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The Not So "Sweet Surprise": Lawsuits Blaming Big Sugar For Obesity-Related Health Conditions Face An Uphill Battle

Catherine Srithong Wicker

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THE NOT SO “SWEET SURPRISE”: LAWSUITS BLAMING BIG SUGAR FOR OBESITY-RELATED HEALTH CONDITIONS FACE AN UPHILL BATTLE

Catherine Srithong Wicker*

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* J.D., 2015, University of San Diego School of Law; M.P.H Epidemiology, San Diego State University; B.S. Biomedical Science, Texas A&M University, College Station. I wish to acknowledge and thank my Faculty Advisor, Professor Elisa A. Brandes, University of San Diego School of Law and my Comment Editor, Megan Catli Wessels, for their insightful feedback and suggestions. I would also like to extend my heartfelt gratitude to my parents, Suphachai and Elizabeth Srithong, for supporting every dream I ever had. Lastly, I dedicate this Comment to my husband, Nicholas R. Wicker, for his patience, love, and sacrifice.
Stop into any bodega in Brooklyn, New York, and there is sure to be soda sweetened with corn syrup. In Brooklyn alone, about “139 million gallons of soda are consumed each year, sweetened by 20,000 acres of corn.” Driving a cab through his Brooklyn neighborhood of Fifth Ave. and Park Slope, Fray Mendez reminisces about “Colonial Grape,” the “sweetest grape soda [he] ever drank.”

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I. INTRODUCTION

Stop into any bodega in Brooklyn, New York, and there is sure to be soda sweetened with corn syrup. In Brooklyn alone, about “139 million gallons of soda are consumed each year, sweetened by 20,000 acres of corn.” Driving a cab through his Brooklyn neighborhood of Fifth Ave. and Park Slope, Fray Mendez reminisces about “Colonial Grape,” the “sweetest grape soda [he] ever drank.” At

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1 KING CORN (Mosaic Films, Inc. 2007). In a documentary tracing the overproduction and subsidization of the corn industry in America, Ian Cheney and Curt Ellis attempt to trace where the nation’s surplus corn ends up. Id. Cheney and Ellis discover that for each kernel of corn produced, there is a 70% chance it will end up sweetening a beverage. Id.

2 Id.

3 Id. This soda is also known as “Old Colony Uva”, and high fructose corn syrup is the second listed ingredient. SAM’S CLUB, http://www.samsclub.com/sams/old-colony-grape-soda-11-27-fl-oz-24-pk/prod10640273.ip (last visited Feb. 25, 2015).
his peak, he drank two liters of the soda each day, maybe more. At that time, Fray was also over 300 pounds, a size sixty in pants, and completely unaware that drinking soda was a problem. Although he lost approximately 100 pounds by eliminating soda from his diet, Fray was recently diagnosed with type 2 diabetes. Unfortunately, he is no stranger to the disease. Fray’s parents and grandmother died as a direct result of their diabetes and his sister has been a diabetic for years. Fray recalls the pain his father had in his toe for six months before being diagnosed with diabetes. He describes how his father had his toe amputated; then his foot, his leg below the knee, and finally his leg above the knee. When doctors wanted to begin amputating his other leg, Fray’s father had had enough and gave up.

4 KING CORN, supra note 1. A single 11.27 fl. oz. can of Old Colony Uva contains 53 g of sugar. SAM’S CLUB, supra note 3. Therefore, drinking two liters of the grape soda is equivalent to consuming 0.70 lbs. of sugar.

5 Id.

6 KING CORN, supra note 1. Type 2 diabetes is a chronic condition that affects the way a person’s body processes sugar (or glucose). Type 2 Diabetes: Definition, MAYO CLINIC, http://www.mayoclinic.com/health/type-2-diabetes/DS00585 (last visited Feb. 25, 2015). “With type 2 diabetes, [a person’s] body either resists the effects of insulin—a hormone that regulates the movement of sugar into . . . cells—or doesn’t produce enough insulin to maintain a normal glucose level.” Id. Because glucose is the body’s main energy source, the inability of insulin to facilitate glucose’s entry into cells means that those cells are not getting the fuel they need to properly function. Diabetes Health Center, Causes of Type 2 Diabetes, WEBMD, http://diabetes.webmd.com/guide/diabetes-causes (last visited Feb. 25, 2015). When glucose is unable to enter cells, it begins to accumulate in the blood, a condition called hyperglycemia. Type 2 Diabetes, MEDLINEPLUS, NAT’L INST. OF HEALTH, http://www.nlm.nih.gov/medlineplus/ency/article/000313.htm (last visited Feb. 25, 2015). Diabetes is clinically confirmed by meeting at least two of the following test criteria or repeating the test on different days: (1) a blood glucose level of at least 126 milligrams per deciliter after an overnight fast; (2) a non-fasting glucose level greater than or equal to 200 milligrams per deciliter with symptoms of diabetes; (3) a glucose level of at least 200 milligrams per deciliter on a 2-hour glucose tolerance test, or (4) a blood sugar (A1C) test of at least 6.5%. Diabetes Health Center, supra; see also Type 2 Diabetes: Definition, MAYO CLINIC, http://www.mayoclinic.com/health/type-2-diabetes/DS00585/DSECTION=tests-and-diagnosis (last visited Mar. 13, 2015).

7 KING CORN, supra note 1.

8 Id.

9 Id. Consistently high blood sugar levels can damage nerve fibers throughout the body, leading to a condition known as diabetic neuropathy. Guido R. Zanni, Diabetic Neuropathy Symptoms and Treatment, U.S. NEWS & WORLD REPORT (Nov. 9, 2013), http://health.usnews.com/health-news/health-wellness/articles/2013/11/09/diabetic-neuropathy-symptoms-and-treatment. Approximately “60 to 70[%] of people with diabetes have some form of neuropathy,” the most common of which is peripheral neuropathy. Diabetic Neuropathies: The Nerve Damage of Diabetes, U.S. DEP’T OF HEALTH & HUMAN SERV’S, NAT’L INST. OF HEALTH 1 (2009) http://diabetes.niddk.nih.gov/dm/pubs/neuropathies/Neuropathies_508.pdf. Peripheral neuropathy causes pain or loss of feeling in the peripheral extremities, such as the toes, feet, and legs. Id. at 3. “Initially, it affects the foot” and “eventually spreads to the ankle and leg.” Zanni, supra note 9. Because of nerve damage, patients do not feel pain and may be unaware of foot injuries, resulting in open sores. Id. These open sores may then become infected and in the most severe cases, lead to amputation of the toes or foot. Id. The natural progression of
Fray’s story is a stark reality for many Americans, as we have become a society that walks less and eats more. As a culture, we have decreased the importance of physical activity, while simultaneously creating an unhealthy food environment. Unfortunately for Fray, he may be without a legal remedy to sue to the makers of his favorite grape soda. Judicially created thresholds of admissibility for scientific evidence have made it increasingly difficult for food plaintiffs to prove that a certain food ingredient, such as high fructose corn syrup (HFCS), caused their type 2 diabetes.

Because obesity and its associated health problems have been largely attributed to poor self-control, laziness, and various other personal failings, society has been unwilling to assign blame to food manufacturers for their role in contributing to this problem. But, as consumers are becoming more aware of the significantly harmful effect that poor diets can have on a person’s heath, the scales may be tipping in favor of bringing “Big Food” to court.

Food manufacturers, however, are not exactly vulnerable. Armed with precedent disputing the causal link between consumption of fast food and adverse health effects, judicially-created barriers to admitting epidemiologic evidence, and the defense of personal responsibility, food plaintiffs face an uphill battle.

This Comment explores that reality. It examines the various challenges that consumers face in holding food manufacturers liable for the dietary impact allegedly causing obesity-related health conditions. Part I briefly traces the emergence of HFCS in America’s food supply and examines its possible role in the development of type 2 diabetes. It discusses previous litigation against the food industry for diabetic neuropathy is irreversible loss of sensation in the feet, “leading to ulceration and/or amputation in 15[%] of patients.” Oskar Aszmann, Patsy L. Tassler & A. Lee Dellon, Changing the Natural History of Diabetic Neuropathy: Incidence of Ulcer/Amputation in the Contralateral Limb of Patients with a Unilateral Nerve Decompression Procedure, 53 ANNALS OF PLASTIC SURGERY 517, 517 (2004).

10 KING CORN, supra note 1.


12 This Comment uses the phrase “food plaintiffs” to generally refer to litigants who bring lawsuits against food manufacturers for allegedly causing their obesity related health conditions.

13 Defined as the “‘large food companies and legacy brands on which millions of consumers have relied on for so long.’” Phil Wahba, Campbell Soup CEO Says Distrust of ‘Big Food’ a Growing Problem, FORTUNE (Feb. 18, 2015), http://time.com/3714572/campbell-soup-ceo-says-distrust-of-big-food-a-growing-problem/.

14 See infra Part II.B.

15 See infra Part IV.A.

16 See infra Part II.B.
allegedly causing obesity and associated health conditions; the Comment then describes a recent lawsuit targeting manufacturers of HFCS for allegedly causing a young girl’s type 2 diabetes. Part II highlights epidemiology’s role in demonstrating causation in product liability suits. Part III examines the current standard of admissibility for epidemiologic evidence in products liability cases after Daubert v. Merrell Dow Pharmaceuticals, Inc. 17 Additionally, it discusses how various courts have construed Daubert as authorizing the creation of judge-made quantitative thresholds for admitting epidemiologic evidence.18 Part IV proposes that these judicially created standards be abandoned and suggests alternative criteria for evaluating the reliability of an epidemiologic study offered into evidence. Part V discusses various conduct-based defenses: assumption of risk, contributory negligence, and comparative fault, which limit food manufacturers’ liability. Part VI explores the potential for market share liability to provide food plaintiffs a remedy by relaxing the burden of proving causation. Finally, Part VII highlights legislative attempts to curb food and beverage litigation, policy concerns, and the future of lawsuits targeting Big Food.

II. A RECENT LAWSUIT LINKING HFCS CONSUMPTION TO DIABETES IS REMINISCENT OF PELMAN V. MCDONALD’S CORP.

In 1971, Japanese food scientists discovered a way to produce a sweetener cheaper than sugar called high fructose corn syrup (HFCS). 19 HFCS is six times sweeter than cane sugar and could be made from corn.20 This was a boon to the corn industry, whose production rose to an all-time high in the mid-1970s. 21 HFCS was economically produced from the huge surplus of corn grown by American farmers and thus significantly decreased the production costs of high-sugar products.22

Initially, no warnings were raised about the significantly different metabolic path fructose takes in the human body.23 Whereas sucrose—or regular table sugar—is

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18 See infra notes 103–05 and accompanying text.
20 Id. When commercial production of HFCS first began in 1967, its fructose content was approximately 15%. Lee S. Gross, Li Li, Earl S. Ford & Simin Liu, Increased Consumption of Refined Carbohydrates and the Epidemic of Type 2 Diabetes in the United States: An Ecologic Assessment, 79 AM. J. CLINICAL NUTRITION 774, 777 (2004). After several modifications that altered the proportion of fructose in HFCS, various food and beverage manufacturers began using HFCS sweeteners with greater fructose content. Id. For example, HFCS with a 55% fructose content was used as the sweetener of the soft drink and ice cream industries. Id. Additionally, HFCS with a 90% fructose content “became a frequent choice for use in ‘natural’ and ‘light’ foods.” Id.
21 CRISTER, supra note 19, at 10.
22 Id.
23 Id. The digestive and absorptive processes are different for glucose–formed from the cleavage of sucrose–and fructose. George A. Bray, Samara Joy Nielsen & Barry M. Popkin, Consumption of High-Fructose Corn Syrup in Beverages May Play a Role in the Epidemic of
chemically broken down before arriving in the liver, fructose bypasses this process and arrives in the liver almost completely intact. Although this feature of fructose, termed “metabolic shunting,” raised concern among food scientists, governmental bodies such as the USDA, did not explore the issue in depth.

Eventually, as mass production techniques made HFCS more readily available to food manufacturers, HFCS found its way into a wide assortment of foods: as a substitute for sucrose in carbonated drinks, candy, baked goods, canned fruits, and even dairy products. Because of its unique chemical attributes, HFCS could be used in frozen foods to prevent freezer burn and in baked goods to enhance their natural appearance. Indeed, corn syrup sweeteners now comprise greater than 20% of total daily carbohydrate intake, an increase of greater than 2100% since the beginning of the century.

A. The Possible Link Between HFCS and Global Diabetes Prevalence

Increasing scientific evidence lends support to the hypothesis that fructose consumption increases diabetes risk. The increasing global prevalence of obesity and type 2 diabetes mirrors the worldwide increase in consumption of processed, Western style foods. The increased availability and consumption of HFCS-

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24 CRISTER, supra note 19, at 11 (“Fructose, unlike sucrose . . . took a decidedly different route into the human metabolism. Where the latter would go through a complex break down process before arriving in the human liver, the former, for some reason, bypassed that breakdown and arrived almost completely intact in the liver . . . . ”).

25 Id.

26 Id. at 10, 138; Bray et al., supra note 23, at 540.

27 CRISTER, supra note 19, at 10.

28 Gross et al., supra note 20, at 775–76.

29 Michael I. Goran et al., High Fructose Corn Syrup and Diabetes Prevalence: A Global Perspective, 8 GLOBAL PUBL. HEALTH 1, 56 (2012). Using a multivariate nutrient-density model, researchers found that corn syrup consumption was positively associated with the prevalence of type 2 diabetes after controlling for total energy, fiber, fat, and protein intake. Gross et al., supra note 20, at 775. There has been a study, however, which found no association between HFCS and adverse health consequences. James M. Rippe & Theodore J. Angelopoulos, Sucrose, High-Fructose Corn Syrup, and Fructose, Their Metabolism and Potential Health Effects: What Do We Really Know?, 4 ADVANCES IN NUTRITION 236, 242 (2013) (concluding that “there is no unique relationship between HFCS and obesity.”). However, the findings of that particular study are questionable in light of the researcher’s conflict of interest. Id. at 236 n. 2 (“[Rippe’s] consulting fees [are] from ConAgra Foods, Pepsi Co International, Kraft Foods, the Corn Refiners Association, and Weigh Watchers International.”).
sweetened beverages is of particular concern because it provides an “an easy vehicle for excessive sugar intake.”31

Amid increasing public health alarm at the “concurrent global epidemics” of obesity and type 2 diabetes, scientists began investigating the possible link between consumption of HFCS and the global rise in the prevalence of diabetes.32 Researchers found that countries utilizing HFCS in their food supply as an alternative sweetener had a diabetes prevalence rate approximately 20% higher than in countries where HFCS is not used.33

B. The Latest Battle in the Fight Against Big Food

On June 17, 2013, a lawsuit was filed in a New York District Court on behalf of a fourteen-year-old girl claiming that HFCS caused her type 2 diabetes.34 This novel suit sought to hold HFCS manufacturers strictly liable for creating an unreasonably dangerous product, without warning consumers of its potential adverse health consequences, which include development of type 2 diabetes.35 The complaint alleged that defendants “knew or should have known that HFCS was a cause of type of diabetes” and deliberately concealed this fact.36 The plaintiff also claimed that the defendants were negligent “in their marketing, distribution, warning, testing and instructions to . . . consumers of the risks associated with the consumption of their product.”37 As a result of the defendants’ actions, the plaintiff sought five million dollars in damages for her injuries, which included the development of “type 2

30 Goran et al., supra note 29, at 1 (citing Barry M. Popkin & Penny Gordon-Larsen The Nutrition Transition: Worldwide Obesity Dynamics and Their Determinants, 28 INT’L J. OBESITY & RELATED METABOLIC DISORDERS S1, S2 –S9 (3 Supp. 2004); but see Rippe & Angelopoulos, supra note 29, at 242 (noting epidemics of diabetes and obesity in countries where little or no HFCS is available, such as Mexico, Australia, and Europe).

31 Goran et al., supra note 29, at 1.

32 Id. Research conducted by Bray et al. showed that the increase in the consumption of HFCS preceded the rapid increase in obesity prevalence. Bray et al., supra note 23, at 542. Similarly, the concurrent rise of HFCS in the nation’s food supply and rates of obesity have led to the notion that consumption of HFCS sweetened soft drinks caused or contributed to childhood obesity. R.E. Morgan, Does Consumption of High-Fructose Corn Syrup Beverages Cause Obesity in Children?, 8 PEDIATRIC OBESITY 249, 249–50 (2013). However, a literature review of the available research investigating this specific relationship concluded that the causal mechanism behind childhood obesity is complex and therefore, increased rates of obesity should not be solely attributed to consumption of HFCS beverages. Id. at 252.

33 Goran et al., supra note 29, at 5. Using data on food availability for forty-three countries, researchers compared diabetes estimates between countries that were HFCS users and those that were non-users, adjusting for country-based estimates of body mass index (an indicator of obesity). Id. at 3. The study revealed that all indicators for diabetes were higher in countries that used HFCS than those that did not. Id.


35 See id. at 10–13.

36 Id. at 14 (emphasis added).

37 Id.
diabetes, loss of enjoyment of life, pain and suffering, emotional distress . . . and lifelong and permanent medical complications[,] including the probability of surgery and shortened life expectancy.”38 The court ultimately dismissed plaintiff’s claims, noting that she offered “limited facts” to demonstrate that her consumption of foods containing HFCS—specifically HFCS manufactured by defendants—“over the course of her life[,] was a substantial factor in causing her [disease].”39

This latest lawsuit is not the first time the food industry has been blamed for causing negative health outcomes.40 In Pelman v. McDonald’s Corp.,41 two obese teenage girls took the fast food giant to court.42 The girls claimed that, as a result of

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38 Id. at 15.
39 S.F. v. Archer-Daniels-Midland Co., No. 13-cv-634S, 2014 WL 1600414, at *4 (W.D.N.Y. Apr. 21, 2014). The court observed that the “‘mere possibility of . . . causation is not enough.’” Id. (quoting WILLIAM L. PROSSER, LAW OF TORTS § 41 (4th ed. 1971)). Thus, “[i]t may be possible that HFCS caused Plaintiff to develop [t]ype 2 diabetes, but [based upon the facts alleged] is it plausible?” Id. (emphasis added).

40 In 2002, Caesar Barber, a fifty-six-year-old man who was 270 pounds and five-foot-ten-inches tall, brought a class action lawsuit against the fast food giants: McDonald’s Corporation, Burger King Corporation, KFC Corporation, and Wendy’s International, Inc. Complaint of Caesar Barber v. McDonald’s Corp., No. 23145/2002 (N.Y. Sup. Ct. 2002); see also Geraldine Sealey, Obese Man Sues Fast-Food Chains, ABC NEWS, http://abcnews.go.com/US/Story?id=91427&page=1 (last visited Feb. 25, 2015). His complaint alleged that the fast food manufacturer’s products, which were high in fat, salt, sugar, and cholesterol, contributed to his obesity. Complaint, Barber, No. 23145/2002, at 9–10. Moreover, Mr. Barber claimed the defendants did not disclose the ingredients of their food or adequately warn consumers that ingestion of its products are known to cause “obesity, diabetes, coronary heart disease, high blood pressure, elevated cholesterol intake, [and] related cancers . . . .” Id. (“Barber’s lawsuit is the first broad-based action taken against the fast food industry for allegedly contributing to obesity. [Barber] claims the fast food restaurants, where [he] says he used to eat four or five times a week even after suffering a heart attack, did not properly disclose the ingredients of their food and the risks of eating too much.”). Mr. Barber’s attorney ultimately withdrew the case to pursue the potentially “ground-breaking” case, Pelman v. McDonald’s Corp. Saul Wilensky & Kerry C. O’Dell, Where’s the Beef?—The Challenges of Obesity Lawsuits, BLOOMBERG LAW, http://about.bloomberglaw.com/practitioner-contributions/wheres-the-beef-the-challenges-of-obsesity-lawsuits/ (last visited Feb. 25, 2015) (“Barber’s attorney withdrew the case to pursue Pelman v. McDonald’s Corporation, a class action with greater potential since, arguably, child plaintiff’s would not be accountable for their choices of food. Pelman was expected to be ground-breaking litigation that would purportedly expose industry documents, which, in turn, could be used to bring a flood of litigation against ‘Big Food.’”).


42 The plaintiffs were fourteen-year-old Ashley Pelman, who was four-feet-ten-inches tall and weighed 170 pounds, and nineteen-year-old Jazlyn Bradley, who was five-feet-six-inches tall and weighed 270 pounds. FRANCINE R. KAUFMAN, DIABETES: THE OBESITY-DIABETES EPIDEMIC THAT THREATENS AMERICA AND WHAT WE MUST DO TO STOP IT 218 (2005). Using a person’s height and weight, body mass index (BMI) provides an indirect measure of a person’s body fat. About BMI for Adults, CENTERS FOR DISEASE CONTROL AND PREVENTION (Sept. 13, 2011), http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/. According to BMI categories, persons with BMI greater than 25 are considered overweight and those with a BMI over 30 are classified as obese. Id. According to her BMI of 35.5, Ashley Pelman was considered obese. Calculate Your Body Mass Index, NATIONAL INSTITUTES OF HEALTH, http://www.nhlbi.nih.gov/guidelines/obesity/BMI/bmicalc.htm (last visited Mar. 30, 2015).
their consumption of McDonald’s fast food products, they became overweight, developed diabetes, coronary heart disease, high blood pressure and cholesterol levels, and other detrimental health effects.\textsuperscript{43}

The girls claimed that the food giant engaged in deceptive marketing and selling practices that caused them to “injure their health by becoming obese.”\textsuperscript{44} Their complaint alleged that McDonald’s failed to adequately disclose the health effects of ingesting certain food items with high levels of cholesterol, fat, salt, and sugar and that it engaged in marketing designed to entice customers to purchase “value meals” without disclosing the potential negative health effects of consumption.\textsuperscript{45}


\textsuperscript{43} Pelman, 237 F. Supp. 2d at 519. Since she was five years old, Ashley had consumed Happy Meals and Big Macs three to four times a week. \textsc{Kaufman}, supra note 42, at 218. Jazlyn, a more avid consumer, ate at McDonald’s for both breakfast and lunch, and sometimes after school. \textit{Id.} Generally, she ordered whole meals each visit, consisting of a Big Mac, Chicken McNuggets, or fried fish sandwich, in addition to fries, soda or a dessert. \textit{Id.}

\textsuperscript{44} Pelman, 237 F. Supp. 2d at 516. The plaintiffs in \textit{Pelman} were not the last to accuse McDonald’s of deceptive practices that violated consumer protection laws. Ashley Post, \textit{Class Action Lawsuit Against McDonald’s Attacks Marketing to Children}, \textsc{Insidecounsel.com}. (Mar. 1, 2011), http://www.insidecounsel.com/2011/03/01/class-action-lawsuit-against-mcdonalds-attacks-marketing-to-children/?litigation&page=3. In December 2010, a California mother of two, Monet Parham, filed a class action lawsuit against McDonald’s Corp., alleging that marketing Happy Meals to children violated consumer protection laws. \textit{Id.} According to Parham’s complaint, “McDonald’s exploit[ed] very young . . . children and harm[ed] their health by advertising unhealthy Happy Meals with toys directly to them.” Amended Class Action Complaint for Violations of the Unfair Competition Law, the Consumers Legal Remedies Act & Declaratory & Injunctive Relief at 2, \textit{Parham v. McDonald’s Corp.}, No. 10-506178 (Cal. Super. Ct., San Francisco County Apr. 4, 2014). Because young children “do not have the cognitive skills and developmental maturity” to comprehend McDonald’s persuasive marketing techniques, its use of toys to “bait” children was “inherently deceptive” and violated state law. \textit{Id.} In April 2012, however, Parham’s claims were dismissed without leave to amend. Order Sustaining McDonald’s Demurrers to Plaintiff’s Amended Complaint at 2, \textit{Parham v. McDonald’s Corp.}, No. 10-506178 (Cal. Super. Ct., San Francisco County Apr. 4, 2014). Although viewed by some critics as frivolous, \textit{Parham v. McDonald’s Corp.} “reflects a national focus on health, and imminent industry wide marketing and product reform.” \textsc{Post}, supra.

\textsuperscript{45} Pelman, 237 F. Supp. 2d at 520. Class action lawsuits for alleged violations of consumer protection statutes may be the best approach to encourage the food industry to improve the nutritional content of its product and to change its marketing strategies. Jess Alderman & Richard A. Daynard, \textit{Applying Lessons from Tobacco Litigation to Obesity Lawsuits}, \textit{30 Am. J. Preventive Med.} 82, 87 (2006). This is likely because “[c]onsumer protection statutes make it easier for plaintiffs to demonstrate a link between corporate behavior . . . and the public’s direct losses . . . because most do not require a showing that the defendant’s misbehavior caused a specific illness.” \textit{Id.} at 85. A similar approach was
Plaintiffs also accused McDonald’s of negligence, arguing that the food giant sold food products high in cholesterol, fat, salt, and sugar when studies showed that consumption of such foods caused obesity and other adverse health consequences. 46 The complaint further alleged that McDonald’s failed to warn customers of the nutritional content and specific ingredients of its food products. 47

In dismissing each of the plaintiffs’ claims, the court provided a roadmap for future food industry lawsuits. Specifically, the court found that the plaintiffs failed to establish that McDonald’s produced a product with dangerous attributes that were outside the common knowledge of the reasonable consumer. 48 The court acknowledged the well-known fact that fast food, particularly McDonald’s fast food products, contained high levels of fat, cholesterol, salt, and sugar and that these ingredients were deleterious to one’s health. 49 As long as consumers knowingly exercise their free choice, manufacturers will not face liability. 50 The court found that plaintiffs did not allege in their complaint that their choice to eat McDonald’s successfully used by plaintiffs against tobacco companies.  See Aspinall v. Phillip Morris, Co., No. Civ.A. 98-6002, 2006 WL 2971490, at *1 (Super. Ct. Mass. Aug. 9, 2006) (holding that Philip Morris engaged in deceptive business practices when it used the descriptors “light” and “lowered tar and nicotine” in the marketing of their cigarettes); but see Price v. Philip Morris, Inc., 848 N.E.2d 1, 54 (Ill. 2005) (overturning $10 billion jury award for plaintiffs by finding that Philip Morris’ use of the terms “light” and “lowered tar and nicotine” were not a violation of the Consumer Fraud Act because their use was specifically authorized by the Federal Trade Commission.).


47 Id. In a negligent failure to warn claim, a plaintiff must prove: (1) the danger was not obvious to the average consumer; (2) the product was unreasonably dangerous for its intended use; (3) the plaintiff’s obesity was caused by the food product; and (4) the harm would not have occurred if a warning had been given. Michelle M. Mello, Eric B. Rimm & David M. Studdert, The McLawsuit: The Fast-Food Industry and Legal Accountability for Obesity, 22 HEALTH AFFAIRS 207, 208–09 (2003) (citing Pelman, 237 F. Supp. 2d at 540–41); see generally RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. i (1998). In their amended complaint, the plaintiffs in Pelman re-alleged negligence by McDonald’s because of its failure to warn plaintiffs of the dangers of eating processed foods from McDonald’s, but dropped this cause of action right before oral argument. Amended Complaint, Pelman v. McDonald’s Corp., No. 02 Civ. 7821(RWS) (S.D.N.Y. Feb. 19, 2003); Pelman ex rel. Pelman v. McDonald’s Corp., No. 02 Civ. 7821(RWS), 2003 WL 22052778, at *2 (S.D.N.Y. Sept. 3, 2003) (“Shortly before oral argument . . . plaintiffs informed the Court that they [were] dropping their fourth cause of action, which alleged negligence by McDonald’s because of its failure to warn plaintiffs of the dangers and adverse health effects of eating processed foods from McDonald’s.”).

48 Pelman, 237 F. Supp. 2d at 522. For a product to be considered unreasonably dangerous, “the article sold must be dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics.” RESTATEMENT (SECOND) OF TORTS, § 402A cmt. i (1965).

49 Pelman, 237 F. Supp. 2d at 532.

50 Id. at 533 (“As long as a consumer exercises free choice with appropriate knowledge, liability for negligence will not attach to a manufacturer. It is only when that free choice becomes but a chimera—for instance, by the masking of information necessary to make the choice . . . that manufacturers should be held accountable.”).
"several times a week [was] anything but a choice freely made" and that their
decisions could not now be attributed to McDonald’s.\textsuperscript{51}

Another hurdle that the \textit{Pelman} plaintiffs faced was establishing that their
particular health problems were proximately caused by consumption of McDonald’s
fast food products.\textsuperscript{52} In order for a plaintiff to prove proximate cause, he or she must
demonstrate that the defendant’s actions were a substantial factor in bringing about
the harm.\textsuperscript{53} The court found that the plaintiffs failed to establish proximate cause
because it is “impossible as a matter of law” to blame a particular fast food
establishment for causing their obesity when the plaintiffs were possibly consuming
other unhealthy foods, may or may not have engaged in regular physical activity, and
when their weights could have been influenced by other genetic or environmental
factors.\textsuperscript{54}

In dismissing the plaintiffs’ claims for lack of proximate cause, the court
provided guidance on how future plaintiff could survive a motion to dismiss. First, a
complaint “must establish that the plaintiffs ate at McDonald’s on a sufficient
number of occasions such that a question of fact is raised as to whether McDonald’s
products played a significant role in the plaintiff’s health problems.”\textsuperscript{55} Second, in
order to allege that consumption of McDonald’s products was a substantial factor in
causing a plaintiff’s health problems, the complaint must eliminate, or at least
address, the factors, other than diet, that might cause or contribute to obesity and
other health problems.\textsuperscript{56}

\begin{footnotesize}
\footnote{\textsuperscript{51} Id.}
\footnote{\textsuperscript{52} Id. at 537.}
\footnote{\textsuperscript{53} Id. In addition to the substantial factor test, demonstrating that the consumption of fast
food causes to adverse health effects requires two additional proofs. Mello et al., \textit{supra} note 47, at 209. First, plaintiffs must establish the association between obesity and specific negative health consequences and then, convince the court that if adequate warnings have been provided, “the plaintiffs could have avoided the health problems for which they blame
the manufacturer.” \textit{Id.} at 10.}
\footnote{\textsuperscript{54} Pelman, 237 F. Supp. 2d at 537, n.27. For additional information on factors
contributing to obesity, see \textit{Obesity Causes}, \textsc{HARVARD SCH. PUB. HEALTH},
http://www.hsph.harvard.edu/obesity-prevention-source/obesity-causes/ (last visited Mar. 30,
2015).}
\footnote{\textsuperscript{55} Pelman, 237 F. Supp. 2d at 538–39. For instance, the larger the number of McDonald’s
meals consumed, the greater the likelihood that its products were a substantial factor in
adversely affecting plaintiffs’ health. \textit{Id.} at 539.}
\footnote{\textsuperscript{56} Id. (citing \textit{Clinical Guidelines on the Identification, Evaluation, and Treatment of
Overweight and Obesity in Adults}, \textsc{NAT’L INST. HEALTH} (Sept. 1998),
http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf (“Obesity is a complex
multifactorial chronic disease that develops from an interaction of genotype and the
environment. Our understanding of how and why obesity develops is incomplete, but
involves the integration of social, behavioral, cultural, physiological, metabolic and genetic
factors.”)). The federal Food and Drug Administration also acknowledges that “[t]he problem
of obesity in America has no single cause. Rather [it] is the result of multiple factors acting
together over time.” \textit{Calories Count: Report of the Working Group on Obesity}, \textsc{U.S. FOOD &
DRUG ADMIN.} (Nov. 10, 2011), http://www.fda.gov/Food/FoodScienceResearch/ConsumerBehaviorResearch/ucm081770.htm .}
III. USING EPIDEMIOLOGIC EVIDENCE TO ESTABLISH CAUSATION IN PRODUCT LIABILITY CASES

Generally, causation is established when a plaintiff can demonstrate a nexus between a defendant’s wrongful conduct and her injury. The traditional “but for” test of actual causation, commonly employed by most jurisdictions, “illustrates the ‘cause and effect’ relationship between an event and a consequence.” The test recognizes that a defendant’s actions are responsible for a plaintiff’s injuries if the harm “would not have occurred in the absence of the defendant’s conduct.” Although the application of the “but for” test resolves most causation issues in tort law, the test presumes the existence of only a single causative factor.

Direct traceability is difficult to establish, however, when multiple factors may have played a role in bringing about a single injury. To prevent negligent defendants from escaping liability by pointing to other potential causes for the plaintiff’s injury, courts developed the “substantial factor” test for multiple causation scenarios. Under this test, a plaintiff must prove that a defendant’s actions were a substantial factor in bringing about her harm. Thus, in order to prevail against HFCS manufacturers under a negligence theory, the plaintiff must establish a causal link between consumption of the defendant’s products and the development of type 2 diabetes. Notably, the plaintiff need not show that her consumption of HFCS was the sole cause of her diabetes, only that it played a substantial role in the
development of her disease. To demonstrate causation, a plaintiff usually presents epidemiologic evidence “as the basis of an expert’s opinion on causation.”

Epidemiology is the “study of the distribution and determinants of health related . . . events in specified populations, and the application of this study to control of health problems.” The goal of epidemiologic research is to quantify the causal relationship between a certain exposure and disease. A two-step process is often followed when evaluating epidemiological evidence. First, researchers determine whether there is an association between an exposure and a particular outcome by conducting studies of group (ecological studies) and individual characteristics (cohort and case-control studies). Next, if an association is found, researchers evaluate whether the observed relationship is a causal one.

Epidemiological studies are increasingly used as a method for demonstrating risks to population groups from various products or practices. This discipline

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63 See id. The “substantial factor test is not a comparative test in which the jury assesses all contributing causes and determines which ones are substantial.” Tragarz, 980 F.2d at 424. Instead, the test is whether each contributing cause, by itself, is a substantial factor in causing the injury. Id. at 424–25 (citing Lipke v. Celotex Corp., 505 N.E.2d 1213, 1221 (Ill. App. Ct. 1987)).

64 Fed. Judicial Ctr., Reference Manual on Scientific Evidence 551 (3d ed. 2011) (“Judges and juries are regularly presented with epidemiologic evidence as the basis of an expert’s opinion on causation. In the courtroom, epidemiologic research findings are offered to establish or dispute whether exposure to an agent caused a harmful effect or disease.”).


66 David A. Savitz, Interpreting Epidemiologic Evidence: Strategies for Study Design and Analysis 9 (2003); see Fed. Judicial Ctr., supra note 64, at 552 (“Epidemiologic evidence identifies agents that are associated with an increased risk of disease in groups of individuals, quantifies the amount of excess disease that is associated with an agent, and provides a profile of the type of individual who is likely to contract a disease after exposed to an agent.”).

67 Leon Gordis, Epidemiology 204 (3d ed. 2004).

68 Id.

69 Id. A demonstrated association between a risk factor and disease is attributed to “chance, bias, confounding, and/or causality.” The Role of Epidemiology in Decision-Making, The Annapolis Center (1999), http://www.accp1.org/pdf/EpidemiologyInDecision.pdf.

Using various study designs, epidemiologists strive to “reduce the influence of the first three factors, leaving cause as the most likely explanation of the demonstrated association.” Id. Even if an association is found, the inability of an investigator to reduce or at least account for, the effect of chance, confounding, and bias will deem the study’s results of little value towards establishing causation. Id.

70 See In re Breast Implant Litig., 11 F. Supp. 2d 1217, 1224 (D. Colo. 1998) (“Epidemiology is the best evidence of causation in the mass torts context.”). In In re Breast Implant Litigation, plaintiffs asserted tort claims of negligence and strict liability against various breast implant manufacturers alleging that their silicone breast implants caused various autoimmune diseases. Id. at 1221. The court noted that, without a controlled epidemiologic study, there would be no way to determine whether autoimmune diseases “are more common in women with silicone breast implants than women without implants.” Id. at 1224. Thus, these studies were deemed necessary to determine causation. Id.; Brock v. Merrell Dow Pharm., Inc., 874 F.2d 307, 315 (5th Cir. 1989) (“[S]peculation unconfirmed by
attained prominence in toxic tort cases where causation was in dispute because toxic
tort injuries can remain latent for many years. 71

Indeed, the difficulty of proving causation is a major difference between toxic
tort and ordinary personal injury cases. 72 Whereas a single product or incident
causes an identifiable harm in personal injury suits, disease resulting from long-term
exposure to a chemical is not directly observable and may not provide any physical
evidence of the causative agent. 73 Because plaintiffs must offer epidemiologic
evidence to establish the requisite causal link between an exposure and disease
outcome, factfinders must understand what the discipline can, and more importantly,
cannot prove. 74

IV. THE USE OF SCIENTIFIC EVIDENCE TO PROVE CAUSATION UNDER DAUBERT AND
ITS PROGENY

The current standard of admissibility for expert testimony was first outlined in
the leading case of Daubert v. Merrell Dow Pharmaceuticals, Inc. 75 In Daubert, two
children alleged that their serious birth defects were caused by their mothers’
prenatal ingestion of the anti-nausea drug, Bendectin, marketed by Merrell Dow
Pharmaceuticals, Inc. (Dow). 76 Dow’s expert, a physician and epidemiologist,
epidemiologic proof cannot form the basis for causation in a court of law.”). The infamous
“tobacco cases” also highlighted the use of epidemiologic evidence to establish causation in
personal injury lawsuits. In these cases, plaintiffs attempted to use scientific evidence to
demonstrate the link between cigarette smoking and lung cancer. For example, in Pritchard v.
Liggette & Myers Tobacco Co., the plaintiff introduced several expert witnesses each of
whom testified that the plaintiff’s lung cancer was caused by smoking. Pritchard v. Liggett &
Myers Tobacco Co., 295 F.2d 292, 294, 299–300 (3d Cir. 1961). The appellate court found
that the plaintiff’s evidence was sufficient to submit the issue of causation to the jury. Id. at
295.

71 Steve C. Gold, Revisiting Relative Risk Rules: Garza, Blanchard, and the Ever Evolving
Role of Epidemiologic Proof in Toxic Tort Cases, 27 TOXICS LAW REPORTER 49, 49 (2012); see
Norris v. Baxter Healthcare Corp., 397 F.3d 878, 882 (10th Cir. 2005) (“[E]pidemiology is
the best evidence of general causation in a toxic tort case.”).

72 Steve Gold, Causation in Toxic Torts: Burdens of Proof, Standards of Persuasion, and

73 Id.

74 Michael Dore, A Proposed Standard for Evaluating the Use of Epidemiological
Evidence in Toxic Tort and other Personal Injury Cases, 28 HOW. L.J. 677, 683 (1985); see,
e.g., Brock, 874 F.2d at 313 (“We find . . . the lack of conclusive epidemiological proof to be
fatal to the Brock’s case. While we do not hold that epidemiologic proof is a necessary
 element in all toxic tort cases, it is certainly a very important element.”).

75 Some consider the three U.S. Supreme Court decisions: Daubert v. Merrell Dow
Pharm., Inc., 509 U.S. 579 (1993), General Electric Co. v. Joiner, 522 U.S. 136 (1997), and
Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999), as the “trilogy” of cases that reflect the
current standard on the admissibility of expert testimony. See generally Margaret A. Berger,
The Supreme Court’s Trilogy on the Admissibility of Expert Testimony, in REFERENCE
MANUAL ON SCIENTIFIC EVIDENCE 10, 10–20 (2d ed. 2000).

76 Daubert, 509 U.S. at 581.
reviewed more than thirty published studies on Bendectin and birth defects, containing over 130,000 patients, none of which found that Bendectin was capable of causing human malformations.\textsuperscript{77} Based on these reviews, Dow’s expert concluded that maternal ingestion of Bendectin during the first trimester of pregnancy was not a risk factor for birth defects.\textsuperscript{78}

Although not disputing the published findings, the plaintiffs offered the testimony of their own expert witnesses, all eight of whom found that Bendectin could cause birth defects.\textsuperscript{79} The witnesses based their conclusions on a combination of animal-cell, live-animal, and pharmacological studies, and a reanalysis of previously published epidemiological studies.\textsuperscript{80} In granting Dow’s motion for summary judgment, the district court found that the plaintiffs’ reanalysis of published epidemiological studies was inadmissible because the reanalysis studies had neither been published, nor subject to the peer review process.\textsuperscript{81}

Upon review of the lower court’s ruling, the Supreme Court in \textit{Daubert} held that the Federal Rules of Evidence, particularly Rule 702,\textsuperscript{82} replaced Frye’s “General Acceptance” test in determining the admissibility of scientific evidence.\textsuperscript{83} The Court assigned the trial judge the “gatekeeping” role of ensuring that an expert’s testimony is relevant and has a solid foundation.\textsuperscript{84}

Under Rule 702, when expert testimony is offered, a trial judge must make a preliminary assessment of whether the methodology underlying the expert’s testimony is scientifically valid and whether it would assist the factfinder in understanding the matter in issue.\textsuperscript{85} The Court provided a non-exhaustive list of factors to be considered in evaluating the admissibility of expert scientific testimony: (1) whether technique or theory can be and has been tested; (2) whether the theory or

\textsuperscript{77} Id. at 582.
\textsuperscript{78} Id.
\textsuperscript{79} Id. at 583.
\textsuperscript{80} Id.
\textsuperscript{81} Id. For a novel statistical approach analyzing the Bendectin data, see Jon Todd Powell, \textit{How to Tell the Truth With Statistics: A New Statistical Approach to Analyzing the Bendectin Epidemiological Data in the Aftermath of Daubert v. Merrell Dow Pharmaceuticals}, 31 Hous. L. Rev. 1241, 1291–1311 (Winter 1994).
\textsuperscript{82} Federal Rules of Evidence Rule 702 states:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

\textit{Fed. R. Evid. 702.}

\textsuperscript{84} Id.
\textsuperscript{85} Id. at 592–93.
The technique has been subjected to peer review and publication; the known or potential error rate of the scientific technique; and general acceptance within the relevant scientific community.

The federal judge’s gatekeeping role in screening scientific evidence was further clarified in two subsequent Supreme Court decisions: General Electric Co. v. Joiner and Kumho Tire Co. v. Carmichael.

In General Electric Co. v. Joiner, the plaintiff, an electrician, alleged that workplace exposure to polychlorinated biphenyls promoted his development of small cell lung cancer. The Supreme Court affirmed the district court’s ruling, which excluded the four epidemiological studies the plaintiff’s experts relied on because they were not a sufficient basis for their opinions. The Court noted that neither Daubert nor the Federal Rules of Evidence required a trial court to admit an expert opinion, which rests solely on the authority of the expert witness and is unsupported by the epidemiological data. Thus, “too great an analytical gap between the data and the opinion proffered,” warrants exclusion of expert opinion evidence.

Later, in Kumho Tire Co. v. Carmichael, the Supreme Court extended Daubert’s “gatekeeping obligation” to all expert testimony and concluded that Daubert’s reliability inquiry is a flexible one. Therefore, instead of using Daubert’s factors

86 Although peer review and publication is an essential component of the research process, it does not automatically attest to a study’s reliability. The Role of Epidemiology in Decision-Making, supra note 69, at 18–19; see also Brief for Kenneth Rothman et al. as Amici Curiae Supporting Petitioners, Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993) (No. 92-102), 1992 WL 12006438, at *3 (arguing that (1) statistical significance is not necessary as a requirement for drawing causal inferences from epidemiologic data; (2) by focusing on such inappropriate criteria, a court forecloses testimony about inferences that can be drawn from a combination of studies with statistically insignificant results; and (3) by suggesting an expert’s “reanalysis” of published data is suspect unless published, a court “fundamentally misconstrues how epidemiologists in the real world of science function on a daily basis”). Publication deadlines often cause the review to be performed by someone less qualified in the investigator’s own field and the sheer number of scientific journals increases the likelihood that a research paper can get published somewhere. The Role of Epidemiology in Decision-Making, supra note 69, at 18–19.

87 Daubert, 509 U.S. at 593–94.


90 Joiner, 522 U.S. at 139. The plaintiff, Robert Joiner, began working as an electrician in 1973. Id. at 193. His job required him to work with and around dielectric fluid, later determined to be contaminated with polychlorinated biphenyls (PCBs). Id. “PCB’s are widely known to be hazardous to human health” and were banned by Congress in 1978. Id.

91 Id. at 147–48.

92 Id. at 146 (“But nothing in either Daubert or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the ipse dixit of the expert”).

93 Id.

94 Kumho Tire Co., 526 U.S. at 141, 150.
as a definitive “checklist,” a trial judge must consider the specific circumstances and issues of each case to determine the appropriate standard of admissibility.\textsuperscript{95}

The following subparts examine how \textit{Daubert} and its progeny have been interpreted to create a higher threshold for the admission of epidemiologic evidence, and how this poses a problem for plaintiffs attempting to prove causation in product liability cases.

\textit{A. Texas’s Strict Criteria for Determining Scientific Reliability}

Various courts since \textit{Daubert} have construed the Court’s ruling as placing stringent standards on the scientific reliability of epidemiologic evidence required to support a finding of causation.\textsuperscript{96} The Texas Supreme Court adopted the strictest of these interpretations in \textit{Merrell Dow Pharmaceuticals, Inc. v. Havner.}\textsuperscript{97} In another case alleging that maternal ingestion of the anti-nausea drug, Bendectin, caused birth defects, Texas’s highest court grappled with the issue of whether the plaintiff’s causation evidence was scientifically reliable.\textsuperscript{98} Here, the court held that if an expert’s testimony is unreliable, then the testimony itself is not evidence.\textsuperscript{99}

Further, in determining the scientific reliability of expert testimony, a court must look beyond the expert’s bare opinion.\textsuperscript{100} In this regard, the \textit{Havner} court differentiated between the admissibility of scientific evidence and its legal sufficiency in support of a finding of causation. The court declared that Rule 702 of the Federal Rules of Evidence dictates whether an expert’s opinion is admissible to support a finding of causation and offers “substantive guidelines in determining if


\textsuperscript{96} See \textit{FED. JUDICIAL CTR.}, supra note 64, at 561; see also Merck & Co., Inc. v. Garza, 347 S.W.3d 256 (Tex. 2011); Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706, 717 (Tex. 1997); Estate of George v. Vermont League of Cities and Towns, 993 A.2d 367, 378 (Vt. 2010) (finding “that the trial court did not abuse its discretion in considering a relative risk greater than 2.0 as a reasonable and helpful benchmark . . . .”); Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1321 (9th Cir. 1995) (“For an epidemiological study to show causation under a preponderance standard, ‘the relative risk of limb reduction defects arising from the epidemiological data . . . will, at a minimum, have to exceed 2.’”) (citing DeLuca v. Merrell Dow Pharm., Inc., 911 F.2d 941, 958 (3d Cir. 1990)); Sanderson v. Int’l Flavors & Fragrances, Inc., 950 F. Supp. 981, 1000 (C.D. Cal. 1996) (dismissing scientific expert’s probability estimate because it was not founded upon epidemiologic studies demonstrating a relative risk value greater than 2.0).

\textsuperscript{97} Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706, 706 (Tex. 1997).

\textsuperscript{98} Id. at 711.

\textsuperscript{99} Id. at 714. “A flaw in the expert’s reasoning from the [epidemiologic] data may render reliance on a study unreasonable and render the inferences drawn therefrom dubious. Under that circumstance, the expert’s scientific testimony is unreliable and, legally, no evidence.” Id.

\textsuperscript{100} Id. at 711–12.
the expert testimony is some evidence of probative value.”101 Thus, if a claimant’s evidence is deemed admissible, a court should then evaluate whether it is legally sufficient to support a finding of causation based on the totality of the claimant’s available evidence.102

In order to be legally sufficient, a litigant must offer epidemiologic studies that not only show a “substantially elevated risk” of disease, but must also demonstrate that they are similar to the study’s participants.103 Moreover, if there are alternative causes of the disease, the litigant must introduce evidence negating those causes.104 Further, in rejecting the reliability of the Havners’ epidemiologic evidence, the Texas Supreme Court established several guidelines in considering its legal sufficiency: (1) each epidemiologic study relied upon must report a statistically significant relative risk105 of at least 2.0;106 (2) each study must be published or otherwise subjected to the peer review process; (3) the study must not have been prepared for litigation purposes; and (4) the claimant must provide at least two properly designed epidemiologic studies that meet the above mentioned criteria.107

The surprising premise behind Havner’s stringent requirements was the notion that any study that did not find a statistically significant relative risk greater than 2.0

101 Id. These guidelines included: (1) the extent to which the theory has been tested; (2) the extent to which the technique depends upon subjective interpretation; (3) whether the theory has been subjected to peer review; (4) the technique’s rate of error; (5) whether the theory or technique is generally accepted as valid by the scientific community; and (6) the technique’s non-judicial uses. Id. at 712 (citing E.I. du Pont de Nemours & Co. v. Robinson, 923 S.W.2d 549, 557 (Tex. 1995)).

102 Havner, 953 S.W.2d at 720.

103 Id.

104 Id.

105 Relative risk is an epidemiologic measure of association, which compares the rate of disease development among a group of individuals that were exposed to a particular risk factor and a group of individuals that were not exposed. See Antony Stewart, Basic Statistics and Epidemiology: A Practical Guide 113 (3d ed. 2010). Relative risk is calculated by dividing the disease occurrence in the exposed group by the disease occurrence in the non-exposed group. Id. If the relative risk value is greater than 1.0, then there is an increased risk of developing disease if one is exposed to the risk factor. Id.

106 Recognizing the difficulty in equating scientific measures of association with legal standards, the court in Havner nevertheless ruled that only properly designed and executed epidemiologic studies finding that exposure more than doubled the risk of injury could be used to support a finding of causation in toxic tort cases. Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706, 17 (Tex. 1997). The court explained, however, that a relative risk greater than 2.0 is not a “litmus test,” and that a single epidemiologic study is legally insufficient to prove causation. Id. at 718. Indeed, the court acknowledged that a study may have a high relative risk even in the absence of a causal relationship. Id.

107 See id. at 725–27.
was unreliable. Thus, an expert’s opinion that relied on that study was also unreliable and inadmissible as evidence to prove causation.

B. The Problems with a Judge-Made Threshold for Admissibility of Epidemiologic Evidence

Findings of liability in the context of toxic torts are rare because the judicial system has erected seemingly insurmountable procedural and substantive barriers to bring a claim, the most daunting of which is proving causation. Judicially created tests for the admissibility of epidemiologic evidence, such as the one developed by the Texas Supreme Court in *Havner*, place an unreasonable burden on plaintiffs and frequently result in the dismissal of otherwise meritorious claims.


109 See id.; see also *Havner*, 953 S.W.2d at 714 (“If the foundational data underlying the opinion testimony are unreliable, an expert will not be permitted to base an opinion on that data because any opinion drawn from that data is likewise unreliable.”). Later, in *Merck & Co. v. Garza*, the Texas Supreme Court reaffirmed the *Havner*’s requirements for determining whether epidemiological evidence is scientifically reliable to prove causation. Garza, 347 S.W.3d 256, 259 (Tex. 2011). Leonel Garza, plaintiffs’ decedent, had a long history of heart disease and was prescribed Vioxx, an anti-inflammatory drug, marketed by the defendant, Merck & Co. as a pain reliever. *Id.* Mr. Garza ingested 25 mg Vioxx a day for twenty-five days until his death. *Id.* In a products liability lawsuit against Merck & Co., plaintiffs introduced clinical trial studies showing an increased risk of cardiovascular disease as proof that Vioxx caused Mr. Garza’s death. *See id.* at 259, 262. Although the court acknowledged the increased reliability of clinical trials, as opposed to observational epidemiological studies, it concluded that both types of studies must report a “statistically significant doubling of the risk” in order to meet the more likely than not standard of proof. *Id.* at 263. The Texas Supreme Court opted not to follow the holdings of other courts that had determined epidemiologic studies with a relative risk less than 2.0 could suffice if supplemented with other evidence of causation. *Id.* at 265 (citing *Havner*, 953 S.W.2d at 715). Other courts favor a more flexible *Daubert* inquiry over bright-line rules and view a relative risk (or odds ratio) value of 2.0 as one factor among many that the court can consider in determining the reliability of an expert’s opinion. *See*, e.g., Pritchard v. Dow Agro Sciences, 705 F. Supp. 2d 471, 486 (W.D. Pa. 2010); *see also* Magistrini v. One Hour Martinizing Dry Cleaning, 180 F. Supp. 2d 584, 606 (D.N.J. 2002) (“[A] relative risk of 2.0 is not so much a password to a finding of causation as one piece of evidence, among others, for the court to consider in determining whether an expert has employed a sound methodology in reaching his or her conclusion.”) (quoting *Landrigan v. Celotex Corp.*, 605 A.2d 1079. 1087 (N.J. 1992)).

110 Conway-Jones, *supra* note 58, at 876.

111 *Id.*; see RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c(1) (2010) (advising that courts should be cautious about adopting certain scientific principles, taken out of context, in order to formulate bright-line legal rules because scientific standards for the sufficiency of evidence to establish a proposition may not be appropriate for the law and because causal inferences require judgment and interpretation); *see also* FAULT LINES: TORT LAW AS CULTURAL PRACTICE 273 (David M. Engel & Michael McCann eds., 2009) (“Plaintiffs can’t achieve epidemiological studies by themselves, epidemiology is not the be all and end all of causal inquiry, and the courts—by and large—have turned their ‘gatekeeping’ function into more of a ‘search and destroy’ mission.”); Kassirer & Cecil, *supra* note 95, at 1382 (“[C]ourts appear to be asserting standards that they attribute to the medical
By equating a relative risk of 2.0 as meeting the more likely than not burden of proof in civil cases, courts mistakenly believe that a relative risk value greater than 2.0 is sufficient evidence for a finding of specific causation. Consistent with the decisions of the Ninth and Tenth Circuits, some courts have deemed as inadmissible any epidemiologic evidence that does not show at least a statistically significant doubling of the risk.

Commentators have also noted that courts are increasingly ignoring other scientific evidence (such as animal studies, differential diagnoses, and chemical structure comparisons) and over-emphasizing epidemiological evidence that demonstrates a risk ratio greater than 2.0. There is an inherent problem in relying too heavily on a bright-line quantitative threshold for admissibility because statistical methods alone cannot establish proof of causation. While the concept of “doubling the risk” appears reasonable, some epidemiologists note that it does not represent a more likely than not probability that an exposure will cause disease. This is because the “causal significance of an association is a matter of judgment which goes beyond any statement of statistical probability.” Indeed, the fundamental problem of relying on epidemiologic evidence alone is that causal inferences can be drawn from such studies only when coupled with additional data.

By ignoring scientific evidence that does not meet an arbitrary quantitative standard, courts deprive juries of the opportunity to aggregate multiple pieces of profession, but that are inconsistent and sometimes more demanding than actual medical practice. As a result, plaintiffs seeking compensation for an illness attributed to a toxic exposure lose the opportunity to present their evidence to a jury.

112 See Vern R. Walker, Restoring the Individual Plaintiff to Tort Law by Rejecting “Junk Logic” About Specific Causation, 56 Ala. L. Rev. 381, 473 n. 320 (2004) (“A relative risk greater than ‘2’ means that the disease more likely than not was caused by the event.”).

113 Id. at 468.

114 In re Breast Implant Litig., 11 F. Supp. 2d 1217, 1224–26 (D. Colo. 1998) (finding that if epidemiologic evidence did not show that breast implants doubled the risk of disease, then plaintiff’s causation evidence was inadmissible); Hall v. Baxter Healthcare Corp., 947 F. Supp. 1387, 1403 (D. Or. 1996); see also In re Agent Orange Prod. Liab. Litig., 597 F. Supp. 740, 748 (E.D.N.Y. 1984) (declaring that plaintiffs must prove at least a two-fold increase in the incidence of disease allegedly caused by exposure to toxic substance). The court in In re Breast Implant Litigation, noted that of at least seventeen epidemiological studies of breast implants published in peer-reviewed medical journals, none consistently showed a significant elevation of risk over 2.0. In re Breast Implant Litig., 11 F. Supp. 2d at 1227. Therefore, the court concluded that breast implants did not cause any of the diseases that plaintiffs alleged. Id. (emphasis added).


116 Id. at 229.


118 Id.
Evidence in determining causation.\textsuperscript{119} Taking advantage of the stringent causation hurdles faced by plaintiffs, product manufacturers have urged courts to evaluate each type of study (animal, epidemiological, pathological, clinical, etc.) independently from other forms of evidence, thus attacking the very means of proving causation.\textsuperscript{120}

V. AN EPIDEMIOLOGIC STUDY SHOULD BE EVALUATED ON THE BASIS OF ITS DESIGN, CONDUCT, AND ANALYSIS.

Judicially created admissibility tests should be substituted with a comprehensive approach that mirrors how practitioners derive causal inferences in the field.\textsuperscript{121} This Comment suggests that instead of relying on arbitrary cut-offs for determining the admissibility of epidemiologic evidence, judges should evaluate the validity\textsuperscript{122} of an epidemiologic study on the basis of its design, conduct, and analysis.\textsuperscript{123} In doing so, it further proposes, as a rubric for assessing study validity, a series of questions that

\begin{itemize}
\item \textsuperscript{119} See Egilman et al., \textit{supra} note 115, at 224.
\item \textsuperscript{120} \textit{Id.} at 231; see Kassirer & Cecil, \textit{supra} note 95, at 1383–84 (“[A]ssessment of evidence and causal inferences depend on accumulating all potentially relevant evidence and making a subjective judgment about the strength of the evidence.”).
\item \textsuperscript{121} For example, physicians practicing the doctrine of evidence-based medicine use a “current best evidence” approach when making decisions about individual patient care. Sean C. Grondin & Colin Schieman, Evidence-Based Medicine: Levels of Evidence and Evaluation Systems, \textit{Difficult Decisions, in Thoracic Surgery} 13 (M.K. Ferguson ed., 2011). A tenet of evidence-based medicine is that a hierarchy of evidence exists based upon the soundness of the study’s methodology and the subsequent strength of any inferences drawn from it. \textit{Id.} Evidence-based medicine recognizes that various forms of evidence may each provide appropriate clinical recommendations, but that some forms are more reliable than others. \textit{Id.} at 14. Consequently, a hierarchy of the strength of evidence has been used to guide clinical decision making. \textit{Id.}
\item \textsuperscript{122} Assessing the validity of epidemiological studies amounts to evaluating whether the causal inferences drawn from such studies are warranted. Julia H. Zaccai, \textit{How to Assess Epidemiological Studies}, 80 Postgrad Med. J. 140, 140 (2004).
\item \textsuperscript{123} \textit{Id.; The Role of Epidemiology in Decision-Making, supra} note 69, at 21; Nat’l Research Council of the Nat’l Academies, \textit{Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2 139} (2006) (“The first step in the interpretation of data is to assess the methods used in the study itself.”); Kassirer & Cecil, \textit{supra} note 95, at 1383 (“[E]very [epidemiologic] study must be scrutinized not only for . . . confounders, but for the defects in study design, data quality, and the strength of the statistical correlation.”). A similar approach for summarizing epidemiologic evidence in order to derive a causal assessment is termed the “weight of the evidence approach.” Ronald H. White, et al., \textit{Workshop Report: Evaluation of Epidemiological Data Consistency for Application in Regulatory Risk Assessment, 6 Open Epidemiology} J. 1, 6 (2013). This approach takes into account the results of all available studies and assigns “greater ‘weight’ to those considered to have the greatest reliability and validity.” \textit{Id.} The approach advocated in this Comment, however, proposes that only validly conducted epidemiologic studies should be used as a basis from which experts can draw any causal inferences. Another approach to weighing epidemiologic evidence recommends that justifiable criteria must include “outcome ascertainment, exposure measures, and other sources of bias,” rather than set rules designed to assess study quality. \textit{Id.}
fact finders should ask of each epidemiologic study offered into evidence.124 If a study is deemed valid under these criteria, then experts may rely on its findings in drawing causal inferences. This Comment also examines how these guidelines can be used to assess the validity of epidemiological studies investigating dietary exposures, particularly the link between HFCS consumption and type 2 diabetes.

A. Assessing the Validity of an Epidemiologic Study.

There are many potential reasons for why a study’s reported measure of association (i.e. relative risk, odds ratio, or risk ratio) does not accurately quantify the true causal relationship between exposure and disease. Two of the most important concepts to consider in evaluating the validity of a study’s results are confounding and bias.125 Because chronic disease epidemiology generally utilizes observational methods to detect associations between exposure and disease, uncertainty exists in understanding the causes of various chronic conditions, such as diabetes.126 Errors in measurement or research design can produce misleading results; therefore, considerable expertise is needed to assess the quality of a study’s methodology and the validity of its purported findings.127 A fact finder must evaluate epidemiologic evidence and the causal inferences derived from them in light of these factors.

1. Did Researchers Attempt to Minimize Confounding?128

When an association is observed between a risk factor and disease, epidemiologists must differentiate whether this association is causal or the result of confounding by a third factor.129

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124 The following series of questions designed to assess study validity borrow from the ideas of Julia H. Zaccai, as described in her article, “How to Assess Epidemiological Studies.” Zaccai, supra note 122, at 143–44.


126 See id.

127 Id.

128 NAT’L RESEARCH COUNCIL OF THE NAT’L ACADEMIES, supra note 123, at 139 (recommending that readers consider whether there is evidence that the study addressed the potential confounding influences of other factors).

129 GORDIS, supra note 67, at 228. In Schwab v. Phillip Morris USA, Inc., the court examined the failure of early epidemiological studies exploring the association between lung cancer and low tar cigarettes to account for confounding variables. 449 F. Supp. 2d 992, 1199–1200 (E.D.N.Y), rev’d on other grounds 552 F.3d 215 (2d Cir. 2008). Early epidemiologic studies concluded that reduced tar cigarettes were safer than their higher tar or “full flavor” counterparts. Id. However, these studies did not consider the possibility that people who smoked low tar cigarettes were also more likely to have healthier diets, exercise more, or better protect themselves from hazardous occupational exposures, than smokers of higher tar cigarettes. Id. Thus, the health consciousness of low tar cigarette smokers was a potential confounding variable because their healthier lifestyle, rather than their use of low tar cigarettes, could have accounted for their lower incidence of lung cancer. Id.
Confounding is a distortion of the estimated effect of an exposure on an outcome due to the presence of an extraneous factor that is associated with both the outcome and the exposure.\textsuperscript{130} A confounding variable is both: (1) a known independent risk factor for the study disease; and (2) simultaneously associated with the exposure in question, but not a consequence of exposure.\textsuperscript{131}

Confounding is a major source of error in nutritional epidemiology because it is difficult to distinguish between diet and other lifestyle factors that contribute to obesity and its associated health consequences, such as type 2 diabetes. The distortion caused by a confounding variable can be so large as to mask the true effect of the exposure on the disease.\textsuperscript{132} Therefore, readers of epidemiologic studies must assess the possible role that confounding may have played in the study by considering whether any important lifestyle factors have been taken into account in the design and analysis phase of the study.\textsuperscript{133} If a study fails to control for confounding variables, any reported findings should be viewed with skepticism.

2. Were There Any Biases that Affected the Study’s Validity?

Inherent within each epidemiological study is the potential for bias, which is “any systematic error in the design, conduct, or analysis of a study that results in a mistaken estimate of the exposure’s effect on the risk of disease.”\textsuperscript{134} Bias in an epidemiologic study can distort the true association between exposure and disease and affects the reliability of the study’s results.\textsuperscript{135} Although researchers can attempt to minimize bias by carefully planning their study’s design and analysis, it is impossible to eliminate completely.

The presence of bias, however, does not automatically mean that the study’s results should be rejected. Instead, each bias should be individually identified and addressed before a study’s results can be used as evidence of a causal relationship. Epidemiologic studies investigating the role of nutrition in the development of chronic disease are prone to two types of biases: selection and recall bias.

\textsuperscript{130} LAST, supra note, 65 at 37. A common example of confounding is illustrated in the relationship between coffee drinking and pancreatic cancer. GORDIS, supra note 67, at 228. In this case, smoking is the confounding variable because (1) it is a known risk factor for pancreatic cancer; and (2) is concurrently associated with coffee drinking, but is not a result of it. \textit{Id}. Thus, the apparent association between coffee consumption and pancreatic cancer could be either that coffee drinking actually causes pancreatic cancer or that individuals who drink coffee are also more likely to smoke cigarettes, a recognized risk factor for cancer. \textit{Id}.

\textsuperscript{131} GORDIS, supra note 67, at 228; JAMES J. SCHLESSELMAN, CASE-CONTROL STUDIES: DESIGN, CONDUCT, AND ANALYSIS 58 (1982) (“A confounder’s association with the study disease may be either cause-and-effect or a noncausal relation resulting from the confounder’s association with causal factors other than the study exposure.”).

\textsuperscript{132} Zaccai, supra note 122, at 141 (“The distortion introduced by a confounding factor can be large and it can lead to overestimation or underestimation of an effect . . . .”).

\textsuperscript{133} Id.

\textsuperscript{134} SCHLESSELMAN, supra note 131, at 124.

\textsuperscript{135} Zaccai, supra note 122, at 140.
a. Did Subject Recruitment Methods Minimize Selection Bias?136

Ideally, investigators want study groups to be comparable on every possible variable besides the exposure of interest. Unfortunately, the procedures used to select subjects and the factors that influence study participation are potential sources of error that can distort a study’s findings.137 Selection bias is error due to systematic differences in characteristics between subjects and non-subjects.138

In nutritional studies, selection bias occurs when a study’s recruitment methods systematically exclude or over-represent certain types of subjects, such that the study’s results are not generalizable to the overall population.139 Therefore, in a case-control study140 investigating type 2 diabetes and past HFCS exposure, cases and controls should be selected independently of their likelihood to have consumed HFCS in the past.141 Similarly, in a cohort study142 examining HFCS consumption and future development of type 2 diabetes, exposed and nonexposed subjects should be chosen independently of their risk for developing diabetes.143

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136 Nat’l Research Council of the Nat’l Academies, supra note 123, at 139 (suggesting that one of the first steps in the interpretation of data is to consider whether there is evidence that selection bias has been avoided in enrolling the study subjects).

137 Kenneth J. Rothman, Sander Greenland & Timothy L. Lash, Modern Epidemiology 134 (3d ed. 2008). Dr. Ann McKee, a leading researcher of the long-term consequences of repetitive brain trauma and its role in the development of chronic traumatic encephalopathy (CTE) among football players, addressed the possibility of selection bias in her autopsy sample of deceased football players. Frontline: A League of Denial (PBS television broadcast Oct. 8, 2013), available at http://www.pbs.org/wgbh/pages/frontline/league-of-denial/. She described selection bias as the greater likelihood of families of a player who they suspect is affected by CTE to donate their brain to CTE research than a family of a player with no symptoms at all. Id.

138 Zaccai, supra note 122, at 140; Last, supra note 65, at 166. In the case of In re “Agent Orange” Prod. Liab. Litig., the court discussed selection bias in the context of a cohort study consisting of young, healthy men who served in Vietnam. In re “Agent Orange” Prod. Liab. Litig., 597 F. Supp. 740, 783 (E.D.N.Y. 1984), aff’d 818 F.2d 145 (2d Cir. 1987). The court found that comparing the mortality rate of the cohort and that of a control group comprised of civilians made it difficult to obtain useful data. Id. The young males in the cohort “were a highly selected, healthy group so that the expected mortality was relatively slight in their early ages and a comparison with base civilian populations difficult.” Id.

139 For example, 24-hour recall interviews that are only conducted in English would necessarily exclude from participation, non-English speaking individuals.

140 See infra note 173.

141 See Fed. Judicial Ctr., supra note 64, at 584.

142 See infra note 170.

143 See Fed. Judicial Ctr., supra note 64, at 584.
b. If Performing a Case-Control Study, Did Researchers Adopt Measures to Prevent Recall Bias?

Recall bias occurs when there is a difference, among cases and controls, in being able to accurately recall past events or experiences.\textsuperscript{144} The potential for recall bias to distort a measure of association is a major concern in case-control studies, particularly when the exposure involves nutrient intake.\textsuperscript{145} Diagnosis can affect subject reporting by improving memory or provoking false memories of exposure.\textsuperscript{146} For instance, diseased subjects are more likely able to remember what foods and beverages they consumed and may, in their search for the cause, overemphasize the role of diet in their disease.\textsuperscript{147}

Additionally, whereas cohort studies measure diet before the onset of disease, case-control studies obtain exposure information after diagnosis has occurred. Cases are thus, more likely to recollect their prior exposures differently from controls because they are more motivated to participate in the study and determine the cause of their disease.\textsuperscript{148}

Epidemiologists use measures of association to derive causal inferences, however, the reliability of those inferences must be considered by evaluating whether the potential biases inherent in the study invalidate its results.\textsuperscript{149} Therefore, potential biases and their effect on the estimated measure of association must be

\textsuperscript{144} See SCHLESSELMAN, supra note 131, at 135. A case-control study examines the possible relationship between a particular exposure and a disease by first identifying a group of individuals with the disease (cases) and a similar group of individuals without the disease (controls). GORDIS, supra note 67, at 159, 161 (“The hallmark of the case-control study is that it begins with people with the disease (cases) and compares them to people without the disease (controls).”). The relationship between a single exposure to disease is examined by comparing cases and controls in regard to how frequently the exposure is present in each group. Id. at 150. Using this type of study design, a positive association exists between the exposure and disease when the proportion of individuals who were exposed is higher in cases than in controls. Id. at 160.

\textsuperscript{145} See Satu Männistö et al., Diet and the Risk of Breast Cancer in a Case-Control Study: Does the Threat of Disease Have an Influence on Recall Bias? 52 J. CLIN. EPIDEMIOLOGY 429, 430 (1999).

\textsuperscript{146} ROTHMAN ET AL., supra note 137, at 111. For example, a mother whose child was born with a congenital malformation will be more likely to identify events or experiences during her pregnancy than a mother of a child born without a birth defect. See generally Martha M. Werler, Barbara R. Pober, Kathryn Nelson & Lewis B. Holmes, Reporting Accuracy Among Mothers of Malformed and Nonmalformed Infants, 129 AM. J. EPIDEMIOLOGY 415 (1989). Contrasting recollections between mothers may artificially suggest a relationship between an exposure during pregnancy and congenital malformations. Id.


\textsuperscript{148} See id.

\textsuperscript{149} See FED. JUDICIAL CTR, supra note 64, at 583.
identified and weighed to determine whether the bias “exaggerate[d] the real association, dilute[d] it, or . . . completely mask[ed] it.”

B. Evaluating the Study's Design and Conduct

1. Was the Chosen Study Design Appropriate to Answer the Research Hypothesis?

In the past, epidemiological inquiries of diet and disease consisted of ecological studies, which compared “disease rates in populations with the population per capita consumption of specific dietary factors.” Although ecologic studies have been useful in stimulating research on the link between diet and chronic diseases, their primary drawback is the possibility that confounding factors—such as genetic predisposition, other dietary determinants of disease, and environmental or lifestyle influences—may vary between regions with high and low incidence of disease. Therefore, such correlational studies cannot yield reliable conclusions regarding the relationships between dietary factors and disease and should be given the least weight when determining causation.}

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150 Id. ("In reviewing the validity of an epidemiologic study, the epidemiologist must identify potential biases and analyze the amount or kind of error that might have been induced by the bias.").

151 Zaccai, supra note 122, at 141 ("Researchers have a choice of several study designs for their investigation and a judgment must be made as to whether their choice is reasonable in relation to the question they wish to consider."). For a more comprehensive discussion about epidemiologic study designs investigating nutritional exposures and disease outcomes, see Rothman et al., supra note 137, at 581–86.

152 Walter Willett, Nutritional Epidemiology 4 (1998). Such studies are advantageous because they reveal large contrasts in international dietary intake, the use of average dietary consumption measures offsets changing dietary patterns over time, and large population samples are subject to less random error. Id. at 4–5. For an example of an ecological study investigating the relationship between availability of high fructose corn syrup and prevalence of type 2 diabetes, see generally Goran et al., supra note 29, at 1.

153 Willett, supra note 152, at 4–5. Another limitation of all ecological studies is the potential for what is known as the “ecological fallacy.” It is “[a]n error in inference due to failure to distinguish between different levels of organization.” Last, supra note 65, at 56–57. Thus, a correlation between variables based on group characteristics may not necessarily mean there is a correlation between variables at the individual level. For example, suppose at the population level, researchers found a correlation between quality of drinking water and deaths due to heart disease in a certain region, it would be an ecological fallacy to infer that consuming low quality drinking necessarily influences an individual’s chance of dying from heart disease. Id. at 57. For more discussion of biases in ecologic studies, see Sander Greenland & James Robins, Ecologic Studies—Biases, Misconceptions, and Counterexamples, 139 Am. J. Epidemiology 747–60 (1994).

154 See Willett, supra note 152, at 5; Fed. Judicial Ctr., supra note 64, at 561 (“[E]cological studies may be useful for identifying associations, but they rarely provide definitive causal answers.”). In Cook v. Rockwell Int'l Corp., plaintiff's expert conducted an ecological study assessing the pattern of cancer incidence among residents living near a nuclear weapons plant. Cook v. Rockwell Int'l Corp., 580 F. Supp. 2d 1071, 1095–98 (D. Colo. 2006). Defendants argued that the expert’s testimony was inadmissible because he...
Case-control\textsuperscript{155} and cohort studies\textsuperscript{156} can avoid many of the weaknesses inherent in ecological studies because confounding can be neutralized in either the design or analysis phases.\textsuperscript{157} Although case-controls studies are generally easier to perform than cohort studies—because of its smaller sample size and lack of follow up—the inherent difficulties in being able to recall past food consumption makes the results of a case-control study unreliable.\textsuperscript{158}

Not only do case-control study subjects have to recall what they ate, when they ate it, and how much they ate, considering that HFCS concentration differs according to product, subjects must also remember the food product’s brand name. Additionally, because HFCS is commonly used to sweeten beverages, subjects would also have to recollect what they drank, how much, and how often they drank it. The inability of people to accurately remember what they ate and drank on a daily basis over an extended period of time introduces systematic error, or recall bias, that will inevitably distort any measure of association derived from the study.\textsuperscript{159}

Cohort studies present a more promising methodology for elucidating a causal relationship between HFCS consumption and type 2 diabetes. One of the most

\textsuperscript{155} A case-control study compares persons with the disease of interest (cases) and persons without the disease (controls). “[T]he past history of exposure to a suspected risk factor is compared between ‘cases’ and ‘controls.’” \textit{E.g.}, \textit{Last, supra} note 65, at 22. A case-control study is termed “retrospective” because the study begins after the onset of disease and looks backwards in time to investigate exposure to suspected causal factors. \textit{Id.} The measure of association derived from a case-control study is termed the odds ratio. \textit{Id.} In this context, the odds ratio represents the odds that a person with type 2 diabetes consumed HFCS as opposed to a person without type 2 diabetes and thus asks the question: “What are the \textit{odds} that a \textit{case} was \textit{exposed} to the study risk factor?” \textit{Gordis, supra} note 67, at 183 (emphasis added); see \textit{Stewart, supra} note 105, at 115 (calculating odds ratio by dividing the odds that subjects with disease were exposed to risk factor by the odds that subjects without the disease were exposed to the risk factor).

\textsuperscript{156} A cohort study follows a group of healthy individuals who are, have been, or in the future may be exposed or not exposed to a postulated risk factor. \textit{E.g.}, \textit{Last, supra} note 65, at 33–34. The frequency of the outcome variable is compared between exposed and unexposed groups. \textit{Id.} A cohort study is prospective in its design because it follows exposed and unexposed individuals forward in time to see who develops the disease outcome. \textit{Id.} If the frequency of disease development is higher in exposed persons than in unexposed persons, it may suggests causality between the exposure and disease variables. \textit{Id.}

\textsuperscript{157} \textit{Willett, supra} note 152, at 6.

\textsuperscript{158} \textit{Id.} (“[C]onsistently valid results may be difficult to obtain from case-control studies of dietary factors and disease because of the inherent potential for methodologic bias.”).

\textsuperscript{159} See Karin B. Michels, \textit{Nutritional Epidemiology—Past, Present, Future}, 32 \textit{Int’l J. Epidemiology} 486 (2003); \textit{see also Rothman et al., supra} note 137, at 582; Bellach & Kohlmeier, \textit{supra} note 147, at 398 (“The concern that cases an controls report their energy intakes with different degrees of error remains a critical consideration that must be addressed through improved measures.”).
attractive features of a cohort study design is its ability to directly measure risk of
disease development. Moreover, due to its prospective nature, dietary information
is collected before the onset of disease and as the study progresses, resulting in more
accurate dietary assessments. Because a cohort study is less susceptible to the
potential sources of bias associated with case-control studies, it provides more
reliable results from which to draw causal inferences. Therefore, among the three
study designs discussed, the results of a validly conducted cohort study should be
given the greatest evidentiary weight.

2. How Were Study Subjects Chosen?

The composition of a study population determines the generalizability of its
results. A study is “generalizable” when its findings can be extrapolated to a target
population beyond the subjects of the study itself. In order for readers to assess
the generalizability of a study’s results, researchers must describe the characteristics
of the study population, including how many and under what circumstances
participants were excluded from subsequent statistical analysis. What was the
study’s attrition rate? Was it so high that the main characteristics of the study and
control groups changed significantly?

A study with a high attrition rate, which reduces its ability to demonstrate an
association and offsets differences in exposure between study groups, should be

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160 Cohort studies, which follow non-diseased exposed and unexposed subjects forward in
time in order to see whether or not disease develops, is the preferred method to assess risk.
GORDIS, supra note 67, at 149. Because the study begins with non-diseased subjects, it can
establish a temporal relationship between exposure and disease outcome. Id. Drawbacks to
this method include cost, its long follow up period, potential for subject attrition, and
inapplicability for diseases with low incidence. Zaccai, supra note 122, at 142.

161 WILLETT, supra note 152, at 9.

162 LAST, supra note 65, at 184–85. Public health research attempts to extrapolate findings
to the general public. SAVITZ, supra note 66, at 12. Extrapolation, however, does not occur
from a single study, rather, findings are generalizable to the larger population when drawn
from a series of validly conducted studies. Id.

163 See Zaccai, supra note 122, at 143. Characteristics of study participants include
baseline health and sociodemographic information such as sex, race, socioeconomic status,
and age. Id.

164 Attrition occurs when subjects permanently leave the study. Vicki L. Kristman,
Michael Manno & Pierre Côté, Methods to Account for Attrition in Longitudinal Data: Do
They Work?, 20 EUR. J. EPIDEMIOLOGY 657, 657 (2005). Because data is no longer collected
from these subjects, attrition leads to missing exposure, confounder, or outcome data. Id.
This loss of data threatens the validity of the study, decreases sample size, and undermines the
precision of the risk estimate. Id.

165 Zaccai, supra note 122, at 143. These factors are particularly relevant in evaluating
nutritional cohort studies because of the study’s long follow up and potential for participant
fatigue due to intensive dietary assessments.

166 The ability to demonstrate an association is termed a study’s power. “The power of a
study is determined by several factors, including the frequency of the condition under study,
the magnitude of the effect, the study design, and sample size.” LAST, supra note 65, at 138.
given less weight in the causal assessment because these factors lead to selection bias and thus, a spurious estimate of association between variables.\^167

3. How Did Researchers Define Exposure and Outcome Measures?

Measurement bias occurs when researchers do not accurately define how subjects will be classified in regards to their exposure and disease status.\^168 A study’s results can be invalidated by simply failing to choose which measurements, whether it is exposure, disease, or confounding variable, will be recorded and how.\^169 A clear definition of what constitutes “exposed” or “diseased” must be decided beforehand.\^170

For example, in a cohort study evaluating the association between HFCS consumption and diabetes, researchers must decide what level of HFCS consumption qualifies a subject as “exposed” for the purposes of the study. Due to the ubiquitous nature of HFCS in the nation’s food supply, most people have consumed HFCS at one time or another. The relevant question thus becomes, what dosage and frequency of HFCS consumption classifies an individual as exposed? This is an important factor to consider when evaluating epidemiological studies because setting exposure to HFCS at abnormally high consumption levels would likely overestimate the effect of HFCS on health outcomes.\^171 Findings from such a study should, therefore, be cautiously viewed because its results are generalizable only to a population that similarly consumes excessive amounts of HFCS-containing foods or beverages.

4. How was Dietary Intake Measured?\^172

In addition to developing an explicit definition of what constitutes “exposed,” researchers must also adopt a reliable method for measuring exposure. A major hurdle in the burgeoning field of nutritional epidemiology is that investigations of dietary exposures have traditionally focused on the role of individual foods in contributing to disease.\^173 The case of HFCS, however, presents a new challenge for researchers because ingredients are not consumed in isolation but, rather, as part of a

\^167 See Kristman et al., supra note 164, at 657 (“Attrition leads to selection bias when the distribution of confounders and outcome among the exposed and non-exposed subjects is dependent on whether they remained in the study. This bias may lead to spurious risk estimates of unpredictable magnitude and direction.”) (citation omitted).

\^168 Zaccai, supra note 122, at 143.

\^169 See id.

\^170 Therefore, the criteria for including and excluding potential study subjects must be planned and clearly delineated a priori, accounting for their degree of exposure, pre-existing health conditions, relevant demographic characteristics, and disease diagnosis. Id.

\^171 Conversely, setting exposure to low levels of HFCS consumption would likely underestimate or fail to capture the true effect of HFCS on health outcomes. Id.

\^172 See Nat’l Research Council of the Nat’l Academies, supra note 123, at 139 (proposing that one of the first questions to consider when interpreting epidemiologic data is whether there is “evidence that information bias has been minimized in assessing exposure or disease”).

\^173 Michels, supra note 159, at 487.
complex assortment of various other ingredients, nutrients, and food products based upon individual preference. Therefore, the single greatest limitation to investigating the role of a particular food ingredient in disease development is the difficulty of accurately measuring dietary intake.

Currently, the most widely used dietary assessment technique is the 24-hour food recall, whereby subjects are asked to report their food intake during the previous day. Food researchers also employ food diaries, which provide “detailed meal-by-meal recordings of types and quantities of foods and beverages consumed during a specified period.” The validity of both methods, however, is questionable due to inaccurate subject recall, highly variable day-to-day intake of specific foods, and the

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174 Id. Unlike exposures that are more easily quantifiable—such as cigarettes smoking—an individual’s diet “represents an unusually complex set of exposures that are strongly intercorrelated.” Willett, supra note 152, at 2; Rothman et al., supra note 137, at 586 (“The foods we consume each day contain literally thousands of specific chemicals, some known and well quantified, some characterized only poorly, and others completely undescribed and presently unmeasurable.”). Further compounding the difficulty of studying diet is that: 1) nutritional exposures are continuous variables; 2) eating patterns change over time; and 3) individuals are generally not aware of the ingredients of the foods that they eat. Willett, supra note 152, at 2.

175 Willett, supra note 152, at 3; see David A. Kessler, The End of Overeating: Taking Control of the Insatiable American Appetite 2 (2009) (“Most people do a poor job of reporting what they eat, and overweight people are particularly inaccurate reporters. So much of our eating takes place outside our awareness that it’s easy to underestimate how much food we actually put into our bodies.”). The next frontier of nutritional epidemiological research will thus, attempt to incorporate complex dietary patterns into less traditional analytic models. Michels, supra note 159, at 487. Possible statistical models include the use of factor analysis, principal component analysis, cluster analysis, and developing diet scores. Id.


177 Rothman et al., supra note 137, at 589. This technique should increase the accuracy of subject reporting because foods are recorded as they are consumed, however, it also places a substantial burden on subjects who must weigh and describe their meals and portion sizes. Id.
fact that many meals are eaten away from home.\textsuperscript{178} Despite these inherent drawbacks, due to their low cost and ease of administration, the 24-hour recall and food diary will continue to be utilized until a more accurate real-time dietary assessment tool is developed. Consequently, nutritional epidemiologic studies that utilize these methods should not be discounted; instead, readers must interpret the study’s findings in light of the limitations of measuring dietary exposures.

\textit{C. Is there Evidence of a Causal Relationship using Hill’s Criteria?}\textsuperscript{179}

Finally, demonstrating a strong association between an exposure and disease does not necessarily indicate a causal relationship. The Bradford Hill criteria\textsuperscript{180} are often used as a tool for determining whether an observed association in an epidemiologic study reflects a causal association between a risk factor and disease.\textsuperscript{181} These criteria are: (1) strength of association;\textsuperscript{182} (2) consistency;\textsuperscript{183} (3) temporal

\textsuperscript{178} Id.

\textsuperscript{179} \textit{E.g.,} OXFORD TEXTBOOK OF PUBLIC HEALTH 650–652 (Roger Detels et al. eds., 4th ed. 2002) (noting that Hill’s criteria is commonly used by epidemiologists to separate causal from non-causal explanations).

\textsuperscript{180} The Bradford-Hill Criteria are derived from Sir Austin Bradford Hill, The Environment and Disease: Association or Causation? 58 PROCEEDINGS OF THE ROYAL SOC’Y OF MED. 295–99 (1965).


\textsuperscript{182} The strength of association is proportional to the magnitude of the estimated risk ratio—the larger the magnitude the more compelling a finding of causation. \textit{See generally} Hill, \textit{supra} note 180, at 296; \textit{but see} ROTHMAN ET AL., \textit{supra} note 137, at 26 (“[A] strong association is neither necessary nor sufficient for causality, and . . . weakness is neither necessary nor sufficient for absence of causality.”).

\textsuperscript{183} Consistency is whether the association has “been repeatedly observed by different persons, in different places, circumstances and times.” Hill, \textit{supra} note 180, at 296; \textit{see also} SMOKING AND HEALTH, \textit{supra} note 117, at 182 (“[Consistency] implies that diverse methods of approach in the study of an association will provide similar conclusions.”).
relationship between exposure and disease;\textsuperscript{184} (4) biological plausibility;\textsuperscript{185} (5) coherence;\textsuperscript{186} (6) specificity;\textsuperscript{187} (7) dose-response relationship;\textsuperscript{188} (8) analogy;\textsuperscript{189} and (9) experimentation.\textsuperscript{190} Although this list represents relevant characteristics in evaluating a study, the author himself warned that such “viewpoints” should not be used as a set of rigid guidelines establishing causation.\textsuperscript{191} Thus, the fulfillment of Hill’s criteria is not dispositive.\textsuperscript{192} Instead, they should be considered additional factors in evaluating whether a study’s results supports a causal association between a dietary exposure and disease outcome.

The findings of poorly designed epidemiologic studies are of little value when deriving causal inferences.\textsuperscript{193} Therefore, interpreters of epidemiologic evidence should not accept a study’s findings without considering the methodology used to

\textsuperscript{184} This factor “refers to the necessity that the cause precede the effect in time.” \textsc{Rothman et al.}, supra note 137, at 28. Temporality and statistical association are the only two criteria that, although not dispositive, are necessary for drawing causal inferences. \textsc{Causation in Law and Medicine} 453 (Ian Freckleton & Danuta Mendelson eds., 2002).

\textsuperscript{185} Plausibility concerns whether there is a biological mechanism for an association. This criterion, however, is dependent upon the current state of scientific knowledge at the time of assessment. \textit{See} Hill, supra note 180, at 298.

\textsuperscript{186} Coherence implies that the suspected causal relationship should not contradict known facts in the natural history and biology of the disease. \textit{Id.} (citing \textit{Smoking and Health}, supra note 117, at 185).

\textsuperscript{187} Considered the weakest of all Hill’s viewpoints, “[a]n association is specific when a certain exposure is associated with only one disease.” \textsc{Gordis}, supra note 67, at 215 (emphasis added).

\textsuperscript{188} Also referred to as “biological gradient,” this criterion refers to a unidirectional dose-response relationship, whereby increasing exposure results in increasing disease severity. \textsc{Oxford Textbook of Public Health}, supra note 179, at 651. For example, as the number of cigarettes smoked increases so do carcinogen exposure and tissue damage, and thus, greater opportunity for cancer formation. \textit{Id.}

\textsuperscript{189} “[A]nalogy provides a source of more elaborate hypotheses about the associations under study[;] the absence of [which] only reflects lack of imagination or experience, not the falsity of the hypothesis.” \textsc{Oxford Textbook of Public Health}, supra note 179, at 652.

\textsuperscript{190} Hill, supra note 180, at 295–99. Although Hill was unclear about what he meant by experimentation, he was likely referring to experimental evidence that was the result of removing the suspected causative agent in order to see if disease subsided. \textsc{Oxford Textbook of Public Health}, supra note 179, at 651.

\textsuperscript{191} \textit{Id.} at 299 (“None of my nine viewpoints can bring indisputable evidence for or against the cause-and-effect hypothesis and none can be required as a \textit{sine qua non.”}). Epidemiologists are also in accord with this view. \textit{See, e.g.,} \textsc{Rothman et al., supra} note 137, at 30 (“Other than [the necessity that the cause precede the effect in time] there is no necessary or sufficient criterion for determining whether an observed association is causal.”).

\textsuperscript{192} \textsc{Restatement (Third) of Torts: Physical and Emotional Harm} \textsection 28 cmt. c(1) (2010) (“No algorithm exists for applying the Hill guidelines to determine whether an association truly reflects a causal relationship or is spurious. Because the inferential process involves assessing multiple unranked factors, some of which may be more or less appropriate with regard to a specific causal assessment, judgment is required.”).

\textsuperscript{193} \textit{The Role of Epidemiology in Decision-Making}, supra note 69, at 18.
obtain those results.\textsuperscript{194} Moreover, arbitrary standards for determining whether epidemiologic studies can serve as the basis for causal inferences should not be set so high that plaintiffs are barred from using this evidence to prove causation.\textsuperscript{195} Indeed, it should be recognized that causal inferences “fall along a continuum of interpretation, [where] even . . . methodologically weak studies are fodder for the assessment of causality.”\textsuperscript{196} Valid studies that modestly contribute to our understanding of the relationship between an exposure and disease outcome should be valued and viewed as another component in the comprehensive framework of evidence from which to make a causal evaluation.\textsuperscript{197}

VI. CONDUCT-BASED DEFENSES POTENTIALLY LIMIT THE LIABILITY OF HFCS MANUFACTURERS

A. Assumption of Risk

Even if HFCS plaintiffs can establish causation, they must still overcome conduct-based defenses, which limit the liability of food manufacturers. The assumption of risk doctrine is an affirmative defense that bars recovery in cases where a plaintiff voluntarily assumes a risk of harm from the conduct of the defendant.\textsuperscript{198} A plaintiff, who fully understands the risk of harm and voluntarily chooses to consume the food product despite that knowledge, implicitly accepts any risks associated with the consumption and is not entitled to recovery.\textsuperscript{199} Therefore, plaintiffs must establish that their decision to eat products containing HFCS was not a decision freely made because “as long as a consumer exercises free choice with appropriate knowledge, liability for negligence will not attach to the manufacturer.”\textsuperscript{200}

Plaintiffs in \textit{S.F. v. Archer-Daniels-Midland}, however, claim that the aggressive attempts of the Corn Refiners Association, a national trade association of corn manufacturers, to undo HFCS’s bad reputation were part of an effort to misrepresent and conceal the science and consequences of HFCS ingestion.\textsuperscript{201} In order for plaintiffs to recover for their injuries, they must demonstrate that HFCS manufacturers did not adequately inform consumers of the risks associated with

\textsuperscript{194} Zaccai, \textit{supra} note 122, at 141.

\textsuperscript{195} See \textit{Savitz, supra} note 66, at 21.

\textsuperscript{196} \textit{Id.}

\textsuperscript{197} \textit{See id.}

\textsuperscript{198} \text{RESTATEMENT (SECOND) OF TORTS} § 496A (1965). When a plaintiff fully understands the risk of harm caused by a food product and nevertheless voluntarily chooses to consume it, the plaintiff impliedly accepts the risk and is thus not entitled to any recovery. \textit{Id.} at § 496C.

\textsuperscript{199} \textit{Id.} at § 496C.

\textsuperscript{200} Pelman, 237 F. Supp. 2d at 533.

HFCS consumption. If consumers were unaware, uninformed, or deliberately misled about the risks of HFCS, then their decisions were not freely made and the assumption of the risk defense is inapplicable.

B. Contributory Negligence

Plaintiffs alleging injury from HFCS consumption may also be barred from recovery under the doctrine of contributory negligence. Similar to the assumption of risk doctrine, a person is liable for contributory negligence if he or she knows, or should have known, the circumstances from which the danger arose and still intentionally exposed himself to the danger. In other words, although a food manufacturer’s negligence is a proximate cause of the plaintiff’s type 2 diabetes, he or she will be completely barred from recovering if his or her own conduct fell below the standard of care and proximately caused the same injury.

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203 Id. The Corn Refiners Association (CRA), a national trade association of corn manufacturers, argues that adverse health consequences, such as obesity, are not caused solely by HFCS consumption but by the overconsumption of unhealthy foods. See generally Veronica Louie, Masquerading Behind Words: The Corn Refiners Association’s Push to Rename High-Fructose Corn Syrup as “Corn Sugar,” 4 NORTHEASTERN U. L.J. 293, 302 (2012). As support for their contention, they cite to numerous scientific articles that call into question claims of the negative effects of HFCS. Id. at 303. The CRA ran national advertisement campaigns to convince consumers that HFCS was equivalent to regular table sugar and in 2010, petitioned the Food and Drug Association to rename HFCS as “corn sugar.” Id. at 293; see Corn Refiners Association, Myth vs. Facts, SWEETSURPRISE.COM, http://sweetsurprise.com/hfcs-myths-and-facts (last visited Jan. 21, 2014) (“[HFCS] is basically the same as sugar--both in terms of composition and in the number of calories they contain. Since [HFCS] and sugar are so similar, the human body absorbs them the same way.”). In 2012, the Food & Drug Administration denied the CRA’s petition to use the term “corn sugar” to describe HFCS because the term “would suggest that HFCS is a solid, dried, and crystallized sweetener obtained from corn.” Michael M. Landa, Response to Petition from Corn Refiners Association to Authorize “Corn Sugar” as an Alternate Common or Usual Name for High Fructose Corn Syrup (HFCS), U.S. FOOD & DRUG ADMIN. (May 30, 2012), http://www.fda.gov/aboutFDA/CentersOffices/OfficeofFoods/CFSAN/CFSANFOIAEelectronicReadingRoom/ucm305226.htm. However, “HFCS is an aqueous solution sweetener derived from corn after enzymatic hydrolysis of cornstarch, followed by enzymatic conversion of glucose . . . to fructose.” Id.

204 RESTATEMENT (SECOND) OF TORTS § 466 cmt. c and d (1965) (recognizing that assumption of risk and contributory negligence doctrines overlap when the plaintiff voluntarily consents to encounter a known danger arising from the defendant’s negligent act).

205 1 J. LEE & BARRY LINDAHIL, MODERN TORT LAW: LIABILITY AND LITIGATION § 10.1 (2d ed. 2013); Schmidt v. Omaha Pub. Power Dist., 515 N.W.2d 756, 792 (Neb. 1994) (“Contributory negligence is conduct for which the plaintiff is responsible, amounting to a breach of the duty imposed upon persons to protect themselves from injury, and which, concurring with actionable negligence on the part of the defendant, is a proximate cause of injury.”).
C. Comparative Responsibility

In products liability actions, most jurisdictions apply the doctrine of comparative responsibility.\(^{206}\) Unlike assumption of risk and contributory negligence, comparative responsibility reduces the plaintiff’s recovery in proportion to his or her degree of fault.\(^{207}\) Some jurisdictions have adopted a “pure” version of comparative fault that “allocates responsibility to each actor . . . in proportion to the actor’s percentage of total fault.”\(^{208}\)

In order to prevail under this defense, a HFCS manufacturer must demonstrate that the plaintiff acted unreasonably by consuming excess amounts of food products containing HFCS, when he was aware of its potential negative health effects.\(^{209}\) Specifically, that a reasonable person would have learned of the dangers of overconsumption and modified his eating habits to reduce his risk for harm.\(^{210}\)

Consumers, however, could argue that because they were unaware of the health risks associated with HFCS consumption, they did not voluntarily expose themselves to the danger. Indeed, the Corn Refiners Association’s “Sweet Surprise” marketing campaign that attempts to recast HFCS as “corn sugar,” may demonstrate that the dangers of HFCS were not within the common knowledge of the average consumer.\(^{211}\)

Furthermore, product misuse, a type of consumer behavior, could play a factor in apportioning liability. HFCS manufacturers may argue that overconsumption of foods containing HFCS is a misuse of the product and that such overconsumption constitutes contributory fault, thereby reducing the plaintiff’s recovery.\(^{212}\) Although most consumers are generally aware of the relationship between overeating and obesity, the success of these conduct-based affirmative defenses rests on the ability of food manufacturers to prove that consumers had specific knowledge of the risk that the consumption of HFCS containing products could lead to negative health effects, such as diabetes.\(^{213}\)

\(^{206}\) RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 17 cmt. a (1998).


\(^{208}\) RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 17 cmt. b (1998); RESTATEMENT (THIRD) OF TORTS: APPORTIONMENT OF LIAB. § 7 (2000) (“Plaintiff’s negligence . . . that is a legal cause of an indivisible injury to the plaintiff reduces the [their] recovery in proportion to the share of responsibility the factfinder assigns to the plaintiff . . . .”).


\(^{210}\) Id.

\(^{211}\) Louie, supra note 203, at 293.

\(^{212}\) See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 17 cmt. a (1998). The plaintiffs in Pelman v. McDonald’s Corp. advanced this argument.

\(^{213}\) See generally Ausness, supra note 209, at 883.
VII. APPORTIONING LIABILITY AMONG SEVERAL MANUFACTURERS IS A BARRIER TO RECOVERY FOR HFCS PLAINTIFFS

Because HFCS plaintiffs must directly trace their adverse health outcome to consuming foods made with the defendant’s product, a major hurdle to recovery will be identifying which of several HFCS manufacturers is the actual maker of the HFCS that caused their type 2 diabetes.214 Proof of causation, however, is particularly difficult when some, but not all, of the HFCS manufactured by the defendant caused the plaintiff’s injury.215

Fortunately, some courts relax the requirement that plaintiffs prove exactly who caused their injury by adopting legal doctrines216 that impose collective liability on defendants.217 At first glance, the market share liability approach appears to be a potential solution to the inability of plaintiffs to identify which of several defendants manufactured the HFCS that caused their diabetes. This section argues, however, that even if plaintiffs can establish a causal relationship between HFCS and type 2 diabetes, the circumstances that typically warrant a remedy under this doctrine are absent in the case of HFCS litigation.

A. The Market Share Liability Approach

First utilized by the California Supreme Court in Sindell v. Abbott Laboratories,218 market share liability allows plaintiffs to recover damages when they can identify a group of defendants engaged in the harmful conduct, but cannot

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214 Tracing diabetes to a specific manufacturer’s HFCS is inherently problematic because consumers have difficulty remembering what they eat. Plaintiffs would have to be able to recall what specific food items they ate, its brand name, and the quantity of the product they consumed. Additionally, plaintiffs’ dietary recall is influenced by their current diet and inherently biased because they are parties to a lawsuit attempting to prove causation. See id.

215 Id. at 870.

216 There are several other legal doctrines whereby multiple defendants are held collectively liable for causing a plaintiff’s injuries. One approach that may provide HFCS plaintiffs a remedy is the doctrine of “enterprise liability,” which was first enunciated in Hall v. E.I. DuPont De Nemours & Co., 345 F. Supp. 353 (E.D.N.Y. 1972). This theory is broadly used to mean that losses caused by an enterprise should be borne by it. Sindell v. Abbott Laboratories, 607 P.2d 924, 928 n. 9 (Cal. 1980) (citing Howard C. Klemme, Enterprise Liability Theory of Torts, 47 U. COLO. L. REV. 153, 158 (1976)). Another approach for assigning collective liability emerged in the case of Summers v. Tice, which imposed the burden of identifying the cause of the plaintiff’s injury on multiple defendants. Summers v. Tice, 199 P.2d 1, 4 (Cal. 1948); see also DOBBS ET AL., supra note 59, at § 1921 (“When the plaintiff presents evidence that she suffered a single or indivisible injury at the hands of two or more tortfeasors, the burden is on the party who seeks to avoid responsibility for the entire damages to prove that magnitude of divisible damages.”).

217 See Sindell, 607 P.2d at 937 (holding that if defendants could not prove that they did not make the DES liability for damages would be apportioned based on market share); Ausness, supra note 209, at 870; Allen Rostron, Beyond Market Share Liability: A Theory of Proportional Share Liability for Nonfungible Products, 52 UCLA L. REV. 151, 159 (2004).

218 Sindell, 607 P.2d at 937.
prove which defendant is responsible for their injury.\textsuperscript{219} Under this theory, a plaintiff who is unable to identify the manufacturer of the particular HFCS that caused his or her diabetes can still recover on a proportional basis from each of the defendant manufacturers that may have supplied the HFCS.\textsuperscript{220}

In \textit{Sindell}, daughters allegedly injured by their mothers’ ingestion of diethylstilbestrol (DES) during pregnancy brought suit against DES manufacturers claiming that the drug caused their vaginal and cervical cancers.\textsuperscript{221} Prior lawsuits seeking to hold DES manufacturers responsible for the product’s carcinogenic effects were unsuccessful because plaintiffs could not identify the manufacturer of the drug prescribed to their mothers.\textsuperscript{222} Therefore, the issue confronting the court in \textit{Sindell} was whether a plaintiff, who cannot identify the specific manufacturer of the responsible product, may hold a manufacturer of a chemically identical drug liable for her injuries.\textsuperscript{223}

Recognizing that the plaintiffs would be barred from recovery altogether if the court rigidly adhered to prior precedent, the court created a remedy for cases of creation of fungible goods whose source cannot be traced to a specific manufacturer.\textsuperscript{224} Unless it could demonstrate that it could not have made the DES that caused the plaintiff’s injuries, the court apportioned damages among DES manufacturers in proportion to its respective market share at the relevant time.\textsuperscript{225}

\begin{footnotesize}
\textsuperscript{219} \textit{Restatement (Third) of Torts: Physical and Emotional Harm} § 28 cmt. p (2010); Rostro, \textit{supra} note 217, at 158; \textit{Compensation for Damage} 24 (Sheila A.M. McLean ed., 1993) (“By this principle, all those who manufactured the generic product may be held responsible for the defect . . . They are not absolved from liability simply because a particular plaintiff cannot identify a particular defendant.”).

\textsuperscript{220} \textit{See Restatement (Third) of Torts: Physical and Emotional Harm} § 28 cmt. p (2010). Market share liability is an extension of the court’s holding in the famous case of \textit{Summers v. Tice}, which held that if a party cannot identify which of two or more joint tortfeasors caused a plaintiff’s injury, the burden of proof may shift to the defendant to demonstrate that they were not responsible for the harm. Summers, 199 P.2d at 4.

\textsuperscript{221} Sindell v. Abbott Laboratories, 607 P.2d 924, 927–28 (Cal. 1980).

\textsuperscript{222} \textit{Id.} at 927–28.

\textsuperscript{223} \textit{Id.} at 925. DES manufacturers had to utilize a standard chemical formula for DES outlined in the United States Pharmacopoeia. \textit{Id.} at 933.

\textsuperscript{224} \textit{Id.} at 936–37. When a product is fungible, market-share liability is appealing because it provides compensatory relief to plaintiffs and deters future tortious conduct by defendants. \textit{Restatement (Third) of Torts: Liab. for Physical and Emotional Harm} § 28 cmt. p (2010). “If plaintiffs can demonstrate that the marketing and sale of a product was tortious and that the product caused their harm, they have a strong claim for compensation. \textit{Id.} This approach also serves as a deterrent because it imposes liability on the manufacturers of harmful products, even when a long latency period makes identification of the responsible manufacturer impossible. \textit{Id.}

\textsuperscript{225} \textit{Id.} at 937. For a discussion of a new proportional liability doctrine that addresses the legal hurdles to recovery for latent diseases caused by diffused environmental hazards \textit{see} Kenneth S. Abraham, Robert L. Rabin & Paul C. Walker, \textit{Enterprise Responsibility for Personal Injury: Further Reflections}, 30 San Diego L. Rev. 333 (1993). Under this approach, “in any case relying on epidemiological proof of causation, proportional liability rules [rather than] traditional all-or-nothing liability rules, would apply.” \textit{Id.} at 355. The authors proposed that proportional liability rules would apply when epidemiological evidence demonstrates at
B. Sindell’s “Fungibility” Requirement As a Barrier to Recovery

Courts since Sindell, however, have limited the reach of the market share approach by confining its applicability to cases where the product in question is “fungible,” such that “every unit of the product poses an identical degree of risk.” Because market share liability is premised on the notion that identical products pose identical risks of harm, the lack of fungibility of a product is often used to bar plaintiffs from recovery.

In the case of HFCS litigation, the fungibility requirement articulated under Sindell, precludes a court from using market share data to allocate liability among manufacturers that do not necessarily produce chemically identical HFCS. In an effort to vary the sweetness of their product, manufacturers began altering the fructose content of its HFCS. There are two types of HFCS currently used in food products: HFCS-42 and HFCS-55, each named according to its respective proportion of fructose. Hence, HFCS-42 is 42% fructose. If a dose-response relationship exists between increasing fructose consumption and negative health effects, the risk of adverse health outcomes will vary depending upon the specific concentration of

least a twenty percent probability of causation and “damages be proportional to causation up the point when the probability is at least eighty percent . . . that the defendant’s action caused the injury in question.” Consequently, victims who were exposed to an environmental hazard need not prove that it was at least 51% likely that their exposure caused their disease. Rather, if the causal likelihood of exposure, as determined by epidemiological studies, was 35%, then victims would be awarded only 35% of their losses. See id.

When market-share liability is limited to fungible products that pose equivalent risks to users who have no reasonable means to prove which manufacturer provided the product that caused the plaintiff’s harm, it has an exceedingly limited reach. Only products that cause harm after a lengthy latency period between exposure and development of harm are likely to create the systemic proof problems that market-share liability addresses.

Additional factors in Sindell that augured in favor of relaxing the traditional causation requirements were the egregious actions of DES manufacturers and the circumstances of the plaintiffs’ injuries that rendered identification of a specific manufacturer impossible by either party. See Sindell v. Abbott Laboratories, 607 P.2d 924, 925–26 (Cal. 1980). DES Manufacturers knew or should have known of the dangers, manufactured failed to test DES for efficacy and safety, failed to warn consumers of potential carcinogenic effects, and marketed DES on an unlimited basis without authorization from the Food and Drug Administration. Id.

Bray et al., supra note 23, at 537 (describing two different types of HFCS—HFCS-42 (42% fructose) and HFCS-55 (55% fructose)—made by enzymatic isomerization of glucose to fructose); see also Corn Refiners Association, What is HFCS?, SWEET SURPRISE, http://sweetsurprise.com/what-is-hfcs (last visited Jan. 21, 2014) (“[HFCS], a sugar made from corn, comes in two compositions—HFCS-42 and HFCS-55.”).

Corn Refiners Association, supra note 228.
fructose used in the defendant’s product.\textsuperscript{230} However, because food and beverage manufacturers are not required to specify which variety of HFCS they used in their products, it is difficult to determine whether HFCS manufacturers subject consumers to equal health risks.\textsuperscript{231}

Furthermore, fundamental differences between HFCS and DES preclude a court from using market share liability in the context of HFCS litigation. A major difference between the two is that, unlike DES, HFCS’s ability to cause harm is not as easily defined because it is one of many ingredients that comprise certain food products. This is especially true where HFCS, with its differing fructose concentrations, is present in food in varying quantities and inconsistently consumed. DES, however, was a single product, manufactured according to a single industry wide formula, ingested by women within the narrowly defined time frame of pregnancy, and responsible for a particular type of cancer.\textsuperscript{232} Because DES posed an equivalent risk of harm, irrespective of its particular manufacturer, the court in Sindell was more willing to find that a reasonable approximation of a defendant’s liability was its proportion of the market share.\textsuperscript{233}

Even if HFCS plaintiffs could establish that the nature of their disease rendered identification of a particular HFCS manufacturer impossible, because HFCS is not chemically identical and because there is no available means to determine which HFCS-variety a manufacturer produced, courts cannot utilize the market share liability approach to provide them a remedy.

VIII. ISSUES OF PERSONAL RESPONSIBILITY AND PUBLIC ACCOUNTABILITY LIE AT THE HEART OF FOOD LAWSUITS

A. Food Litigation as the New Tobacco

Before obesity and its associated health consequences grabbed the nation’s attention, tobacco use was a major public health concern. Recent lawsuits against the fast food industry, such as Pelman v. McDonald’s Corp., are reminiscent of tobacco litigation.\textsuperscript{234} Both include a personal responsibility component, allegations that the industries targeted their advertising to children, and the possibility that food

\textsuperscript{230} Indeed, current scientific evidence lends support to the notion that a dose-response relationship exists between fructose concentration in HFCS and negative health effects. See Bray et al., supra note 23, at 537 (finding that the increased consumption of soft drinks and concomitant increase in fructose intake from HFCS and sucrose may be an important contributor to the obesity epidemic).

\textsuperscript{231} See id. at 540 (“HFCS is found in most processed foods; however . . . exact compositions are not available from either the manufacturer or any publicly available food composition table.”).

\textsuperscript{232} See Sindell, 607 P.2d at 926.

\textsuperscript{233} Id. at 937.

\textsuperscript{234} For a more in-depth discussion of the parallels between fast food and tobacco litigation, see generally Joshua Logan Pennel, Big Food’s Trip Down Tobacco Road: What Tobacco’s Past Can Indicate About Food’s Future, 27 BUFF. PUB. INT. L.J. 101 (2008–2009).
manufacturers, like “Big Tobacco,” knew of the dangers of their products, yet continued to market them.\textsuperscript{235}

These striking similarities may help assess whether future juries will assign liability to food manufacturers when consumers suffer obesity-related injuries.\textsuperscript{236} Early tobacco cases faced initial skepticism from the public, who believed that any negative health effects from tobacco use were the result of a lack of self-control.\textsuperscript{237} Similarly, food plaintiffs today face the all too familiar argument of personal responsibility.\textsuperscript{238}

Lawsuits such as \textit{S.F. v. Archer-Daniels-Midland Co.} reveal that issues of personal autonomy and public accountability affect all food consumers.\textsuperscript{239} However, the idea that HFCS manufacturers should be held strictly liable for causing diabetes may not be one that society is ready to accept because it is contrary to societal attitudes regarding individual liberty and personal responsibility.\textsuperscript{240} These principles reflect the belief that individuals are free to make their own food choices and must take responsibility for the consequences of their actions.\textsuperscript{241} In other words, allowing consumers to blame the food industry for the results of their own bad judgment unfairly shifts responsibility from the individual to the manufacturer.\textsuperscript{242}

\textsuperscript{235} Cohan, \textit{supra} note 202, at 110–13; \textit{Fault Lines}, \textit{supra} note 111, at 103–04 (arguing that food litigation followed anti tobacco strategists’ three most effective substantive claims: 1) inadequate disclosure of nutritional content; 2) marketing aimed at impressionable children; and 3) increasing public costs of healthcare due to obesity related conditions); see generally Jada J. Fehn, \textit{The Assault on Bad Food: Tobacco-Style Litigation As An Element of the Comprehensive Scheme to Fight Obesity}, 67 \textit{Food & Drug L.J.} 65, 72–76 (2012) (noting the similarity between tobacco and food litigation).

\textsuperscript{236} Cohan, \textit{supra} note 202, at 110. Cigarettes have been successfully recast in a negative light by the “truth campaign,” the largest anti-tobacco movement focused on young people. Kessler, \textit{supra} note 175, at 247. The campaign promoted the notion that a person’s desire for cigarettes did not come from the individual themselves, but rather from a “manipulative and profit-driven industry.” \textit{Id.} The success of this campaign suggests the possibility that consumers could be willing to hold the food industry responsible for obesity related conditions. \textit{See id. at 247.}

\textsuperscript{237} \textit{See} Fehn, \textit{supra} note 235, at 73.

\textsuperscript{238} \textit{Id.} at 75. The theory of “conditioned hypereating,” proposed by David Kessler, calls into question the idea that individuals truly have a choice in what they consume. Kessler, \textit{supra} note 175, at 145. Kessler posits “chronic exposure to highly palatable foods changes our brains, conditioning us to seek continued stimulation. Over time, [the brain develops a powerful urge] for a combination of sugar, fat, and salt, [which] competes with our conscious capacity to say no.” \textit{Id.}

\textsuperscript{239} \textit{See} Pelman v. McDonald’s Corp., 237 F. Supp. 2d 512, 519 (S.D.N.Y. 2003).

\textsuperscript{240} \textit{See Ausness, supra} note 209, at 887.

\textsuperscript{241} \textit{Id.} The importance of moderation and avoidance of excessive food intake dates back to the Old Testament, in which God specifically warns against the sin of gluttony. \textit{See Proverbs} 23:2 (New Int’l Version) (“[P]ut a knife to your throat if you are given to gluttony.”); \textit{see also Proverbs} 23:20–21 (New Int’l Version) (“Do not join those who drink too much wine or gorge themselves on meat, for drunkards and gluttons become poor, and drowsiness clothes them in rags.”).

\textsuperscript{242} This argument, however, becomes less applicable when the injured plaintiffs are children. Children and teenagers do not possess the requisite maturity to understand the
Despite increasing rates of obesity, the notion of personal responsibility still pervades the public mockery of food lawsuits and underscores legislative attempts seeking to hold Americans accountable for what they eat.  

B. Legislative Attempts to Curb Food Litigation

Recognizing that litigation is a major threat to their industry, food manufacturers lobbied members of Congress to introduce legislation that immunized them from liability. The Personal Responsibility in Food Consumption Act of 2005 prevented civil liability actions brought against food manufacturers, marketers, distributors, advertisers, sellers, and trade associations for claims of injury related to an individual’s weight gain, obesity, or any health condition related to such. The Act asserted that a person’s weight gain, obesity, or obesity-related health condition is based on a multitude of factors such that it cannot be attributed to the consumption of any particular food product or beverage. It also recognized that “lawsuits seeking to blame food and beverage providers for a person’s weight gain, obesity, or consequences of their eating habits. KAUFMAN, supra note 42, at 219–20. Consequently, they are more susceptible to the aggressive tactics that food manufacturers use to market their products. Fehn, supra note 235, at 69–70; KAUFMAN, supra note 42, at 219–20; KILLER AT LARGE: WHY OBESITY IS AMERICA’S GREATEST THREAT (ShineBox Media Prod. 2008) (suggesting that junk food marketing to children undermines parental authority to determine what their children consume and is a contributory factor to the growing rise in obesity among America’s youth). Junk food marketing is a two billion dollar a year effort by the food industry to create brand loyalty among the nation’s young teens and children. TEDxTalks, Marketing Food to Children: Anna Lappe at TEDxManhattan, YOUTUBE (Mar. 11, 2003), https://www.youtube.com/watch?v=0bop3D7-dDM. The food industry seeks to create brand loyalty at a young age because it knows that this loyalty ultimately generates “pester power,” which works. Id. In fact, 75% of parents reported that they bought something for the first time simply because their children asked them to. Id. Juries will be more likely to assign blame to food sellers when children develop obesity-related health problems associated with the consumption of their products. Alderman & Daynard, supra note 45, at 85 (“Because children are more vulnerable than adults due to their lower capacity to evaluate advertising objectively, the food industry may be especially vulnerable to claims about misleading advertising directed toward children.”).

243 See Shirleen Holt, Go Ahead, Splurge on The Bulge, But Any Resulting Fact Is On You, SEATTLE TIMES, Sept. 9, 2003, at A1, available at http://www.freerepublic.com/focus/f-news/977597/posts; see infra Part VII(B). Diners at Seattle’s 5 Spot restaurant must sign a waiver promising not to file a lawsuit for any weight gain associated with consuming “The Bulge,” a calorie-dense “concoction of sugar-coated fried banana, ice cream, macadamia nuts, whipped cream and two kinds of syrup.” Holt, supra at A1. The waiver states in relevant part, “I promise to release the 5 Spot from all liability of any weight gain that may result from ordering and devouring this sinfully fattening treat. If I have to go to ‘fat camp’ at some time in my life, I will not mail my bill to the 5 Spot.” Id.

244 KAUFMAN, supra note 42, at 220.


246 Id. at § 2(a)(3).
a health condition . . . are not only legally frivolous and economically damaging, but also harmful to a healthy America.”

Despite being reintroduced three times, the federal Personal Responsibility in Food Consumption Act failed to gain enough Congressional support. Undaunted, the National Restaurant Association, representing large food chains such as McDonald’s, has successfully lobbied state legislatures to pass various “commonsense consumption” laws. These laws, dubbed “Cheeseburger Bills,” bar civil lawsuits against food manufacturers seeking recovery for obesity-related health conditions. Between 2004 and 2012, twenty-five states enacted Cheeseburger Bills.

Although HFCS litigants may still bring obesity related tort claims against HFCS manufacturers in federal court, the enactment of “Commonsense Consumption” laws by over twenty-five states demonstrates how organized lobbying efforts, huge financial incentives, and an increasingly “receptive legislative climate” can effectively shield the food industry from liability.

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247 Id. at § 2(a)(4).


249 Id. As recently as July 18, 2013, North Carolina enacted its Commonsense Consumption Act, barring civil actions against food and beverage manufacturers from claims arising from weight gain, obesity, its associated health conditions, or other conditions likely to result from long-term consumption of food. Commonsense Consumption Act, H.B. 683, 2013 Gen. Assemb. § 99E-42 (N.C. 2013). The Act also prohibits local governments from regulating the size of soft drinks offered for sale. Id.


251 Id. Notably, fifteen of the twenty-five states with the highest obesity rates have enacted Commonsense Consumption Acts. Id.

252 Warner, supra note 248 (“[T]he food and restaurant industry gave a total of $5.5 million to politicians in the 20 states that have passed laws shielding companies from obesity liability.”).

253 Id.; see generally Wilking & Daynard, supra note 250, at 230. Boehmer and colleagues investigated state-level childhood obesity prevention legislation in order to analyze geographic patterns of bill introduction and adoption. Tegan K. Boehmer, et al., Patterns of Childhood Obesity Prevention Legislation in the United States, 4 PREVENTING CHRONIC DISEASE 1, 3-4 (July 2007), available at http://www.cdc.gov/pcd/issues/2007/jul/pdf/06_0082.pdf. During the three-year study period, 17% of the 717 introduced bills, which related to childhood obesity prevention topics, were adopted by the fifty states. Id. at 3. None of these adopted bills, however, sought to hold the food industry responsible. See id. Those bills relating to snack and soda taxes, restaurant menu, and product labeling were not adopted by any state legislature. Id.
IX. CONCLUSION

The New York District Court’s ruling in the current HFCS lawsuit will set the stage for future food litigation and will determine if courts are willing to accept the legal theory that food manufacturers should be held liable for the adverse health outcomes associated with their food products.

Liability is contingent upon plaintiffs proving causation. In order to demonstrate that an exposure or product caused their adverse health outcome, plaintiffs are increasingly relying on epidemiologic evidence. Strict interpretations of the Supreme Court’s ruling in Daubert, erect seemingly insurmountable barriers to admitting an expert opinion based on epidemiologic evidence. Bright-line tests, such as a risk ratio threshold of 2.0, do not reflect how practitioners derive causal inferences in the field and usually result in the dismissal of otherwise meritorious claims. Instead of utilizing these arbitrary admissibility tests, judges should determine the reliability of epidemiologic evidence by examining the methodology behind each study.

Unfortunately, even if HFCS plaintiffs succeeded in establishing causation, additional barriers, such as apportioning liability and the battle cry of personal responsibility, likely stand in their way. According to law professor and anti-tobacco litigator, John Banzhaf III, “as was the case with tobacco, it takes time for legal theories to coalesce in a way that forces major societal change.”254 Indeed, the line between individual responsibility and public accountability for the economic and public health costs of obesity-related health conditions, has yet to be firmly drawn in the context of food litigation.255

S.F. v. Archer-Daniels-Midland Co. may


255 See Pelman, 237 F. Supp. 2d at 516 (“The issue of determining the breadth of personal responsibility underlies much of the law: where should the line be drawn between an individual’s own responsibility to take care of herself, and society’s responsibility to ensure that others shield her?”). Entitled, “YOU ARE TOO STUPID...to make good personal decisions about foods and beverages,” the Center for Consumer Freedom’s ad that was launched in response to the New York City Department of Health’s campaign encouraging consumers to choose beverages with less sugar, illustrates the current battle between personal responsibility and industry accountability. You are Too Stupid, CENTER FOR CONSUMER FREEDOM (Dec. 22, 2011), http://www.consumerfreedom.com/2011/12/you-are-too-stupid/
just be one battle in the greater war to hold the food industry responsible for the nation’s expanding waistline and its attendant health consequences.