ISSN 2474-8927

SOCIAL BEHAVIOR RESEARCH AND PRACTICE

Open Journal

Openventio PUBLISHERS

Opinion

Despite 50 Years of Knowledge of Actual *Versus* Perceived Risk, Public Fear Persists of Contaminated Foods

Sweta Chakraborty, PhD*

Millennium Fellow, The Atlantic Council, 1030 15th St NW, Washington, DC 20005, USA

Corresponding author
Sweta Chakraborty, PhD
Millennium Fellow, The Atlantic Council, 1030 15th St NW, Washington, DC 20005, USA; E-mail: sweta@adapttothrive.com

Article Information
Received: October 17th, 2019; **Revised:** October 30th, 2019; **Accepted:** November 1st, 2019; **Published:** November 5th, 2019

Cite this article
Chakraborty S. Despite 50 years of knowledge of actual *versus* perceived risk, public fear persists of contaminated foods. *Soc Behav Res Pract Open J*. 2019; 4(2): 26-27. doi: 10.17140/SBRPOJ-4-118

Irrational overreactions to the food we eat are commonplace these days, despite food scientists' and regulators' best efforts at communicating actual risk associated with consuming foods to be significantly low. This is because we can detect toxins in foods to the parts per billion, which has advanced significantly since we were only able to detect to contaminants to the parts per million. Despite the infinitesimally small risk still associated with food production and consumption, consumers still fear adulteration of the foods they eat.

This is largely because consumers are painfully inept at processing numbers. Despite the base-rate statistics of the actual risk of contamination, consumers systematically attribute much higher risk than is actually the case. In the case of food-related risks, perception is often far greater than the reality of the risk. This incongruence can be attributed to the disproportionate media coverage of certain risks over others. Stories that are scandalous, sexy and attention-grabbing receive far more airtime in the media. No example in modern reporting of food safety showcases this better than the infamous Dioxin Affair.

In the spring on 1999 in Belgium, the dioxin, polychlorinated biphenyls (PCB) was detected in animal food products--mainly eggs and chickens. Dioxin refers to a large group of toxic chemicals, including PCBs and polychlorinated dibenzofurans (PCDFs). Dioxins are by-products of industrial processes and are particularly dangerous because of their ability to accumulate in the fatty tissue of animals. Prolonged exposure, even at very low doses, can damage the immune, hormonal and reproductive systems, and can lead to cancer. Human exposure to dioxins mainly occur through food, and specifically through meat, fish and dairy products.[1]

Our bodies, and the food we consume are made up of chemical compounds. The chemical compounds which contribute to fats and proteins in food are mostly beneficial to human health.[2] Some synthetic chemicals can be harmful, however, and those that find their way up the food chain, like dioxin, fall into that category.

The Dioxin Affair was not simply identifying and containing the alleged harm to human health posed from toxins in what was later found to be mainly in animal feed; rather, the perceived food safety risk turned into an all-out political and social crisis. It resulted in the resignation of both of Belgium's Ministers of Health and Agriculture. The perceived ineptitude of the government to protect the public from food risk also resulted a historic loss for the incumbent governing party in Belgium.

Belgian farms suffered critically from the cost of lost operations. Potentially contaminated products were banned from markets and export bans were put in place. Approximately 70 million chickens and 50 thousand pigs were slaughtered in the process of attempting to contain the contamination. All of this would prove futile upon completion of the investigation, which found that there was never a serious threat to human health because the contaminated material was largely diluted during the production of animal feed.

In the rare circumstance that food is found to be contaminated, even when the contamination is ultimately found to be non-threatening, the media picks up on the story and propagates it through various channels and outlets. Developed by Kasperson et al. The social amplification of risk framework (SARF)[2] provides a conceptual charter for describing this phenomenon. Risks are amplified or attenuated through the media through "social am-

plification stations," which can range from individuals to the news media. Amplification happens in two stages: in the initial transfer of information about the risk, and in the response mechanisms in society.

Social amplification of a risk story, like dioxin in eggs, results in easy cognitive retrieval of the risk. As scandals reverberate through the media and through our social networks, they are easily retrieved upon recall--potentially coloring our views and assessments on new information and new risks. Hearing about a new, similar-sounding story can very well result in retrieval of the most salient example imbedded in our brains, even if much of the contextual details are dissimilar or wholly unique. From that biased foundation, humans then make judgments about the new story without fully processing the new information. This explains not just the public reaction to food scares regardless of their nature (e.g., food fraud, foodborne illnesses), but also reaction to risks in other sectors such as pharmaceuticals. For example, it's been found that drug recalls result in decreased prescription refills--an affect even observed across totally different drug classes from that of the recall.[3]

There are inherent biases contributing to public perceptions of risk around food scares and drug recalls. The primary heuristic of note is what Nobel Prize-winning researchers Amos Tversky and Daniel Kahneman described as the "availability bias," or a rule of thumb in which consumers "*assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind*."[4]

This type of bias may appear to be cognitively disadvantageous; however, the ability to remember or imagine common events over uncommon events has been essential to human evolution and progress. The issue arises when the lay public is asked to assess probability and frequency, which salience based on social amplifications can and does often skew.

Researchers have known for almost half a century now that human assessment of risk frequency and probability often depends on how easily it can be conjured in the mind. The SARF has robustly showcased how media and social media networks propagate news of scandals like dioxins in eggs, creating echo chambers--where information accepted to be true is continuously reinforced.[2] Depending on the networks to which a consumer belongs, their chosen information will become more salient, easer to retrieve, and destined to influence future judgments particularly around the risk of contaminated food.

Risks will continue to be perceived where they do not exist or are immeasurably low, and demands will be made for reducing or removing inconsequential risks altogether. Despite the knowledge of how humans cognitively process risk information, society continues to fear the food they eat. Human brains may not have evolved fast enough to catch up to the modern-day risk landscape, or in actuality how well regulated it is, and so the continued public fear and pushback stems from the inability to close the discrepancy between real and perceived risk. Despite keen knowledge on the science of communication, application of science communication to communicating science is still in its early days. Once widespread effective science communication is in place, perhaps the gap between the base-rate statistics of food contamination and it's perceived rates will begin to narrow.

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