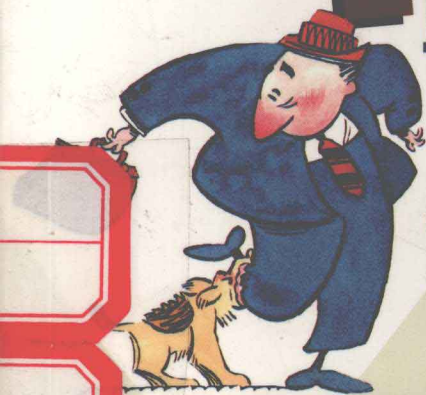


# The Book of Risks



**Fascinating Facts  
About the  
Chances We Take  
Every Day**

**LARRY LAUDAN**

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**John Wiley & Sons, Inc.**

New York • Chichester • Brisbane • Toronto • Singapore

Composition: Impressions, a division of Edwards Brothers, Inc.

Design: Tenenbaum Design

This text is printed on acid-free paper.

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Published by John Wiley & Sons, Inc.

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***Library of Congress Cataloging-in-Publication Data***

Laudan, Larry

The book of risks: fascinating facts about chances we take every day /

Larry Laudan

p. cm.

Includes index.

ISBN 0-471-31034-4 (paper)

1. Risk perception—United States—Statistics. 2. Risk assessment—United States—Statistics. I. Title.

HM256.L38 1994

302'.12—dc20

94-6762

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

# **The Book of Risks**

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***For all those who think that knowing  
is better than not knowing.***

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## INTRODUCTION

# Thinking about Risks

**N**o other society in history has been as sensitized to risks, dangers, and threats to life and limb as our own. If the food we eat isn't killing us, then it is the air we breathe, or the water we drink. Our fellow human beings are overpopulating the planet, stretching its limited resources beyond the breaking point. Our children return from school fretting about greenhouse gases, the ozone layer, and nuclear winter—the latter produced either by our own stupidity or by a fiery encounter with a comet or asteroid. Parents worry about whether to let Johnny have that peanut butter sandwich because they read somewhere that peanuts carry a potential carcinogen, aflatoxin. We have been told to avoid meat, milk, cigarettes, alcohol, fats, small cars, breast implants, sunny beaches, tap water, smoke-filled rooms, high-rise hotels, nonorganically produced vegetables, and terrorist-infested foreign countries—to mention only a few.

If anyone bothered to keep a list of the risks we are routinely warned about—and doubtless some of us *do* keep such lists—it would fill multiple volumes. More to the point, if we *acted* on all this advice, life would become very dull indeed. In fact, because virtually everything is risky to some degree or other, we would be reduced to total inactivity. You doubt that everything is risky? Ponder this: Hundreds of thousands of Americans are injured each year on their beds, and tens of

thousands are done harm by their toilet bowl cleansers or by the change they carry in their pockets. Annually, tens of thousands of Americans inadvertently set their clothing on fire. Another hundred thousand or so are injured by their clothing seriously enough to require emergency medical treatment.

The idea of curtailing everything risky begins to unravel in the face of such facts. We can't give up our beds, our clothes, our toilets, and our currency all in the name of risk management. Because risks lurk everywhere, our risk-averse behavior is sometimes comic, sometimes absurd—that is, if we can briefly distance ourselves from our situation. As perils go in and out of fashion, we find ourselves doing today exactly what we were urged to avoid yesterday. We are warned, "Avoid aspirin because it causes stomach ulcers" at the same time that we are admonished, "Take aspirin to avoid the risk of strokes." "Alcohol is dangerous to your health." But, of course, "Red wine reduces the chances of a heart attack." "Buy fire-retardant pajamas for your children"; however, as the fine print warns us, "Fire-retardant materials may be carcinogenic."

As we adjust and readjust our actions to keep up with the latest pronouncements of media risk gurus, we resemble nothing so much as drunks staggering from pillar to post with no clear sense of direction. If the stakes weren't so high, our lungings and lurchings would be laughable.

Consider a different sort of example. In the wake of the oil crisis of the mid-1970s, energy conservation measures, designed to reduce the risk of our dependence on foreign oil, became popular. Among those measures were new standards for ventilation and insulation. Yuppies everywhere went out and retrofitted their houses with airtight windows and doors and wood stoves. It later turned out that the added insulation

vastly increased the concentration of toxic gases (especially radon) in private homes, while the wood stoves pumped untold quantities of carcinogen-bearing gases into everyone's (now airtight) parlors. We are learning that the world is increasingly like that. Averting or minimizing one risk brings exposure to new ones.

This is a book about many of the risks we face. I try to report the straight facts about them. But I also try to keep it all in perspective by noting some of the contradictions and confusion we get into when we take to heart the numerous bits of information with which we are daily bombarded. This introduction is discursive and didactic; it establishes a context for thinking about risks. The main body of the text is like a "Book of Lists"; it catalogs much of what we know about risks and how to avoid them. If you are already familiar with the basic issues of risk assessment and risk management, you should skip ahead to Chapter 1 without delay.

To the old cliché that a picture is worth a thousand words, our century has added a new twist: A number is sometimes worth a thousand pictures. Let's ponder a few examples. For all the wrenching emotions produced by photographs of stacked corpses and the ovens at Auschwitz or Buchenwald, nothing more nearly conveys the magnitude of the horror than the realization that more than 15 million Jews, Gypsies, homosexuals, and leftists were butchered in the camps. Similarly, no photograph of a hospital deathbed can come as close to summoning up the dread of the 1919 flu epidemic as the realization that it killed more than 20 million men, women, and children. Sometimes the numbers that carry such force are not simple head counts but ratios or percentages. For instance, the fact that four out of every five of the millions of Soviet troops who fought World War II never returned home speaks volumes about how that

war took its toll on every family in that country. (Joseph Stalin, with characteristic moral myopia, claimed, "The death of a single Russian soldier is a tragedy, but a million deaths is just a statistic.") The fact that diseases brought from the Old World wiped out more than 80 percent of the millions of Indians living in the New World within two generations is another example of how vividly percentages can convey both information and emotion.

Thus, this is a book about numbers and ratios, for that is the language in which risks to life and limb are most vividly expressed. On the whole, I have deliberately kept my editorializing to a minimum, because the numbers so often speak eloquently for themselves. The book is an experiment of sorts, an attempt to see whether quantities—in this age of numbers and data—still retain the power to inform the mind, to animate the imagination, to guide action, and sometimes to amuse.

I can guarantee, at a minimum, that many of the numbers here will surprise you, for they show vividly that many of the risks of life are quite different from what we might expect.

## **Risks and You**

At some time or other, all of us have played the part of a hypochondriac, imagining that we have some dreaded disease on the strength of the flimsiest of symptoms. Some people have scarcely to hear about a new disease before they begin checking and probing themselves to see if they may be suffering from it. But fear of disease is not our only fear, and neither is risk of disease the only risk we run. Modern life is replete with all manner of threats—to our lives, our peace of mind, our pocketbooks, our families, and our futures. And from these threats come questions that we must pose to our-

selves: Is the food I buy safe? Are toys for my children likely to maim them? How risky is that toxic waste dump over in the next county or the nuclear reactor 200 miles upwind from my house? Should my family avoid smoked meats? Am I likely to be robbed on vacation? Should I use a condom? Our uncertainties multiply indefinitely.

Anxiety about the risks of life is a bit like hypochondria; in both, the fear or anxiety feeds on *partial* information. But one sharp difference exists between the two. The hypochondriac can usually turn to a physician to get a definitive clarification of the situation—either you have the suspected disease or you don't. It is much more difficult when anxiety about other forms of risk is concerned, because with many risks, the situation is not as cut and dried.

Risks are almost always a matter of *probabilities* rather than certainties. You may ask, "Should I wear seat belts?" If you're going to have a head-on collision, of course. But what if, heaven forbid, you get hit from the side and end up trapped inside the vehicle, unable to extricate yourself because of a mangled seat belt mechanism? So does this mean that you should lay out the extra cash for an air bag? Again, in head-on collisions, it may well save your life (although, as we will see in Chapter 6, it does less to save your life than a seat belt will). But what if the bag accidentally inflates while you are driving down the highway, thus causing an accident that would never have occurred otherwise?

According to Murphy's famous law, if something can go wrong, it will. Fortunately, Murphy's law is patently false. If even most of the things that could go wrong routinely did go wrong, then none of us would now be around to muse about it. That said, we have to acknowledge that at any time, a dizzying number of things *could* start going wrong. Whether they will, and which ones, all depends on the relevant probabilities.

All of this is another way of saying that nothing we do is completely safe. There are risks, often potentially serious ones, associated with every hobby we have, every job we take, every bite we eat—in sum, with every action. But the fact that there are risks associated with everything we contemplate doing does not, or should not, reduce us to trembling neurotics. Some actions are riskier than others. The point is to inform ourselves about the relevant risks and then act accordingly.

For example, large cars, as everyone knows, are generally safer than small ones in collisions. But how much safer? The answer is that you are roughly twice as likely to die in a serious crash in a small car than in a large one. Yet large cars generally cost more than small ones (and also use more fuel, thus increasing the environmental risks!), so how do we decide when the diminished risks are worth the added costs? The ultimate risk avoider might, for instance, buy a tank or an armored car, thus minimizing the risk of death or injury in a collision. But is the added cost and inconvenience worth the difference in price, even supposing you could afford it?

We cannot begin to answer such questions until we have a feel for the magnitude of the risks in question. So how do we measure the magnitude of a risk? Some people seem to think that the answer is a simple number. We know, for instance, that about 25,000 people per year die in automobile accidents. By contrast, only about 300 die per year in mine accidents and disasters. Does that mean that riding in a car is much riskier than mining? Not necessarily. The fact is that some 200 million Americans regularly ride in automobiles in the United States every year; perhaps 700,000 are involved in mining. The relevant figure that we need to assess a risk is a ratio or fraction. The numerator of the fraction tells us how many people were killed or harmed as the result of a

given activity over a certain period of time; the denominator tells us how many people engaged in that activity during that time. *All risk magnitudes are thus ratios or fractions, with values between 0 (no risk) and 1 (totally risky).*

By reducing all risks to ratios of this sort, we can begin to compare different sorts of risks—like mining versus riding in a car. The larger this ratio, that is, the closer it is to 1, the riskier the activity in question. In the case just discussed, we would find the relative safety of car travel and coal mining by dividing the numbers of lives lost in each by the number of people participating in each. Here, it is clear that the riskiness of auto travel is about 1 death per 10,000 passengers; with mining, the risk level is about 4 deaths per 10,000 miners. So although far more people are killed in car accidents than in mining, the latter turns out to be four times riskier than the former. Throughout this book, we will be looking at such ratios. They enable us to compare the risks of activities or situations as different as apples and oranges. If you are risk averse, you will want to choose your activities by focusing on the small-ratio exposures. If your attitude is more devil-may-care, then you are not likely to be intimidated by higher ratios unless they get uncomfortably large, when any but the absolutely foolhardy will make discretion the better part of valor.

Consider, for instance, the figures in the table on the following page. They enable us to take a variety of different risks and reduce them to a common denominator. We see, for example, that hour for hour, skiing is 300 to 400 percent more likely to kill you than flying on a scheduled airline. Three strenuous days of rock climbing exposes a person to about the same risk of death as that run by the average 65-year-old man who goes about his normal business for a fortnight.

**ACTIVITIES PRODUCING A 1-IN-1,000  
RISK OF DEATH**

<b>Activity</b>	<b>Time or Effort Involved</b>
Rock climbing	25 hours
Skiing	340 hours
Working on a farm or in a mine	2.2 years
Being a 65-year-old man	336 hours (2 weeks)
Driving a car	2,000 hours (100,000 miles)
Driving a motorcycle	55 hours (cross-country, one way)
Flying on a scheduled airline	1,200 hours
Regular skydiving	50 hours

Once we understand that risk can never be totally eliminated from any situation and that, therefore, nothing is completely safe, we will then see that the issue is not one of avoiding risks altogether but rather one of managing risks in a sensible way. Risk management requires two things: a modicum of common sense *and* information about the character and magnitude of the risks we may be running. The purpose of this book is to provide a heavy dose of the second. You will find information about a huge spectrum of risks to life and limb. My hope is that it will provide you with the information you need to make reasonable decisions about everything from your choice of life-style to the food you eat and the sorts of gadgets you fill your household with.

I suspect you will discover that the true character of many risks is quite different from what you may have imagined. Too often, we end up preparing ourselves for the improbable risk while failing to take precautions against more likely ones. The media, in particular, have a habit of selecting two or three risks every season to publicize while playing down others. It is



not so much that they dishonestly state the dangers associated with the “in” risk as that they fail to set that risk into context. Several years back, for instance, it was fashionable to focus on the risks of the birth-control pill (for example, thrombosis). Those risks were solemnly discussed by talk-show gurus and many women, understandably, became frightened. Sadly, almost no one bothered to point out that *every* pregnancy is roughly 300 percent more life-threatening to a (non-smoking) woman than is a decade on the pill.

Ordinary folk need to know not only what is risky but also what *the level of risk* involved amounts to. Newspaper headlines routinely scream about a cancer risk associated with this or a toxic danger associated with that. Rarely, however, do we learn the magnitude of the risk. If, for instance, the chance of getting botulism from a contaminated can of salmon is only 1 in 10 million, most of us probably would not hesitate to order that salmon salad sandwich. After all, that is much less than the risk of getting hit by lightning. If, on the other hand, the risk is 1 in 100, none of us would knowingly keep a can of salmon in the pantry. But in either case, headline writers are likely to cover the story in the same way:

## **CONTAMINATED SALMON HITS SHELVES OF LOCAL MARKETS**

Such an indiscriminate attitude towards the level of risk doubtless sells newspapers; because virtually everything is risky, there is a limitless set of scare stories that can be cranked out on demand. But this should not be your attitude, because ignoring the level of risk makes sensible risk management impossible. Indeed, my general rule is this: *Unless someone can tell you what level of risk is associated with a given*