium due to abandonment by family (LOSSCONS), and chronic complications (CHRONIC). The award equation was expanded to include defendant was negligent (DEFNEG), defendant breached implied or expressed warranty of merchantability and fitness (DBREWAR), cause of action was brought strict liability (STRICTLIAB), and defendant failed to warn consumers (DFTWARN).

Controlling for pain and suffering, loss of consortium due to abandonment by family, and chronic complications in the selection equation each had a positive impact, while emotional distress had a negative effect on the probability of the plaintiff winning. When included in the award equation, the various causes of actions were found not to be statistically significant. In addition, the resolution year (RESOLYEAR) had a negative effect on the probability of a plaintiff winning and was statistically significant at the 1% level implying that the probability of winning has decreased over time. The Wald Test concluded that the coefficients in the model were different from zero, while the IMR provided no evidence of a sample selection problem ($t=0.33$; $p \geq 0.74$).

In Scenario 4, the award equation was expanded to include REGCRT1 through REGCRT11 to control for regional differences in award amounts. FBI cases resolved in New Hampshire, Maine, Massachusetts, and Rhode Island (REGCRT1) and Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon, and Washington (REGCRT9) had a positive effect on the amount awarded while North Carolina, South Carolina, Virginia, and West Virginia (REGCRT 4) had a negative effect on the amount awarded at the 5% significance level. In addition, the resolution year (RESOLYEAR) had a negative effect on the probability of a plaintiff winning and a positive effect on the amount awarded and was statistically significant at the 1% and 5% levels respectively. The Wald Test testing the hypothesis that the coefficients in the model are zero was rejected at the 1% level ($t=74.88$; $p \geq 0.0$). The Inverse Mills Ratio (IMR) however, suggests that there is evidence of a sample selection problem in the award equation ($t=-2.49$; $p \geq 0.013$).

In the four scenarios considered, two regional court variables had a positive effect on the probability of plaintiffs winning. REGCOURT4 covering North Carolina, South Carolina,

Virginia, and West Virginia and REGCOURT7 covering Illinois, Indiana, and Wisconsin, were both statistically significant at the 5% level. As such, plaintiffs pursuing cases in these states have a higher probability of winning a FBI lawsuit in comparison to the baseline model, holding all other case characteristics constant. The average plaintiff success rate for states cover by REGCOURT4 was 73.7%.[28] The average plaintiff success rate for states cover by REGCOURT7 was 57.8%. This may help explain the positive effect of both variables of plaintiff success rates.

Among the considered model, Scenario 3 is the preferred specification. Apart from no evidence of sample selection problem, this specification encompasses the most complete list of independent variables in the selection equation and as such is likely to result in more consistent estimates. Specifically, the inclusion of pain and suffering, loss of consortium due to abandonment by family, and chronic complications in the selection equation highlights the importance of these factors in influencing a plaintiff 's probability of winning and thus provide greater insights into FBI litigation outcomes. Based on this model, one can predict that lawsuits involving a child, implicated pathogen, and pain and suffering would increase the probability of the plaintiff winning while defendants use of expert witness, "deep pockets" and resolution year were likely to reduce such probability. Cases involving a child plaintiff and chronic complications are expected to increase the total amount awarded by $393,266 and $1,108751 respectively. "Deep pocket" defendants are likely to increase the amount awarded to plaintiffs by $255,529. Additionally, the findings related to child plaintiffs and chronic complications were consistent with the hypothesized sign, while "deep pocket" defendants was expected to have either a positive and negative effect. In this case, it had a positive effect on the amount awarded.

[28] West Virginia was excluded because no cases were recorded.

Furthermore, only chronic complication was consistent with the findings reported by Buzby et al. (2001).

5.11.1 Discussion and Evaluation of Study Hypotheses

The study hypotheses outlined in Section 1.6 are evaluated in relation to the preferred model specification (Scenario 3). In terms of research hypotheses related to the probability of a plaintiff winning a FBI case settled through jury-trials, the alternate hypothesis that plaintiff(s) ability to link their illnesses to a specific pathogen increases the probability of winning is supported. In addition, the null hypotheses that lawsuits involving "deep pocket" firms decrease the probability of a plaintiff(s) winning and FBI cases involving children will increase the probability of plaintiff(s) winning are supported.

More severe FBI cases are likely to result in higher payouts if the defendant food firm is found responsible. The null hypothesis that FBI involving children will receive a higher award was supported. The alternate hypotheses that FBI cases involving chronic complications or mental or physical disabilities will be awarded higher amounts and "deep pocket" firms are expected to pay higher award amounts if found guilty are also supported.

5.12 Data Limitations and Limitation of Data Analysis

While this study provides insights into the impact of important characteristics of defendants, plaintiffs, and FBI incidents and their impact on outcomes and any subsequent awards in FBI lawsuits, it is not without limitations. In the absence of a national database that captures all FBI lawsuits, development of our databases was reliant greater on jury verdict reporting firms that compile data which is made available through Westlaw and Lexis-Nexis. Information available

in both databases proved problematic in that several cases summaries were missing important specific case information such as the number of days hospitalized or information on food(s) implicated.

While most jury verdict reporting firms collected data from a single state or local jurisdiction, according to Busby et al. (2001), none collected every verdict in their respective areas. This analysis is limited to only cases for which case summaries are available through these sources and, as such it is possible that some cases may have gone unreported resulting in some inadvertent selection bias. It is possible that cases were more completely reported for more popular and/or important jurisdictions such as big cities or counties than smaller counties and towns.

In terms of data analysis, the inclusion of other independent variables that control for jury characteristics (gender, religion, ethnicity and social status) would be worthwhile since it is possible that personal circumstances of a juror may play a pertinent role in their decision making. Including average plaintiff success rates in a jurisdiction in the analysis may also help improve the model specification even though this variable was not found to be significant by Buzby et al. (2001). It is expected that plaintiffs living in states with higher plaintiff success rates in personal injury lawsuits are more likely to win in the subcategory of FBI product liability cases brought before the courts. In addition, the quality of legal representation, the impact of news reports about a specific foodborne incident, and information concerning what, if any, food safety certification a food firm has could not only influence the outcome of the trial but could also impact the amount awarded. Reflecting these considerations in the estimation could help further refine this analysis.

Chapter 6: Conclusions

In its 2013 annual report, the CDC indicated that foodborne infections continue to be an important public health problem in the United States (CDC, 2014a). For those who wish to pursue remedy for their illness through the court system, findings of this study offer interesting insights regarding which factors influence whether a plaintiff is likely to win and affect subsequent amount awarded. This chapter presents a summary of key findings and implications of this study's results. The chapter concludes by offering suggestions of areas for future research.

6.1 Summary of Key Findings

Product liability is a powerful mechanism[29] for shifting the costs of FBI from persons who become ill to the food firms responsible for the contaminated product (Busby et al. 2001). Favorable outcomes and significant awards (for plaintiffs) in FBI lawsuits for plaintiffs can be used to motivate food firms to produce safer foods. Such outcomes may also encourage injured consumers to pursue litigation. However, the presence of high transaction and information costs coupled with the structure of the legal system may limit the effectiveness of FBI litigation in compensating injured consumers while creating disincentives for food firms to produce safer food (Busby et al. 2001).

Key findings of this study include:

1. One-third (34.8%) of cases decided between 1979 and 2014 resulted in positive outcomes and subsequent monetary awards for the party injured by FBI. In comparison, Buzby et al. (2001) found 31.4% of cases resolved between 1988 and 1997 resulted in monetary award for the plaintiff. As such, both findings suggests that plaintiffs failed to

[29] It helps deter or punish wrongdoings.

convince juries that food firms were responsible for their illness in the majority of the examined cases.

2. Compensation to successful plaintiffs ranged from $151 to $6.2M, with average and median awards of $276,148 and $32,264 respectively. As this range of compensation for successful plaintiffs is highly skewed, the median better reflects typical compensation awarded in FBI lawsuits.
3. For FBI cases examined between 1979 and 2014, the median award of $32,264 was lower than the $36,001 (2012 dollars) reported by Busby et al. (2001).
4. Success rates for plaintiffs that suffered a premature death, were hospitalized and survived, and all other cases varied. The expected award in cases involving a premature death ($228,945) was significantly higher in comparison to that for those who were hospitalized and survive ($170,804), and all other cases ($68,069).
5. More than half of the cases settled did not identify a specific pathogen responsible for illness. Where a pathogen was identified, *Salmonella* was the most frequent causal agent accounting for 16.6% of cases examined.
6. In cases examined, success rates of plaintiffs that alleged illness from a specific pathogen (44.4%) or causal agent (44.8%) were significantly greater than in cases where the cause of illness was not identified (27.1%). Similarly, the expected awards in such cases were significantly higher than in cases where the cause of illness was not identified. Thus, where possible, it important for plaintiffs to identify the pathogen that caused their illness in order to convince a jury that the defendant food firm is responsible.

7. Hamburgers and ground beef (12.2%), various types of sandwiches (12.2%) and seafood excluding oysters (12.2%) were the most frequently cited food vehicle among all cases where a food was identified.
8. Plaintiff success rates in cases that alleged illness from a specific food (32.6%) was lower than cases that did not identify a specific food as the source illness (39.5%). The absence of information available on foods implicated in FBI through jury summaries may partially explain this result. However, the expected award for cases that alleged illness from a specific food ($125,438) was significantly higher in comparison to cases where a specific food was not identified ($36,166).
9. More than 50% of defendants were restaurants (including hotel restaurants). Foodstores (13.2%), manufacturers (8.3%), and parent company (8.1%) were the other common defendant types.
10. Due to heat treatment, freezing, and other preparation steps, foods, which have undergone processing generally, carry lower food safety risk than raw foods. Nonetheless, food safety is a significant concern for food manufacturers given the extensive distribution (both geographically, and number of customers) that their products enjoy. It is unclear whether the relatively low food number of cases attributed to food manufactures is due to less risky products originating from this source, or an increased likelihood of food manufacturers opting to settle FBI cases out of court.
11. In cases where gender was clearly identified, there was little difference in success rates between male (34.3%) and female (33.8%) plaintiffs. However, compensation for successful female plaintiffs ($85,355) was almost double that received by successful male plaintiffs ($46,075).

12. Over the last five years, the number of FBI cases settled through the courts has declined by an average of 5 cases per year. As FBI lawsuits may take several years before a final resolution is reached, there may be many incidences of FBI during this period that are not reflected in our dataset.
13. Cases were in Florida, Texas, and California accounted for 38.2% of all cases examined. The large population of these states may explain the high number of cases being brought to trial in these areas.
14. Plaintiff's success rates (47.2%) were higher in cases where public health authority was involved. Because of their expertise and perceived objectivity, expert testimony by public health professionals may help substantiate a plaintiff's case.
15. FBI lawsuits involving children are likely to result in positive outcomes for plaintiff by. Similarly, child plaintiffs are likely to increase the amount awarded by $393,266 in FBI cases. This may be due to juries being more sympathetic to child plaintiffs, and/or due to their health vulnerability, the higher cost of FBI in children due to chronic health complications including disability resulting in years of future medical expenses, supportive care, and loss productivity.
16. Chronic complications that result in some form of long-term injury and/or disability increase the amount awarded by $1,108,751. This may be due to a jury compensating plaintiffs for the loss of utility in terms of leisure, life, and, work productivity for the rest of their lives.
17. Plaintiffs claiming pain and suffering and loss of consortium are likely to increase their odds of winning in FBI lawsuits.

18. “Deep pocket” defendants are likely to reduce the odds of a plaintiff win. This is because “deep pocket” defendants (and their insurers) may possess the financial and legal resources to successfully respond to FBI claims.
19. Defendants that employ one or more expert witnesses are likely to reduce the odds of a plaintiff win. This is because expert testimony can discredit a plaintiff’s claims.
20. “Deep pocket” defendants also have a positive impact on the amount awarded. A possible explanation is that deep pocket firms maybe seem as profit driven and hence, a jury may penalize them for FBI linked their operations.
21. Although the expected monetary compensation in FBI lawsuits has increased, plaintiffs have little incentive to pursue litigation because of cost shifting among health insurance and employers.

Although this research examined only FBI resolved through court trials, the overall impact of FBI is not limited to the outcome of jury trials. In general, product liability has broader implications than those suggested by the value of awards and settlements reported in this study. Apart from helping to restore tort victims to their pre-injury condition, product liability plays the important role of deterrence. In addition, the negative publicity that product liability trials bring may encourage other lawsuits to be filed. Thus, food firms may be more inclined to take preventative actions instead of reacting to claims of FBI through product liability litigation.

In addition, and apart from court cases, there are four broad categories of FBIs: illnesses that are never linked to a supplier or vendor, illnesses that are linked to a supplier or vendor that are not worth pursuing, illnesses that are linked to a supplier or vendor that a firm agrees it caused and settles, and FBI that an accused supplier settles even though it does not agree that

they are at fault for the illness. The prevalence and aggregate health impacts of these other types of FBI cases are likely dwarf those pursued through jury trials. The relative importance of court cases is still noteworthy in that it provides a vehicle for remedy for those who have been most adversely affected by FBI, and the negative publicity surrounding court cases and resulting negative revenue and stock price impacts may serve as a deterrent for negligent food safety behavior. (The actual case awards to plaintiffs and the expense of court cases is also expected to be a deterrent to poor food safety behavior; these expenses, however, are likely dwarfed by those due to reputational impacts.)

The food marketing system, including food service and food retailing, supplied about $1.24 trillion worth of food in 2010 (ERS, 2015). In light of these findings, the cost to the food industry of jury-awarded liability cases in many ways is insignificant when compare to the value of food supplied. However, one must recognize that the cost to the food industry resulting from jury awards is only one part of the analysis. Importantly, there are other costs such as amounts awarded through settlements, arbitration, and mediation that are not included. Additional costs of FBI incidents also include but are not limited to the cost higher insurance premiums, and the potential for fines imposed by regulatory agencies. In aggregate, these costs may be a notable expense for food industry firms.

The results are important to food producers because it provide insights regarding important characteristics of FBI litigation. The findings may also encourage food producers to adopt changes in internal food safety practices, policies, and procedures that could help mitigate the risk associated with FBI claims.

6.2 Policy and Industry Guidance

The findings of this research offer important policy implications for the food industry. The findings may also help support and influence policy decisions at the federal, state, and local government levels while providing the basis for policy changes in the insurance and health industries.

6.2.1 Policy Implications for Food Industry

Findings of this research may provide incentive for firms in the food supply chain to improve their operations to produce safer foods. Changes in food firm behavior can minimize the risk associated with FBI and thereby reducing the costs borne by other stakeholders (e.g. employers, private health insurers, government) of the economy (Busby et al. 2001). Specifically, corporate policies may play an important role to prevent and/or mitigate the impact of a FBI incident. For instance, developing a corporate code of ethics that outlines a food firm's expectations regarding employee behavior and responsibility is a key component of its food safety efforts. To implement this, investment in management and employee ethics training can help reinforce the code of ethics and provide employees with greater awareness of ethical considerations and practices in the food industry. Also, whistleblower protection for employees that report food safety irregularities is important to reinforcing a firm's commitment to food safety efforts.

Vasconcellos (2004) stressed the importance of employee education and training, process improvement and interaction between a company's quality assurance, quality control, product development, marketing, sales, and consumer affairs department. To help reduce potential for a FBI incident, these findings may also encourage food firms to implement additional internal and external food safety training, and feedback mechanisms such as quality circles, and/or the

establishment of a formal safety committee that could review quality assurance and quality control reports for manufactured food products. In addition, a firm can incorporate as part of its communication strategy, procedures to monitor and report FBI in a timely manner.

Labels identifying food allergens, ingredients, food and color additives, food contact substances can help prevent FBI. Including instructions or warnings on food labeling and packaging may help food firms reduce the occurrence of FBI and any subsequent litigation that may follow. For example, including suggested cooking times on raw meat, labels warning of the risk involved in consuming undercooked meat products may help prevent the occurrence of FBI. Similarly, restaurants' menu warnings regarding the consumption of raw fish can help inform consumers of the health risk involved. Furthermore, firms need to ensure that food product labels are clear, concise, accurate, and easy to understand.

The adoption of an Enterprise Quality Management System (EQMS) that connects existing disparate systems, including enterprise resource planning (ERP), logistics information management system (LIMS), customer relationship management (CRM) and with other IT systems for a closed-loop solution may also enhance overall food safety efforts through standardization of processes that ensure compliance with regulatory and other industry specific initiatives (Kuchinski, 2014).

Given the high costs to food firms in terms of awards, future litigation, and lost reputation, these findings can also influence a defendant's decision of whether to pursue litigation or settle out of court. At the onset, significant legal and administrative costs are incurred to defend FBI product liability claims. According to the Searle Center on Law, Regulation, and Economic Growth (2010), average outside litigation cost per respondent was approximately $115 million in 2008. In addition, average annual litigation costs as a percent of

revenues increased by 78% between 2000 and 2008. Discovery costs, that include searching, retrieving, reviewing and producing electronic information, cost an average of $621,880 to $2,993,567 per case between 2006 and 2008 (Searle Center on Law, Regulation and Economic Growth, 2010). In the event of an unsuccessful defense, however, compensatory and punitive damages awarded against food firms may have an even greater impact on a firm's short-term performance and long-term survival. Considering the characteristics that give rise to plaintiff success for a specific FBI case, food firms can make more informed decisions about case strategy and potentially reduce their cost of a FBI incident by agreeing to a settlement.

Food safety certification helps to demonstrate that a food supplier food safety and quality management system goes beyond domestic food safety regulations to further protect the safety of the food supply. Food safety certifications programs (including those for raw materials and ingredients), supplier quality programs, HACCP audits, and identity preserved-ingredient systems (Vasconcellos, 2004) can enhance overall food safety. In addition, firms in the food industry can also require that those in their supply chain (wholesalers and retailers) obtain a food safety certification, which require that they are subjected to third party audits and periodic recertification. Such audits may include product manufacturing audits, food plant sanitation audits, and product quality audits (Vasconcellos, 2004). Possessing a food safety certification may be seen as a proactive step to assure safety and quality thereby may decrease the likelihood of punitive damages in a case of FBI.

6.2.2 Policy Implications for Government Agencies

In response to the findings of this study, federal, state, and local government agencies can also update and/or upgrade policies that support overall food safety efforts. Consumer education is

one area that can be addressed primarily at the state and local levels of government. Consumer education programs that focus on good hygiene practices, cooking foods adequately, avoiding cross contamination, storing foods at safe temperatures, and avoiding foods and water from unsafe sources are paramount to FBI prevention (Medeiros et al. 2000). Government agencies with responsibility for agriculture and health can create greater public awareness of FBIs through infomercials, food safety newsletters, and videos that increase consumer awareness about causes and consequences of FBI and disseminate pertinent information about food safety best practices.

Through the introduction of additional new legislation, specific responses by the federal government could include mandatory surveillance, coordination and information sharing across states and various agencies, mandatory inspection of certain foods, and increase funding to support inspection of high-risk foods identified. Currently, only ten states health departments are part of the Foodborne Diseases Active Surveillance Network (Foodnet). A federal regulation could mandate all other states to be part of this collaborative surveillance program. Doing so would greatly enhance the quality of information gathered on FBI by providing a more accurate picture of the number of FBIs, trends in incidence of specific FBIs over time, and important attributes of foods and setting that can be used to bolster food safety policy and prevention efforts. The success of such a policy would require increase federal oversight of individual state surveillance efforts, establishment of specific surveillance standards and reporting requirements, and information sharing among all stakeholders.

State specific actions could also increase surveillance of major FBI causing organisms. Individual states decide on which FBI should be under surveillance and only the more impactful pathogens are being tracked and reported. Currently, *Campylobacter, Cryptosporidium, Cyclospora, Listeria, Salmonella,* Shiga toxin-producing *Escherichia coli* (STEC) O157 and

non-O157, *Shigella, Vibrio*, and *Yersinia* are under surveillance in 10 states as part of the Foodborne Diseases Active Surveillance Network (FoodNet). However, tracking and reporting of other less common FBI causing pathogens such as *Cyclospora* and *Vibrio* vulnificus may be beneficial to the overall fight against FBI. However, such efforts would require considerable financial resources to be successful. At the local government level, responses may entail more frequent inspection of local restaurants, food stores, and other food establishments to ensure that they are up to health code standards.

6.2.3 Policy Implications for Insurance Industry

While insurance providers have a general idea of risk factors related to the food industry, risk associated with individual companies varies widely. FPLI providers can use the findings of this study to better understand and assess various risk conditions based on the characteristics of individual food firms. The knowledge gained from such assessment, coupled with conditions specific to individual food firms, can be used to develop insurance products that target a specific type of food firm or address specific insurable risk. For example, a FBI lawsuit involving a child plaintiff increases the chance of winning and has a positive effect on the award amount. Insurance providers could use this information to better price and package FPLI policies that reflect the risk associated with food firms whose products are primarily consumed by children.

The introduction of FSMA gave the FDA mandatory recall powers in the interest of overall public safety. Since the decision to recall food products implicated as the source of FBI no longer rests with individual food firms, recall insurance that covers expenses such as customer notification, shipping, and disposal costs is now even more important. A proactive food firm can avoid an involuntary recall by voluntarily recalling its product. It is important to note,

however, that recall insurance usually covers only mandatory recalls. A firm who wishes to be proactive in their product recalls usually does not have this cost covered by insurance.

The findings of this study highlight the financial implications to food firms involved in FBI lawsuits while making a strong case for a change in scope of current recall insurance policies especially as it relates to large manufacturers, processors and producers whose products are widely distributed and sold. Regardless of the type of insurance coverage being sought, the findings of this study could help influence insurance premiums decisions and allow providers to better market insurance products to food firms on a case-by-case basis.

6.3 Future Work

Although this research concentrated on FBI product liability cases that reached legal resolution through the court system, future research could extend the analysis by including FBI cases that were settled out-of-court. Insight into the amounts, and examining the factors that influence out of court settlements would provide important further insights regarding the costs associated with food safety. Including information on appeals made by either party in this analysis could enhance these results. This is especially important in cases where the decision was reversed in favor of either party since the amounts awarded would change.

The multifaceted nature of this topic also encourages further research in related areas. One appealing research avenue would be to examine the effects of product liability litigation on firms' performance and see whether FBI court cases lead to a change in firm behavior. Such research may encompass the examination of both financial and non-financial indicators. Non-financial indicators specific to the food industry may include firm's adoption of food safety certification, and also requiring partners and suppliers to have a food safety certification,

implementing a corporate whistleblower program, company policies emphasizing food safety, increased ethics and food safety training for employees, and increased third party audits.

In the case of publicly traded companies, research focusing on share prices, insurance premiums, market share, sales revenues, earnings per share, gross and net profits can help determine the overall impact of litigation on firms' financial performance and market position. Such findings may also be used to further bolster the incentive for firms to produce safer and better quality foods while providing greater information and awareness to current and future investors regarding the riskiness of their investments in food firms. Finally, future research could examine the time-to-trail (time that elapse between the date of incident and date of final resolution) to help determine actual lags rates in FBI cases.

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Appendices

Appendix A: Compensation in Foodborne Illness Court Cases by Award Year, (1979-2014)[a]

Award Year	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	Percent	----------2012 Dollars----------		
1979	1	100	55,362	55,362	55,362
1980	0	-	-	-	-
1981	1	100	25,251	25,251	25,251
1982	2	50	237,921	237,921	118,961
1983	3	100	311,197	57,629	311,197
1984	1	100	14,987	14,987	14,987
1985	3	67	19,181	19,181	12,787
1986	14	50	45,209	31,420	22,605
1987	10	40	61,432	68,206	24,573
1988	8	25	14,561	14,561	3,640
1989	20	55	214,746	27,781	118,110
1990	25	36	383,050	49,930	137,898
1991	30	27	236,479	8,429	63,061
1992	30	37	152,449	60,993	55,898
1993	26	50	479,551	31787	239,776
1994	33	21	182,167	56,782	38,641
1995	41	37	120,982	15067	44,262
1996	44	16	56,879	18,297	9,049
1997	25	16	144,575	153,268	23,132
1998	23	30	167,241	22,184	50,899
1999	18	33	133,803	90,793	44,601
2000	17	29	90,158	83,331	26,517
2001	13	62	1,516,679	1,578	933,341
2002	19	26	57,068	25,528	15,018
2003	15	40	32,913	26,834	13,165
2004	12	33	61,380	39,638	20,460
2005	6	33	62,897	62,897	20,966
2006	8	50	1,896,113	1,950,376	948,057
2007	12	25	198,210	276,829	49,553
2008	17	35	8,353	7,998	2,948
2009	8	50	22,816	18,056	11,408
2010	11	27	320,599	147,408	87,436
2011	6	67	693,120	658,347	462,080
2012	3	67	14,123	14,123	9,415
2013	5	40	41,886	41886	16,754
2014	1	0	-	-	-
All Years	511	34.83	276,148	32,264	96,192

[a] Only 511 of the 512 court decisions had award information so the award totals do not represent statistics for all court awards.
[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

Appendix B: Compensation in Foodborne Illness Court Cases by State, (1979-2014)[a]

State	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	Percent	----------2012 Dollars----------		
AK - ALASKA	2	-	-	-	-
AL - ALABAMA	14	-	-	-	-
AR - ARKANSAS	2	100	13,588	13,588	13,588
AZ - ARIZONA	7	71	23,195	18,733	16,568
CA - CALIFORNIA	56	29	714,393	161,138	204,112
CO - COLORADO	0	-	-	-	-
CT - CONNECTICUT	6	33	15,632	15,632	5,211
DC – DISTRICT of COLUMBIA	1	-	-	-	-
DE - DELAWARE	0	-	-	-	-
FL - FLORIDA	74	36	261,573	57,629	95,439
GA - GEORGIA	10	30	5,252	2,817	1,575
HI - HAWAII	2	-	-	-	-
IA - IOWA	3	67	36,998	36,998	24,665
ID - IDAHO	0	-	-	-	-
IL - ILLINOIS	17	41	74,192	48,305	30,550
IN - INDIANA	7	57	40,614	42,810	23,208
KS - KANSAS	5	40	18,442	18,442	7,377
KY - KENTUCKY	3	67	68,709	68,709	45,806
LA - LOUISIANA	9	33	275,553	124,307	91,851
MA - MASSACHUSETTS	11	27	1,709,788	1,748,278	466,306
MD - MARYLAND	3	67	117,020	117,020	78,013
ME - MAINE	7	29	542,916	542,916	155,119
MI - MICHIGAN	15	33	58,567	30,388	19,522
MN - MINNESOTA	5	40	88,331	88,331	35,332
MO - MISSOURI	18	28	136,369	19,415	37,880
MS - MISSISSIPPI	1	-	-	-	-
MT - MONTANA	0	-	-	-	-
NC - NORTH CAROLINA	5	80	115,283	110,663	92,226
ND - NORTH DAKOTA	0	-	-	-	-
NE - NEBRASKA	4	100	11,997	10,664	11,997
NH - NEW HAMPSHIRE	2	-	-	-	-
NJ - NEW JERSEY	22	55	91,198	40,826	49,745
NM - NEW MEXICO	3	33	864,435	864,435	288,145
NV - NEVADA	3	33	11,526	11,526	3,842
NY - NEW YORK	23	30	274,961	219,651	83,684
OH - OHIO	23	13	7,756	1,297	1,012
OK - OKLAHOMA	5	20	6,045	6,045	1,209
OR - OREGON	4	25	6,159,099	6,159,099	1,539,775
PA - PENNSYLVANIA	29	45	35,711	12,715	16,008
RI - RHODE ISLAND	2	100	68,976	68,976	68,976
SC - SOUTH CAROLINA	7	57	14,583	12,461	8,333
SD - SOUTH DAKOTA	0	-	-	-	-
TN - TENNESSEE	4	50	13,560	13,560	6,780
TX - TEXAS	65	17	301,086	49,306	50,953
UT - UTAH	2	-	-	-	-

VA - VIRGINIA	7	86	75,624	59,066	64,820
VT - VERMONT	0	-	-	-	-
WA - WASHINGTON	15	40	1,008,560	14,652	403,424
WI - WISCONSIN	8	75	2,797	2,536	2,098
WV - WEST VIRGINIA	0	-	-	-	-
WY - WYOMING	0	-	-	-	-
All States	511	35	276,148	32,264	96,192

[a] Only 511 of the 512 court decisions had award information so the award totals do not represent statistics for all court awards.

[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

Appendix C: Stata Commands

```
gen FINAL_AMTAWARDED =  AMTAWARDED if AMTAWARDED >0
```

Scenario 1

```
heckman  FINAL_AMTAWARDED CHILD DEATH DISTRESS PAINSUFF LOSSCONS
CHRONIC HOSPITAL, select (YEAR1993 CHILD HOSPITAL DEATH REST PUBLIC
PWITDOC DWITDOC PATHOGEN DEEPPOCKET DEFNEG DBREWAR STRICTLIAB
DFTWARN REGCOURT1 REGCOURT2 REGCOURT3 REGCOURT4 REGCOURT5
REGCOURT6 REGCOURT7 REGCOURT8 REGCOURT9 REGCOURT10 REGCOURT11
RESOLUTIONYEAR) twostep
```

Scenario 2

```
heckman  FINAL_AMTAWARDED CHILD DEATH DISTRESS PAINSUFF LOSSCONS
CHRONIC HOSPITAL REST DEEPPOCKET YEAR1993, select (YEAR1993 CHILD
HOSPITAL DEATH REST PUBLIC PWITDOC DWITDOC PATHOGEN DEEPPOCKET
DEFNEG DBREWAR STRICTLIAB DFTWARN REGCOURT1 REGCOURT2 REGCOURT3
REGCOURT4 REGCOURT5 REGCOURT6 REGCOURT7 REGCOURT8 REGCOURT9
REGCOURT10 REGCOURT11 RESOLUTIONYEAR) twostep
```

Scenario 3

```
heckman  FINAL_AMTAWARDED CHILD DEATH DISTRESS PAINSUFF LOSSCONS
CHRONIC HOSPITAL REST DEEPPOCKET YEAR1993 DEFNEG DBREWAR
STRICTLIAB DFTWARN, select (YEAR1993 CHILD HOSPITAL DEATH REST PUBLIC
PWITDOC DWITDOC PATHOGEN DEEPPOCKET DEFNEG DBREWAR STRICTLIAB
DFTWARN REGCOURT1 REGCOURT2 REGCOURT3 REGCOURT4 REGCOURT5
REGCOURT6 REGCOURT7 REGCOURT8 REGCOURT9 REGCOURT10 REGCOURT11
RESOLUTIONYEAR DISTRESS CHRONIC PAINSUFF LOSSCONS) twostep
```

Scenario 4

```
heckman  FINAL_AMTAWARDED CHILD DEATH DISTRESS PAINSUFF LOSSCONS
CHRONIC HOSPITAL REST DEEPPOCKET YEAR1993 DEFNEG DBREWAR
STRICTLIAB DFTWARN REGCOURT1 REGCOURT2 REGCOURT3 REGCOURT4
REGCOURT5 REGCOURT6 REGCOURT7 REGCOURT8 REGCOURT9 REGCOURT10
REGCOURT11 RESOLUTIONYEAR, select (YEAR1993 CHILD HOSPITAL DEATH REST
PUBLIC PWITDOC DWITDOC PATHOGEN DEEPPOCKET DEFNEG DBREWAR
STRICTLIAB DFTWARN REGCOURT1 REGCOURT2 REGCOURT3 REGCOURT4
REGCOURT5 REGCOURT6 REGCOURT7 REGCOURT8 REGCOURT9 REGCOURT10
REGCOURT11 RESOLUTIONYEAR DISTRESS CHRONIC PAINSUFF LOSSCONS)
twostep
```

Appendix D: Lexis Nexis and WestLaw Databases Systematic Search Process

To obtain the population of foodborne product liability cases that reach resolution through the courts, searches were conducted in WestLaw and Lexis Nexis databases. Apart from using general search terms such as food poisoning and foodborne illness, searches were conducted using common foodborne illness such as *E. coli*, Botulism, *Salmonella*, and Hepatitis individually and together with food poisoning in the search criteria.

WestLaw Database Search

The Jury Verdicts and Settlements database under WestLaw was used to conduct the search for cases involving foodborne illness. For the purpose of this research, searches were done without refining or restricting the search by date or product liability subcategory to ensure that all cases in the database relating to foodborne illness were being captured. Once each search was completed, the number of hits obtain was recorded to keep track of cases found.

Lexis Nexis Database Search

Similar to WestLaw, Lexis Nexis Academic was used to conduct searches for the various search terms. Searches were performed under the Federal and State cases option that allows you to search with in all federal and state cases. Once each search was completed, the number of hits obtain was also recorded to keep track of the number of cases found. The table in Appendix E reflects the total number of cases found under each database.

Cases found under each search were extracted and recorded in an Excel workbook with separate tabs containing each search term results. As part of the preliminary review, each tab contained columns reflecting case name, brief description, date, and relevance to food foodborne

illness. If the description indicated the case was related to foodborne illness a “yes” was entered into the relevance column, otherwise a “no” was entered. At the completion of all searches and preliminary review, only relevant cases were kept.

Cases deemed relevant under each search term or combination of terms were then combined into a single workbook and sorted by case title to identify and remove duplicates cases that arise from multiple searches. With duplicates removed, case summaries for the remaining cases were downloaded for further examination and review in order to build the database. This process provided a complete audit trail of how the final population of cases was obtained.

Appendix E: Lexis Nexis and WestLaw Search Results as of September 2014.

First Term		Second Term	Lexis Nexis	WestLaw
Botulism			140	2
Campylobacter			81	12
Campylobacteriosis			7	3
Ciguatera			21	5
Ciguatoxin			6	3
Clostridium			147	1
Cryptosporidium			34	3
Cyclospora			3	1
E. coli			539	29
Hepatitis			525	43
Listeria			81	2
Listeriosis			19	1
Salmonella			567	76
Shigella			68	8
Staphyloccocus			7	0
Toxoplasma			16	0
Toxoplasmosis			104	15
Trichinella			13	2
Trichinosis			125	1
Vibrio			42	4
Yersinia			20	2
Norovirus			23	1
Foodborne Illness			38	167
Food borne Illness			130	213
Food Poisoning			543	254
Food Poisoning	AND	Botulism	32	1
Food Poisoning	AND	*Campylobacter*	21	10
Food Poisoning	AND	Campylobacteriosis	0	2
Food Poisoning	AND	Ciguatera	4	5
Food Poisoning	AND	Ciguatoxin	2	2
Food Poisoning	AND	*Clostridium*	8	0
Food Poisoning	AND	*Cryptosporidium*	0	0
Food Poisoning	AND	*Cyclospora*	0	1
Food Poisoning	AND	*E. coli*	30	26
Food Poisoning	AND	Hepatitis	49	15
Food Poisoning	AND	*Listeria*	6	2
Food Poisoning	AND	Listeriosis	3	0
Food Poisoning	AND	*Salmonella*	161	76
Food Poisoning	AND	*Shigella*	14	8
Food Poisoning	AND	*Staphyloccocus*	1	0
Food Poisoning	AND	*Toxoplasma*	0	0
Food Poisoning	AND	Toxoplasmosis	0	0
Food Poisoning	AND	*Trichinella*	1	0
Food Poisoning	AND	Trichinosis	5	1
Food Poisoning	AND	*Vibrio*	4	4
Food Poisoning	AND	*Yersinia*	1	0
Food Poisoning	AND	Norovirus	1	1
Total			**3,639**	**1,002**

Appendix F: Variable Construction

No. – The numbering of cases sorted in alphabetical order of case title starting with the number 1 and ending with the number 512.

Case Title – The name of the parties involved in the foodborne illness lawsuit obtained from the WestLaw and Lexis Nexis searches conducted.

Description – A brief description of all new cases found was captured as part of the initial search. Existing cases are referenced as "Case from Original Study" since this variable did not exist in the original database.

Date – This is the date of the final verdict or resolution of the case.

Relevance – This variable was created to enable the researcher to sort through all hits obtained in order to extract only those cases related to foodborne illness. In the current version of the data set only cases that are relevant were retained.

Database – This refers to the source of the case. That is, either WestLaw or Lexis Nexis. There are a few cases from the original study that was not found and for the time being this variable is coded as WestLaw/Lexis Nexis.

Database ID – Refers to the WestLaw or Lexis Nexis database number associated with each case. In WestLaw, this number immediately follows WL in each case summary while in Lexis Nexis, the number immediately follows LEXIS in each case summary.

ERS Data – This variable was coded with a 1 if the case was part of the original database. If it is a new case, the variable was left blank.

ERS Data Analyzed - This variable was coded with a 1 if the case was part of the original analysis conducted by ERS.

State – The name of the State the case was filed and resolved.

Resolution Year – The year of the verdict or final resolution of the case. This variable ranged from 1979 to 2014.

Title – The name of the parties involved in the foodborne illness lawsuit obtained in the WestLaw and Lexis Nexis searches conducted. This is a duplication of the Case Title above and was done to ensure that the cases in the original database were properly aligned with the new cases found.

Court – The name of the court that the case was heard was entered under this variable.

County – The name of the county/city and the respective State if available was entered under this variable.

Incident Date – The actual date of the incident (Month and Year) if available, was entered under this variable.

Filing Date - The date the lawsuit was filed (Month and Year) if available, was entered under this variable.

Trial/ Settlement Date - The date of the final verdict or decision (Month and Year) if available, was entered under this variable.

Incident to Trial (Months) – This variable is determined as the difference in months between the date of the incident and the date of the trial or settlement. In cases where only the incident date or the trial/settlement date was available, this variable was left blank.

Outcome – This variable indicates who won the case and was coded with a "P" for plaintiff verdict and a "D" for defense verdict.

Trial – This variable captures whether the case was settled by a trial (T). Since the study only focuses on jury trials, all cases included were settled by trail.

Settlement – This variable captured whether or not the case was settled before a final verdict. Since this study focuses only on cases that reached a final verdict, this variable was left blank for the cases being analyzed.

Dollar Amount – The final dollar amount awarded to the plaintiff was entered under this variable.

Number of Other Defendants Settled Earlier – This variable captures the number of defendant that settled similar cases earlier with the defendant. For the most part, this information was not available as part of the WestLaw and Lexis Nexis case summaries examined.

Outbreak - This variable captured whether the case involved a possible food poisoning outbreak between a family, possible non-family outbreak and definite non-family outbreak. Unless specifically indicated in the case summaries, this variable was coded with a 0 – No Information.

JIB Outbreak – This variable was coded with a "1- Yes" if the lawsuit involved Jack in the Box or its parent company as the defendant and "0 –No" for all other defendants.

Gender – This variable was coded with "M- Male" and "F-Female" if the gender of the plaintiff was clearly indicated, the narrative referenced the plaintiff with a pronoun (he, she, him, her) or the name of the plaintiff would otherwise indicate gender. In cases where there are more than one plaintiff and unless it could be clearly ascertain that the gender of all plaintiffs were the same, "MU – Multiple Male and Female" was used as in the case of a lawsuit involving a husband and wife or food poisoning involving school children. In the rare instance involving children whose identity and gender was kept private, "P-Private" was used for this variable. If the gender could not be otherwise determined, "NI – No Information" was coded.

Number of Plaintiffs (IF>1) – This variable captured the number of plaintiffs involved in the foodborne illness lawsuit. The majority of the cases involved a single plaintiff. However, several cases did have more than one plaintiff and was coded as such.

Number Ill No Age Specified – If the age of the plaintiff(s) was not specifically stated in the case summary, the number of plaintiff involved in the lawsuit was entered under this variable. For instance, if the case summary noted the plaintiff as an adult but does not give a specific age; the case summary referred to the plaintiff in her early 50s but did not give an exact age; the case summary referenced a minor child without providing the actual age, the actual number of plaintiffs whose age was not provided was entered under this variable. In cases where the actual age was stated, this variable was left blank.

Number of Adults Ill (>=18 Years) – This variable captured the number of plaintiff(s) that were adults. This was determined by either the specific age stated in the case summary or other facts contained in the summary. For instance, if the case summary stated "an adult of undetermined age" or a "married female", or a "retiree" etc. In these cases, once it can clearly be determined based on the information included in the summary narrative that the plaintiff is an adult; this variable was coded as such.

Number of Pregnant Ill – Cases involving a pregnancy at the time of the incident was coded with the number of plaintiff(s) that was pregnant. These include cases where the baby was affected by the food poisoning but the case was brought after the pregnancy had ended. For instance, cases that involved a parent suing on behalf of a child born with mental or physical challenges.

Number of Children Ill (Age Unknown) – This variable captured the number of child/children whose age was not specifically stated in the case summary. Even though the case summary may have noted a minor child was injured, since the age was not explicitly stated the number of children that became ill was entered under this variable.

Number of Children Ill (<5 Years) – The number of child/children whose age was explicitly noted in the case summary as being under five (5) years old was entered under this variable. In certain cases where the child was referenced as an infant and was treated as age unknown in the above variable, it was also entered under this variable since an infant refers to a child under the age of five (5) years old.

Number of Children Ill (5-9 Years) - The number of child/children plaintiff(s) whose age was explicitly noted in the case summary as falling within this age range was entered under this variable.

Number of Children Ill (10-17 Years) - The number of child/children whose age was explicitly noted in the case summary as falling within this age range was entered under this variable.

Number Hospitalized (No Aged Specified) – The number of plaintiff(s) whose age was not explicitly specified was entered under this variable.

Number of Adults Hospitalized - The number of plaintiff(s) whose age was explicitly specified was entered under this variable. In addition, plaintiff(s) whose age was not specified but were deemed to be an adult based on other information included in the case summary were included under this variable.

Number of Children Hospitalized - The number of child/children plaintiff(s) whose age was explicitly specified was entered under this variable. In addition, plaintiff(s) whose age was not specified but were deemed to be an a child as in the cases of infants or minors based on other information included in the case summary were included under this variable.

Total Number of Days Hospitalized – The actual number of days spent in the hospital was entered under this variable. In case summaries where hospitalization was mention but a specific number of days were not stated, this variable was coded as "Not Stated" or "Several" or as the information provided warranted.

Age if Death – If the person that suffered food poisoning died, the age of the person was entered under this variable. In cases where a death was involved but no age was stated in the case summary, a comment to this effect was made under this variable.

Number of Emotional Distress – If the plaintiff claimed emotional/psychological distress a one (1) was entered under this variable, otherwise a zero was entered.

Number of Husband & Kid Not Ill – In cases where a mother became ill while the husband and child did not, the number of person(s) that did not suffer from food poisoning was entered under this variable.

Number of Congenital Injury – If the case summary indicated that the plaintiff suffered chronic complications or long term injuries such as brain damage, kidney damage requiring dialysis etc. a one (1) was entered under this variable, otherwise a zero was entered.
Other Injuries Sustained – Under this variable other injuries suffered by the plaintiff(s) as a result of food poisoning was recorded.

Plaintiff Paid Costs – If the case summary indicated that the plaintiff paid or claimed past medical costs or any other costs, a one (1) was entered under this variable, otherwise a zero was entered.

Food (If Specified) – The specific food involved in the food poisoning case was entered. In cases where the specific food was not evident, an entry to this effect was made as "Not Specified".

Food Code – Based on the food indicated above, it was classified into specific categories as detailed in the codebook. In cases where the specific food was not evident, an entry to this effect was made as "Not Specified".

Pathogen (if Specified) – The specific pathogen or reason for the alleged food poisoning as detailed in the codebook was recorded under this variable. In cases where the pathogen was not specified, an entry to this effect was made as "Not Specified".

Pathogen Code – The pathogen code recorded was based on the specific pathogen indicated above.

Defendant – The Name of the defendants and or co-defendants was recorded under this variable.

1st Defendant – The type of business of the 1st defendant was recoded under this variable based on the classification outlined in the codebook.

1st Defendant Paid – In the event of a plaintiff verdict, the actual amount the 1st defendant paid was recorded under this variable. In cases where there were more than one defendant but the amount paid by each defendant is not indicated, it was assumed that the first defendant paid the entire amount.

2nd Defendant - The type of business of the 2nd defendant was recoded under this variable based on the classification outlined in the codebook.

2nd Defendant Paid - In the event of a plaintiff's verdict, the actual amount the 2nd defendant paid was recorded under this variable.

3rd Defendant - The type of business of the 3rd defendant was recoded under this variable based on the classification outlined in the codebook.

Type of Business under Parent Company – This variable captured whether the place where the food poisoning occurred was a restaurant even though the parent company or an individual owner may have been sued.

Restaurant Code – If a restaurant was the defendant in the food poisoning case, this variable recorded the specific restaurant as outlined in the codebook classification.

Public Health Authority Involved – If a governmental organization such as the department of health or CDC was involved in providing evidence, conducting testing of food and or inspection of the defendant place of business, a one (1) was recorded under this variable.

Plaintiff Used Medical Witness (Number) – The number of specific medical witnesses used by the plaintiff as indicated in each case summary was recorded under this variable.

Plaintiff Used Other Witness (Number) - The number of other witnesses used by the plaintiff as indicated in each case summary was recorded under this variable.

Defendant Used Medical Witness (Number) - The number of specific medical witnesses used by the defendant as indicated in each case summary was recorded under this variable.

Defendant Used Other Witness (Number) - The number of other witnesses used by the defendant as indicated in each case summary was recorded under this variable.

Unspecified Specials ($) – The dollar amount of any compensation the plaintiff received that was classified as "specials" in the case summaries was recorded under this variable.

Claimed Medical Costs ($) – The dollar amount of medical costs (past and future) claimed by the plaintiff was recorded under this variable.

Claimed Loss of Productivity Costs ($) - The dollar amount related to loss wages or employment (past and future) claimed by the plaintiff was recorded under this variable.

Claimed Travel or Other Specified Costs - The dollar amount related to travel or legal fees claimed by the plaintiff was recorded under this variable.

Pain and Suffering – If the plaintiff claimed pain and suffering under the lawsuit, a one (1) was recorded under this variable. In addition, if the award included an amount specifically for pain and suffering, one (1) was recorded under this variable.

Loss Consortium – If the plaintiff 's family (spouse, children) claimed lost of services of the injured person, a one (1) was recorded under this variable.

Negligence – If the plaintiff claimed that the defendant acted negligently such as failure to train or supervise staff, failure to properly store food at correct temperatures, failure to ensure proper hygiene of staff, failed to take due care or any other similarly phrased claims that is tantamount to negligence, a one (1) was recorded under this variable.

Breach of Warranty - If the plaintiff claimed that the defendant breached implicit or explicit warranty of fitness, a one (1) was recorded under this variable.

Strict Liability – If it was indicated in the case summary that the plaintiff brought the suit under strict liability, a one (1) was recorded under this variable.

Failure to Warn - If it was indicated in the case summary that the plaintiff claimed the defendant failed to adequately inform them of the dangers of consuming a specific food item whether verbally or in writing included on a menu, a one (1) was recorded under this variable.

Defense Argues Wrong Time for Illness – If the defendant argued that the plaintiff's symptoms or proximate time of injury were not consistent with the incubation period of the specific pathogen identified by the plaintiff as the cause of his or her illness, a one (1) was recorded under this variable.

Defense Argues No One Else Got Sick - If the defendant argued that no one else complained of becoming ill during the time the plaintiff claimed he or she was injured, a one (1) was recorded under this variable.

Defense Admits Liability – If the defendant specifically admitted liability, a one (1) was recorded under this variable.

Defense Argues Plaintiff Had Pre-existing Illness - If the defendant argued that the plaintiff had a pre-existing medical condition(s) and that such condition(s) was the likely caused of or exacerbated the extent of the illness, a one (1) was recorded under this variable.

At Appeal – If either the plaintiff or defendant appealed the original outcome of the case and subsequently appeal the verdict, the outcome of the appeal was coded under this variable based on the categories outlined in the codebook.

Plaintiff was hospitalized - A one (1) was recorded under this variable in order to summarize whether the plaintiff involved in the lawsuit was hospitalized regardless of the number of days, otherwise a zero was recorded.

Food Poisoning Involved a Child – A one (1) was recorded under this variable in order to summarize whether a child was involved in the lawsuit, otherwise a zero was recorded.

Defendant Has Deep Pockets –A Google search of each defendant was conducted to determine whether each defendant met the following criteria: three (3) or more retail operations; forty (40) or more fulltime employees; two (2) or more manufacturing plants; three (3) or more warehouses. A one (1) was recorded under this variable if the defendant(s) met any of the above criteria. Otherwise, a zero was recorded.

Lawsuit Resolved in 1993 or Later - A one (1) was recorded under this variable if the case was resolved in 1993 or later, otherwise a zero was recorded.

Prisoner Related – A one (1) was recorded under this variable if the plaintiff was incarcerated at the county, city, state or federal level at the time of his or her illness.

Summary Judgment: Jurisdiction – A one (1) was recorded under this variable if it was argued that the court had no jurisdiction to hear the case.

Summary Judgment: Default Judgment - A one (1) was recorded under this variable if the defendant failed respond to the claims made or appear at the trial. In such instances an awarded was made in absentia.

Summary Judgment: Statute of Limitations - A one (1) was recorded under this variable if it was argued that the statutory timeframe the case could be heard had expired.

Summary Judgment: Sovereign Immunity – A one (1) was recorded under this variable if the court ruled that the defendant had sovereign immunity. That is, the defendant is the state or a designated state official that cannot commit a legal wrong and or is immune from a civil suit or criminal prosecution.

Defendant Motion for Summary Judgment – The outcome of a defendant motion for summary judgment was recorded under this variable based on the classification outlined in the codebook.

Microbial Pathogen – If the case summary referenced a specific pathogen (*E. coli*, *Salmonella* etc.) as the alleged caused of illness, a one (1) was recorded under this variable. Cases where a foreign object (specified or not) was the alleged cause of illness, this variable was left blank.

U.S. Appeals Court Region 1 – A one (1) was recorded if the state in which the case was decided was ME, NH, MA, or RI, otherwise a zero was recorded.

U.S. Appeals Court Region 2 – A one (1) was recorded if the state in which the case was decided was NY, CT or VT, otherwise a zero was recorded.

U.S. Appeals Court Region 3 – A one (1) was recorded if the state in which the case was decided was PA, NJ, or DE, otherwise a zero was recorded.

U.S. Appeals Court Region 4 – A one (1) was recorded if the state in which the case was decided was WV, VA, DC, MD, NC, or SC, otherwise a zero was recorded.

U.S. Appeals Court Region 5 – A one (1) was recorded if the state in which the case was decided was TX, LA, or MS, otherwise a zero was recorded.

U.S. Appeals Court Region 6 – A one (1) was recorded if the state in which the case was decided was MI, OH, KY, or TN, otherwise a zero was recorded.

U.S. Appeals Court Region 7 – A one (1) was recorded if the state in which the case was decided was WI, IL, or IN, otherwise a zero was recorded.

U.S. Appeals Court Region 8 – A one (1) was recorded if the state in which the case was decided was ND, SD, NE, MN, IA, MO, or AR, otherwise a zero was recorded.

U.S. Appeals Court Region 9 – A one (1) was recorded if the state in which the case was decided was WA, OR, MT, ID, NV, CA, AZ, AK, or HI, otherwise a zero was recorded.

U.S. Appeals Court Region 10 – A one (1) was recorded if the state in which the case was decided was WY, UT, CO, KS, OK, or NM, otherwise a zero was recorded.

U.S. Appeals Court Region 10 – A one (1) was recorded if the state in which the case was decided was AL, GA, or FL, otherwise a zero was recorded.

Remarks – Additional details/facts specific to the case was recorded.

Appendix G: Location of Variables in Database

Variable Name	Variable Description	Column Location
No.	Numerical Number of Cases	A
Case Title	The name of the parties involved in the case	B
Description	Brief Description of the case	C
Date	Date the case was filed	D
Relevance	Based on the narrative under description whether the case is relevant to FBI or not	E
Database	The database source the case was retrieved from	F
Database ID	The unique case identification number	G
ERS Data	Case data use in the original study	H
ERS Data Analyzed	Trial data analyzed as part of the original study	I
State	The State the case was brought	J
Resolution Year	The resolution year of the case	K
Title	The name of the parties involved in the case	L
Court	The court the case was tried	M
County	The state or county the case was tried	N
Incident Date	The date of the incident	O
Filing Date	The date the lawsuit was brought	P
Trial/Settlement Date	The date of the trial or settlement	Q
Incident to Trial (Months)	The number of months between the incident and actual trial	R
Outcome	The outcome of the case	S
Trial	The verdict was handed down via a court	T
Settlement	The time a final settlement as reached	U
Dollar Amount	Dollar amount of award	V
Cumulative Rate of Inflation	Rate of inflation with base year 2012	W
Adjusted Award to 2012 Dollars	Awards adjusted to 2012 dollars	X
Number of Other Defendants Settled Earlier	The number of other defendants that settled earlier	Y
Outbreak	The illness was as a result of an outbreak	Z
Jack in the Box (JIB) Outbreak	Not sure what JIB is	AA
Gender	The gender of the Plaintiff	AB
Number of Plaintiffs (IF>=1)	The number of plaintiffs involved	AC
Number Ill No Age Specified	Number of illness where no age was specified	AD
Number of Adults Ill (>=18 Years)	Number of adults 18 years and older that got ill	AE
Number of Pregnant Ill	The number of pregnant mothers and or child what was ill	AF
Number of Children Ill (Age Unknown)	The number of children that was ill and age unknown	AG
Number Children Ill (< 5 Years)	The number of children below the age of 5 that was ill	AH
Number of Children Ill (5-9 Years)	The number of children between the age of 5 and 9 that was ill	AI
Number of Children Ill (10-17 Years)	The number of children between the age of 10 and 17 that was ill	AJ
Number Hospitalized (No Aged Specified)	The number persons that were hospitalized but no age specified	AK
Number of Adults Hospitalized	The number of children hospitalized	AL
Number of Children Hospitalized	The number of adults hospitalized	AM
Total Number of Days	The total number of days hospitalized	AN

Hospitalized		
Age if Death	The lawsuit involved a death	AO
Number of Emotional Distress	The plaintiff claimed emotional distress	AP
Number of Husband & Kid Not Ill	The mother got ill while the husband and child did not	AQ
Number of Congenital Injury	The lawsuit involved chronic complications	AR
Other Injuries Sustained	Other injuries reported	AS
Plaintiff Paid Costs	Plaintiff paid costs	AT
Food (If Specified)	Type of food specified	AU
Food Code	The code use for each food	AV
Pathogen (if Specified)	Specific foodborne pathogen, toxin or illness was implicated	AW
Pathogen Code	The code use for each pathogen	AX
Defendant	The name of the defendants	AY
1st Defendant	The first defendant involved in the lawsuit	AZ
1st Defendant Paid	The producer or distributer first paid	BA
2nd Defendant	The second defendant involved in the lawsuit	BB
2nd Defendant Paid	The second defendant involved in the lawsuit paid	BC
3rd Defendant	The third defendant involved in the lawsuit	BD
Type of Business under Parent Company	One or more of the defendants was a restaurant	BE
Restaurant Code	The restaurant type or chain involved	BF
Public Health Authority Involved	Public health authority was involved	BG
Plaintiff Used Medical Witness (Number)	The plaintiff employed one or more doctors as expert witness	BH
Plaintiff Used Other Witness (Number)	The number of Other witnesses used by the Plaintiff	BI
Defendant Used Medical Witness (Number)	The defendant employed one or more doctors as expert witness	BJ
Defendant Used Other Witness (Number)	The number of Other witnesses used by the Defendant	BK
Unspecified Specials ($)	Special damages being sought	BL
Claimed Medical Costs ($)	The amount of medical costs claimed by the plaintiff	BM
Claimed Loss of Productivity Costs ($)	The amount of productivity costs claimed by the plaintiff	BN
Claimed Travel or Other Specified Costs	The amount of travel or other specified costs claimed by the plaintiff	BO
Pain and Suffering	The plaintiff claimed pain and suffering	BP
Loss Consortium	The plaintiff claimed loss of cons	BQ
Negligence	Defendant was negligent	BR
Breach of Warranty	Defendant breach of warranty	BS
Strict Liability	Case involve strict liability	BT
Failure to Warn	Defendant failed to warn consumers	BU
Defense Argues Wrong Time for Illness	Defense argues wrong time for illness	BV
Defense Argues No One Else Got Sick	Defense argues no one else got sick	BW
Defense Admits Liability	Defense Admits Liability	BX
Defense Argues Plaintiff Had Pre-existing Illness	Defense argues plaintiff had pre-existing illness	BY
At Appeal	Case was appealed	BZ
State Win Rate	The weighted average win rate per State in completed Federal District product liability jury trials for personal injury	CA
Plaintiff was Hospitalized	The plaintiff(s) was hospitalized	CB
Food Poisoning Involved a	One or more of the plaintiff was a child	CC

Child		
Defendant Has Deep Pockets	The defendant had “deep pockets"	CD
Lawsuit Resolved in 1993 or Later	The lawsuit was resolved in 1993 or later	CE
Average Award per State	The average award per state in complete Federal District product liability trials for personal injury	CF
Defendant Possess a Food Safety Certification	The defendant held a specific food safety certification at the time of the foodborne illness	CG
Impact of News Report	News coverage of the case was wide spread around the time of the case hearing	CH
Plaintiff Lawyers	The name of the lawyer(s) or law firm that represented the Plaintiff	CI
Defendant Lawyers	The name of the lawyer(s) or law firm that represented the Defendant	CJ
Prisoner Related	The case involved some form of incarceration or detention of the Plaintiff	CK
Summary Judgment: Jurisdiction	The court ruled on whether it had jurisdiction to try the case	CL
Summary Judgment: Default Judgment	The court made a judgment due to default of the defendant	CM
Summary Judgment: Statute of Limitations	The court ruled on whether the statute of limitations expired	CN
Summary Judgment: Sovereign Immunity	The court ruled on whether the defendant has sovereign immunity	CO
Defendant Motion for Summary Judgment	The court ruled on whether the defendant motion for summary judgment is granted or denied	CP
Microbial Pathogen	A specific microbial pathogen was identified	CQ
Appeals Court District	State Classified by Geographic Boundaries of US Courts of Appeals	CR
RegCourt1	State where Lawsuit brought classified as Region 1	CS
RegCourt2	State where Lawsuit brought classified as Region 2	CT
RegCourt3	State where Lawsuit brought classified as Region 3	CU
RegCourt4	State where Lawsuit brought classified as Region 4	CV
RegCourt5	State where Lawsuit brought classified as Region 5	CW
RegCourt6	State where Lawsuit brought classified as Region 6	CX
RegCourt7	State where Lawsuit brought classified as Region 7	CY
RegCourt8	State where Lawsuit brought classified as Region 8	CZ
RegCourt9	State where Lawsuit brought classified as Region 9	DA
RegCourt10	State where Lawsuit brought classified as Region 10	DB
RegCourt11	State where Lawsuit brought classified as Region 11	DC
Remarks	General Comment about a specific case or variable	DD

Appendix H: Sample WestLaw Case Summary

9 Nat. J.V.R.A. 9:8, 1994 WL 16886476 (Pa.Com.Pl.) (Verdict and Settlement Summary)

Court of Common Pleas of Pennsylvania, First Judicial District, Philadelphia County.

BIELAWSKI vs. AU BON PAIN.

92-12-03911
DATE OF VERDICT/SETTLEMENT: March 14, 1994
TOPIC: ALLEGED FOOD POISONING FROM ROAST BEEF AND CHEESE CROISSANT - SEVERAL DAYS HOSPITALIZATION REQUIRED.

SUMMARY:
Result: DEFENDANT'S VERDICT

EXPERT WITNESSES:
Plaintiff's treating physician: Warren Cohen from Philadelphia.
ATTORNEY:
Defendant's: William Lynch, Jr. of the Law Offices of Jane Tutoki in Philadelphia.

JUDGE: Abraham Gafni

RANGE AMOUNT: $0

STATE: Pennsylvania
COUNTY: Philadelphia

INJURIES:
Alleged food poisoning from roast beef and cheese croissant - Several days hospitalization required.

FACTS:
The plaintiff, a male in his late 30's, contended that he contracted food poisoning as a result of a contaminated roast beef and cheese croissant purchased at the defendant's cafe.

The plaintiff testified that he began to experience stomach pains within an hour of ingesting the roast beef and cheese croissant purchased at the defendant's restaurant. The following day, the plaintiff exhibited flu-like symptoms, a temperature of 101 to 104 degrees, sought treatment

from the emergency room of a nearby hospital and was released. Several days later, as a result of cramping and diarrhea, the plaintiff sought treatment from his family physician who diagnosed food poisoning from the *Campylobacter* jejuni organism requiring several days hospitalization.

The plaintiff's treating physician testified that his organism can cause symptoms within 24 hours of ingestion and opined that the plaintiff contracted food poisoning from ingestion of the croissant purchased from the defendant. The plaintiff's expert testified that he reviewed the plaintiff's diet for the several day period prior to the manifestation of the symptoms and ruled out all other possible causes of the food poisoning.

The defendant's infectious disease expert testified that the symptoms caused by the *Campylobacter* jejuni organism do not manifest themselves for 24 to 48 hours after ingestion and sometimes take up to seven days to surface. Based upon the plaintiff's testimony that he felt stomach pains within an hour of ingestion of the croissant, the defendant's expert opined that the food poisoning was not caused by the food served by the defendant. The defendant also contended that there were no other reports of food poisoning associated with the food served at the defendant's restaurant on the day in question. The jury found for the defendant.

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End of Document

Appendix I: Sample Lexis Nexis Case Summary

Carol Abrams v. Terry H. Jones dba Jones Family Farms et al.

CV044001003S

SUPERIOR COURT OF CONNECTICUT, JUDICIAL DISTRICT OF ANSONIA - MILFORD, AT DERBY

2005 Conn. Super. LEXIS 1242

May 11, 2005, Decided

NOTICE: [*1] THIS DECISION IS UNREPORTED AND MAY BE SUBJECT TO FURTHER APPELLATE REVIEW. COUNSEL IS CAUTIONED TO MAKE AN INDEPENDENT DETERMINATION OF THE STATUS OF THIS CASE.

DISPOSITION: Plaintiff's motion to strike the first, second and third special defenses granted.

CASE SUMMARY:

PROCEDURAL POSTURE: Plaintiff consumer sued defendants, who were an apple cider manufacturer and others, and alleged claims under the Connecticut Product Liability Act (CPLA), Conn. Gen. Stat. ß 52-572m et seq., arising out of her consumption of unpasteurized apple cider. The consumer moved to strike defendants' special defenses of (1) comparative negligence, (2) modification of the product by third parties, and (3) misuse of the product and/or failure to maintain.

OVERVIEW: The complaint alleged the cider was manufactured, prepared, supplied, and/or sold by defendants and alleged, inter alia, that the cider was defective and unreasonably dangerous in that it was unpasteurized, infected with ***E. coli*** 015787, and/or unfit for human consumption. The defense of comparative or contributory negligence in a product liability action failed to demonstrate that a plaintiff had no cause of action because, under Conn. Gen. Stat. ßß 52-572l, 52-572o of the CPLA, a jury could reduce damages based on the degree of a claimant's negligence, but that was not the equivalent of a claim that the claimant had "no cause of action" as was required for defendants to have a special defense. Therefore, the comparative/contributory negligence "special defense" was struck. The second and third special defenses were struck because they did not allege any facts to support them as was required by Conn. Gen. Prac. Book, R. Super. Ct. ß 10-50.

OUTCOME: The court granted the consumer's motion.

CORE TERMS: special defenses, product liability action, cause of action, comparative negligence, judicial district, cider, moves to strike, unpasteurized, comparative, apple, attributed, claimant, contributory negligence, legal sufficiency, plead facts, quotation marks omitted, compensatory damages, contributory, consumption, specially, modification, misuse

LexisNexis(R) Headnotes

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Failures to State Claims
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Motions to Strike > General Overview
[HN1] A motion to strike is the proper procedural vehicle to attack the validity of the special defenses. Whenever any party wishes to contest the legal sufficiency of any answer to any complaint, including any special defense contained therein, that party may do so by filing a motion to strike the contested pleading or part thereof. Conn. Gen. Prac. Book, R. Super. Ct. ß 10-39(a).

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Failures to State Claims
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Motions to Strike > General Overview
[HN2] The purpose of a special defense is to plead facts that are consistent with the allegations of the complaint but demonstrate, nonetheless, that the plaintiff has no cause of action.

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Failures to State Claims
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Motions to Strike > General Overview
[HN3] In ruling on a motion to strike a special defense, a trial court is obligated to take the facts to be those alleged in the special defenses and to construe the defenses in the manner most favorable to sustaining their legal sufficiency.

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
Torts > Products Liability > Negligence
Torts > Products Liability > Plaintiff's Conduct
[HN4] The Connecticut Product Liability Act, Conn. Gen. Stat. ß 52-572m et seq., does not eliminate consideration of a claimant's conduct in determining liability or the amount of damages to the extent that a jury can reduce damages based on the degree of the claimant's negligence.

That is not, however, equivalent to a claim that the claimant has "no cause of action" as is required for a defendant to have a special defense.

Torts > Negligence > Defenses > Comparative Negligence > Intentional & Reckless Conduct
Torts > Negligence > Defenses > Contributory Negligence > General Overview
Torts > Products Liability > Plaintiff's Conduct
[HN5] See Conn. Gen. Stat. ß 52-572l.

Torts > Negligence > Defenses > Comparative Negligence > General Overview
Torts > Products Liability > Negligence
Torts > Products Liability > Plaintiff's Conduct
[HN6] See Conn. Gen. Stat. ß 52-572o.

Torts > Negligence > Defenses > Contributory Negligence > General Overview
Torts > Products Liability > Negligence
Torts > Products Liability > Plaintiff's Conduct
[HN7] Conn. Gen. Stat. ß 52-572l eliminates contributory negligence as a defense to products liability actions. Since Conn. Gen. Stat. ß 52-572o is the applicable comparative negligence statute in a product liability case and under ß 52-572o a plaintiff's damages are only diminished in proportion to the plaintiff's negligence and ß 52-572o does not bar recovery, comparative negligence cannot be specially pled in a product liability action because this special defense does not demonstrate that the plaintiff has no cause of action.

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
Torts > Products Liability > Negligence
Torts > Products Liability > Plaintiff's Conduct
[HN8] A special defense of comparative negligence is not permitted in a product liability action.

Torts > Negligence > Defenses > Contributory Negligence > General Overview
Torts > Products Liability > Negligence
Torts > Products Liability > Plaintiff's Conduct
[HN9] The defense of comparative or contributory negligence in a product liability action fails to demonstrate that a plaintiff has no cause of action.

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
[HN10] The fundamental purpose of a special defense, like other pleadings, is to apprise a court and opposing counsel of the issues to be tried, so that basic issues are not concealed until the trial is underway.

Civil Procedure > Pleading & Practice > Pleadings > Rule Application & Interpretation
[HN11] See Conn. Gen. Prac. Book, R. Super. Ct. ß 10-1.

Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Affirmative Defenses > General Overview
Civil Procedure > Pleading & Practice > Defenses, Demurrers & Objections > Failures to State Claims
Civil Procedure > Pleading & Practice > Pleadings > Rule Application & Interpretation
[HN12] See Conn. Gen. Prac. Book, R. Super. Ct. ß 10-50.

JUDGES: By Hartmere, J.

OPINION BY: Hartmere

OPINION

MEMORANDUM OF DECISION RE MOTION TO STRIKE

This action is brought pursuant to the Connecticut Product Liability Act (CPLA), General Statutes ß 52-572m et seq., and arises out of the plaintiff's consumption of unpasteurized apple cider. In the amended complaint, dated January 17, 2005, the plaintiff, Carol **Abrams,** sets forth four counts against the defendants, Terry H. Jones d/b/a Jones Family Farm, Beardsley's Cider Mill & Orchard, LLC, Berkshire Cider Co., Inc. (Berkshire), and Grove Street Enterprises, Inc. (Grove). The complaint alleges that on October 20, 2002, she purchased and consumed unpasteurized apple cider manufactured, prepared, supplied and/or sold by the defendants. The complaint also alleges, inter alia, that the apple cider was defective and unreasonably dangerous in that it was unpasteurized, infected with ***E. coli*** 015787 and/or unfit for human consumption. **[*2]** As a result of consuming the unpasteurized apple cider, the plaintiff suffered injuries and damages.

On March 11, 2005, the defendants, Berkshire and Grove, filed an answer and three special defenses. The special defenses, respectively, assert: (1) comparative negligence; (2) modification of the product by third parties; and (3) misuse of the product and/or failure to maintain.

Before the court is the plaintiff's motion to strike filed on March 23, 2005, accompanied by a memorandum of law. The plaintiff moves to strike the first special defense on the ground that contributory or comparative negligence is not a defense to a product liability action. The plaintiff moves to strike the second special defense on the ground that it fails to set forth any facts which show that a third party altered or modified the product. Finally, the plaintiff moves to strike the third special defense on the ground that it fails to set forth any facts to support a conclusion that the product was misused or improperly maintained. The defendants object to the motion to strike with a memorandum of law dated April 15, 2005.

[HN1] A motion to strike is the proper procedural vehicle to attack the validity of the **[*3]** special defenses. "Whenever any party wishes to contest . . . the legal sufficiency of any answer to any complaint . . . including any special defense contained therein, that party may do so by filing a motion to strike the contested pleading or part thereof." Practice Book ß 10-39(a). [HN2] "The purpose of a special defense is to plead facts that are consistent with the allegations of the complaint but demonstrate, nonetheless, that the plaintiff has no cause of action." (Internal quotation marks omitted.) Homecomings Financial Network, Inc. v. Starbala, 85 Conn.App. 284, 288-89, 857 A.2d 366 (2004). [HN3] In ruling on a motion to strike a special defense, "the trial court [is obligated] to take the facts to be those alleged in the special defenses and to construe the

defenses in the manner most favorable to sustaining their legal sufficiency." Connecticut National Bank v. Douglas, 221 Conn. 530, 536, 606 A.2d 684 (1992).

The first special defense asserts that "the defendants are entitled to a reduction of any award of compensatory damages due to the comparative responsibility of or attributed to the plaintiff." "The purpose of a special defense is to plead **[*4]** facts that are consistent with the allegations of the complaint but demonstrate, nonetheless, that the plaintiff has no cause of action." (Emphasis added; internal quotation marks omitted.) Danbury v. Dana Investment Corp., 249 Conn. 1, 17, 730 A.2d 1128 (1999); see also Practice Book 10-50. In her supporting memorandum of law, the plaintiff argues that General Statutes ßß 52-572l [1] and 52-572o, [2] and Connecticut case law provide that comparative negligence is not a valid special defense to a product liability claim. The defendants cite Elliot v. Sears, Roebuck & Co., 229 Conn. 500, 642 A.2d 709 (1994), to support their argument that [HN4] CPLA did not eliminate consideration of the claimant's conduct in determining liability or the amount of damages. The defendants' contention is accurate to the extent that a jury can reduce damages based on the degree of the plaintiff's negligence. It is not, however, equivalent to a claim that the plaintiff "has no cause of action."

1 General Statutes ß 52-572l provides in relevant part that [HN5] "in causes of action based on strict tort liability, contributory negligence or comparative negligence shall not be a bar to recovery."

[*5]

2 General Statutes ß 52-572o provides in relevant part that [HN6] "the comparative responsibility of, or attributed to, the claimant shall not bar recovery but shall diminish the award of compensatory damages proportionately, according to the measure of responsibility attributed to the claimant."

In Norrie v. Heil Co., 203 Conn. 594, 600, 525 A.2d 1332 (1987), the Connecticut Supreme Court held that General Statutes ß 52-572l [HN7] "eliminated contributory negligence as a defense to products liability actions . . ." On previous consideration, this court, Hartmere, J., has held that "since General Statutes ß 52-572o is the applicable comparative negligence statute in a product liability case and under the statute a plaintiff's damages are only diminished in proportion to the plaintiff's negligence and the statute does not bar recovery, comparative negligence cannot be specially pled in a product liability action because this special defense does not demonstrate that the plaintiff has no cause of action." **[*6]** Petrol Plus v. Fred D'Onofrio, Inc., Superior Court, judicial district of New Haven, Docket No. CV 93 0351700 (September 20, 1995, Hartmere, J.).

Likewise, several other Superior Courts have held that [HN8] a special defense of comparative negligence is not permitted in a product liability action. See Danielson v. Cummings Insulation Co., Superior Court, judicial district of Fairfield at Bridgeport, Docket No. CV 00 0375887 (November 15, 2000, Moran, J.); Yavorka v. Anderson Desk, Inc., Superior Court, judicial district of Hartford-New Britain at Hartford, Docket No. CV 95 0555423 (September 23, 1997, Wagner, JTR); Khongdy v. Die-Quip Corp., Superior Court, judicial district of New Haven at Meriden, Docket No. CV 93 0244695 (May 20, 1996, Silbert, J.) (17 Conn. L. Rptr. 127); Greenwood v. Eastmen-Kodak Company, Superior Court, judicial district of Hartford-New Britain at New Britain, Docket No. CV 92 0452919 (March 25, 1994, Lavine, J.); Sterling v.

Vesper Corp., Superior Court, judicial district of Litchfield, Docket No. 060771 (August 30, 1993, Pickett, J.) (10 Conn. L. Rptr. 58).

Consistent with this court's prior holding and Connecticut case law, the court finds **[*7]** that [HN9] the defense of comparative or contributory negligence in a product liability action fails to demonstrate that the plaintiff has no cause of action. Accordingly, the motion to strike the first special defense is granted.

The plaintiff also moves to strike the second special defense on the ground that the defendants failed to allege any facts to support their legal conclusion. The second special defense asserts that "the defendants are not responsible for any injuries, damages or losses alleged to have been sustained by the plaintiff which were caused by the alteration or modification of the product by a third party for whose conduct these defendants are not responsible."

[HN10] "The fundamental purpose of a special defense, like other pleadings, is to apprise the court and opposing counsel of the issues to be tried, so that basic issues are not concealed until the trial is underway." Bennett v. Automobile Ins. Co. of Hartford, 230 Conn. 795, 802, 646 A.2d 806 (1994). Practice Book ß 10-1 requires that [HN11] "each pleading shall contain a plain and concise statement of the material facts on which the pleader relies . . ." Furthermore, Practice Book ß 10-50 provides that **[*8]** [HN12] "facts which are consistent with [the plaintiff's statement of fact] but show, notwithstanding, that the plaintiff has no cause of action, must be specially alleged."

Simply stated, the second special defense fails to allege any facts to support their defense and therefore fails to comply with Connecticut procedure. The plaintiff's motion to strike the second special defense is granted.

Lastly, the plaintiff moves to strike the defendants' third special defense on the ground that the defendants failed to allege any facts to support its special defense. The third special defense asserts that "the defendants are not responsible for any injuries, damages or losses alleged to have been sustained by the plaintiff which were caused by the misuse of the product and/or failure to have the product properly maintained." In their memorandum of law, the defendants state that they intend to file an amended special defense to set forth additional facts.

The defendants again fail to plead any facts to support their conclusion. The third special defense is legally insufficient, and the motion to strike the third special defense is granted.

Based on the foregoing, the plaintiff's motion to strike **[*9]** the first, second and third special defenses is granted.

The Court

By Hartmere, J