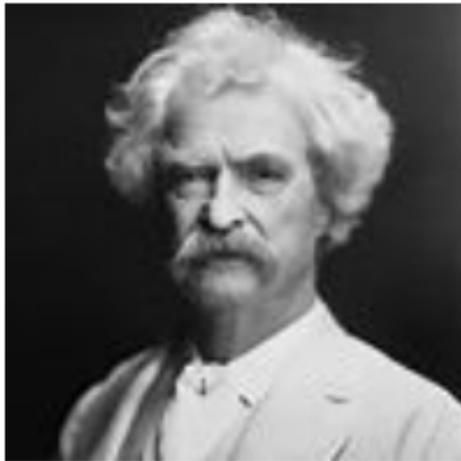


Food Ingredients, Health and Statistics

Lies, damned lies, and statistics



"Lies, damned lies, and statistics" is a phrase describing the persuasive power of numbers, particularly the use of statistics to bolster weak arguments. It is also sometimes colloquially used to doubt statistics used to prove an opponent's point.

en.wikipedia.org · Text under CC-BY-SA license

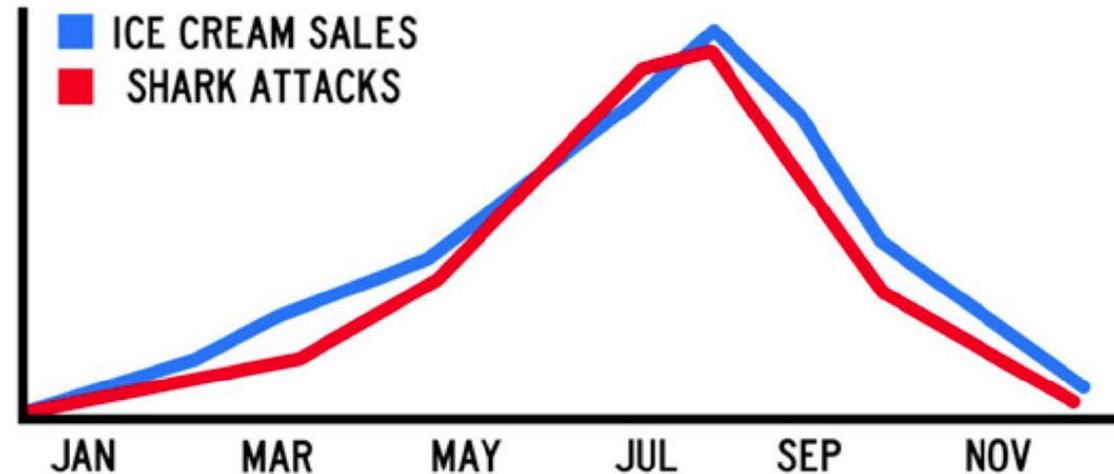
What is the most important cause of critical thinking failure?

- The public has only minimal background knowledge of nutrition and nutrition science
- Human nature has limitations in critical thinking ability
- The media (including social media and celebrities) get in the way of people's ability to think critically
- Education systems do not adequately teach critical thinking

Courtesy of Brandon McFadden & Jason Riis

Understanding Causality?

CORRELATION IS NOT CAUSATION!



Both ice cream sales and shark attacks increase when the weather is hot and sunny, but they are not caused by each other (they are caused by good weather, with lots of people at the beach, both eating ice cream and having a swim in the sea)

Processed Foods Saves Lives

Why food processing?

- Processing enhances safety, e.g., pasteurization of milk
- Processing makes foods palatable, e.g., most grains
- Processing to ensures availability throughout the year (beyond the typical growing season), e.g., canned and frozen fruits/vegetables
- Fortification of processed foods contributes to public health
- Processed foods provide affordable options

Fruits and Vegetables: All Forms Nutritious



All Forms of Fruit & Vegetables are Nutritious!

Fresh, frozen, canned, dried, and 100% juice—all these forms of fruit and vegetables are important to include in everyday meals and snacks! Each form contributes essential nutrients that your body needs to grow and function properly. Using all forms of fruit and vegetables in your meal preparation lets you take advantage of the benefits that each form provides and increases your choice of healthy food items.

Nutritional research shows that . . .

- Fresh, frozen, dried, and canned fruit and vegetables contain similar amounts of fiber and minerals. Cooking fruit or vegetables does not destroy fiber or minerals.^{1,2}
- From a nutrition and taste standpoint, recipes prepared with canned and/or frozen ingredients have been rated as comparable to those prepared with cooked fresh ingredients.^{3,4}
- Dried fruit are a particularly significant source of dietary potassium and fiber. Depending on the specific fruit, they provide other important nutrients like vitamin A and carotenoids (dried peaches and apricots); vitamin K (dried plums); calcium (dried figs); manganese (dried figs); and boron (raisins and dried plums).⁵
- Research shows that children and teens who drink 100% juice have higher usual intakes of vitamins A and C, magnesium, folate, phosphorus, calcium, and potassium—all nutrients that have been identified as frequently under-consumed by these age groups.^{6,7}
- Most fat-soluble nutrients, including carotenoids, vitamin A, and vitamin E, are higher in processed fruit and vegetables. This is true, in part, because the mild heat treatment in processed products allows for greater bioavailability of lipid-soluble nutrients.⁸
- Processed fruit and vegetables may also contain greater nutritional value because some processing cultivars are more nutritious than fresh cultivars, as is the case with tomatoes.¹
- Canned blueberries contain an increased amount of anthocyanins, a powerful antioxidant, compared to the amounts found in fresh and frozen blueberries.⁹
- The absorption of lutein, an antioxidant that may reduce the risks of cataracts and macular degeneration, is enhanced in canned corn by heat from the canning process.⁹
- The antioxidant capacity found in dried fruit is much higher than the corresponding values for fresh because the antioxidants are concentrated in a smaller volume during the dehydration process.⁸



FruitsAndVeggiesMoreMatters.org



FruitAndVegFoundation.org

What nutrition research tells us ...

- Most fat-soluble nutrients (including carotenoids, vitamin A, vitamin E) are higher in processed fruit & vegetables: true, in part, because mild heat treatment allows greater bioavailability of lipid-soluble nutrients.¹
- Processed fruit and vegetables may contain greater nutritional value because some processing cultivars are more nutritious than fresh cultivars, as is the case with tomatoes.¹
- The antioxidant capacity (*no official FDA-approved method*) of dried fruit is much higher than the corresponding values for fresh because the antioxidants are concentrated in a smaller volume during dehydration.²

¹ Rickman J et al. *J Sci Food Agri*. May 2007; 87(7):1185-1196

² International Nut and Dried Fruit Council. *Dried Fruits: Valuable Tools to Meet Dietary Recommendations for Fruit Intake*. 2011

Benefits of Modern Food System

■ Increased Food Availability

- Decreased post-harvest losses → more food
- Techniques: millings, grinding, canning, preserving, freezing and drying

■ Safety and Freshness

- Pasteurization (e.g., milk)
- Packaging (reduces contamination)
- Packaging atmospheres (e.g., MAP, CO₂)

■ Convenience and Affordability

- More food options → more affordability

■ Variety and Choice

- Expanded agriculture → improved nutrition (e.g., nutrient-dense)

■ Improved Nutrition

- Fortification and Enrichment (e.g., vitamin D, folic acid)
- Reduced intolerances (e.g., gluten, lactose)



Nutrition and Food Technology

Food Product, Ingredient or Technology	Potential Benefit or Application
Iodine added to NaCl; Niacin added to flour; Vitamin D in milk	Elimination of goiter; Elimination of pellagra; Elimination of rickets;
Oils from soybean cultivar	Reduced saturated fatty acids and higher n-3 unsaturated fatty acids
Resistant starches	Weight management, satiety, (gut microflora?)
Grains/flour fortified with zinc, β -carotene, folic acid	Improved nutriture of individuals in developing countries; significant reduction in NTD
Low-gluten foods	Increased choices for those with celiac disease
Foods without/reduced allergens(e.g., hydrolysates) or with allergens (labelled)	Increased choices for those with food allergies
<i>Lactobacillus acidophilus</i> and other potential probiotics in diary products (e.g., yogurt)	Addition of healthful bacteria to the diet (gut microbiota)
Reduction of toxins (e.g, aflatoxins, fumonisins)	Improved food safety
Whole grain-rich foods (e.g., enhanced with bran, and grain other components)	Weight management, satiety, cholesterol-lowering

What About These Foods?

- Medical foods
- Military foods (MRE)
- Space foods
- Rehydration
- Plumpy Nut



Food Toxicology vs Food Processing

Food	Toxin	Process
Potato; tomato	Glycoalkaloids (choline esterase inhibitor) natural pesticides and fungicides	Physically remove; monitor during harvest
Red kidney beans	Lectin (phytohaemagglutnin); natural insecticide	Soak and cook
Raw eggs	Avidin (biotin binder)	Cook
Avocado	Persin (terpenoid)	Carefully remove seed and skin
Celery/Parsley	Psoralens (phototoxic dermatitis);	Minimize exposure; used as pharma agent against UV
Seed fruits (e.g., peaches, cherries, apples)	Cyanogenic glycosides	Minimize seed exposure/consumption
Carrots	Falcarinol (carotatoxin)	Minimize exposure; cook
Quinoa	Saponins (toxic glycosides)	Wash, dry
Cabbages, broccoli, green pepper, eggplant	>50 Mutagens/Carcinogens (note;80% mutagens → carcinogens)	Minimize “raw” exposure
Cassava (tapioca)	Cyanogenic glycosides: linamarin and lotaustralin	Soak and cook

Calls to Action: We All Have a Stake!

If we are ...	We can ...
food industry	<ul style="list-style-type: none">▪ provide affordable, accessible and healthy processed foods▪ develop new technologies for preserving food and enhancing quality▪ maintain quality and safety standards▪ educate the public about food processing▪ develop effective food labeling▪ develop tasty, convenient alternatives to perishable foods▪ define and support food processing research
consumers	<ul style="list-style-type: none">▪ demand information on food processing & health▪ provide feedback to food industry▪ encourage public/private partnerships to enhance food quality & reduce food waste
agriculture	<ul style="list-style-type: none">▪ develop procedures for enhancing food quality and evaluating food safety▪ invent technologies for increasing accessibility to healthy process foods

Adapted from: Weaver CM et al; *Am J Clin Nutr* 2014;99(6):1525-42

Fresh and Processed Foods are Important in a Healthful Dietary Pattern

