

Missing Elements in
the Public Science
Supporting the
COVID-19 Spread
Narrative in the US

Missing Elements in the Public Science Supporting the COVID-19 Spread Narrative in the US

By

James L. Sherley

**Cambridge
Scholars
Publishing**



Missing Elements in the Public Science Supporting the COVID-19 Spread
Narrative in the US

By James L. Sherley

This book first published 2022

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Copyright © 2022 by James L. Sherley

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

ISBN (10): 1-5275-8267-1

ISBN (13): 978-1-5275-8267-5

*Dedicated to my friends who understand me
and to my friends who don't.*

TABLE OF CONTENTS

Preface.....	ix
Chapter I	1
Searching for a valid representation of reality	
Chapter II	11
A question that must be asked	
Chapter III	15
Epidemiology 101 and Epidemiology COV	
Chapter IV	21
Beginning with bias	
Chapter V	31
COVID-19 infection surveillance, a new paradigm in epidemiology	
Chapter VI	39
The new epidemiology of COVID: The plague of testing	
Chapter VII	53
Understanding COVID Ascertainment Bias: Who's dying of what?	
Chapter VIII	65
COVID prevention: From common sense to uncommon science	

Chapter IX..... 85
Embracing the Uncertainty of Science as the Best Practice
for the U.S. COVID Response

Chapter X..... 93
Politicians, Scientists, Physicians, News Media:
Who’s responsible?

Chapter XI..... 103
Closing Thoughts

PREFACE

This book has the purpose of being a generally accessible educational resource for information that will allow members of the public to develop a more balanced impression of scientific and medical aspects of the current COVID-19 crisis in the U.S. The author is a physician scientist with training, expertise, and experience in relevant areas of science and medicine, including molecular virology, molecular and cellular biology, immunology, experimental biomedical research, stem cell biology, epidemiology, pulmonary medicine, drug development and clinical trial design, environmental health science, and biostatistics.

Early in the COVID-19 crisis, in 2020, the author submitted an original research article addressing a crucial issue of concern about overlooked important statistical analyses for COVID-19 testing data. The editors of ten different relevant scientific research journals opted not to advance the article to evaluation by their journal reviewers. In addition, the author has worked continuously to provide the ideas and assessments found in this book to the public by public service announcements posted on social media platforms (five as of this writing) and by submitting many opinion-editorials and letters to the editor of his local national newspaper, *The Boston Globe* (42 submissions at the time of this writing). All of these submissions have gone unpublished as well.

Each chapter of this book begins with one of those many unpublished submissions to *The Boston Globe*. They are included for the purpose of giving readers a clear understanding that this book is an extension of an ongoing professional effort to serve the public by providing people a source of previously

understated and unstated ideas, principles, and knowledge that temper the current COVID flames, which many people are desperately attempting to navigate and negotiate through. This book's purpose is to enable, engender, and encourage more complete scientific analyses needed to enable policies and actions that are more appropriate to the reality of the present situation.

Uncertainties abound in science and medicine, as they do in other areas of human knowledge. Though both science and medicine have principles and practices expressly for measuring and managing uncertainties, many of these standards have been abandoned in the pressuring storm of political and governmental expediency to define and control the COVID-19 pandemic narrative. Aligning that narrative with the many uncertainties has often been at cross-purposes with the motivations, incentives, and aspirations of many people, in particular many of those who hold elected or appointed positions given the authority to develop and enforce social, political, economic, and government responses to the COVID-19 crisis.

This book is about making sure that the U.S. does not need to consider that old adage, "Don't fix what ain't broken". The current predominant narrative is that COVID-19 disease has broken America. But it may be the case that it is actually the COVID-19 spread *narrative* that is continuing to break America. This book considers that by treating the many uncertainties of COVID-19 science and medicine as if they were certain indicators of a new dreadful disease, promoters and believers of that narrative continue to lead the country down a path of response that has no possible resolution, except getting the narrative closer to reality. Getting the cause of a problem right is essential to solving the problem. This essential tenet for all successful problem solving applies to the current U.S. COVID-19 crisis, too. When the identified cause is correct, the country will eventually emerge from this storm with effective solutions; but if the narrative is wrong, not only

will the crisis continue, but it will also worsen, along with the many uncertainties about it.

CHAPTER I

SEARCHING FOR A VALID REPRESENTATION OF REALITY

Thu, Mar 19, 2020 at 11:45 PM

To: oped@globe.com

Dear Op-ed Editor(s):

Please consider this article for publication as an op-ed in *The Boston Globe*.

Coronavirus: More bark than bite?

Because of my training and experience, my disbelief at the disproportionate character of the U.S. government's response to the coronavirus situation increases everyday now. Each day brings a new extreme edict from the White House administration, from both elected officials and its noted scientist appointees, followed quickly on their heels by mandates from state governors and city mayors, with their local scientist appointees in tow as well.

My introduction to epidemiology began with physician scientist training in medical school at Johns Hopkins in Baltimore; and I immersed in cancer epidemiology as a principal investigator at the Fox Chase Cancer Center in Philadelphia. From there, I moved to MIT and pursued investigations in environmental health sciences, including teaching the fundamentals of epidemiology. My course is still listed on the MIT Open Courseware website¹. Now, I watch as many heading the U.S.

responses to the present coronavirus situation ignore fundamental principles taught in that course – among these principles, an important one being not stoking or succumbing to public hysteria when investigating and making policy decisions to address an increased incidence in disease or adverse health effects.

Of course, one does not need a degree in epidemiology to see the contradictions between the available data for the newly identified coronavirus and its associated illness, Covid-19, and the present excessive governmental reaction. There are many of these paradoxes that even children can see. The new coronavirus does not have the mortality and health risks of HIV, poliovirus, Hepatitis virus, and perhaps not even flu virus. Other than for a high-risk fraction of the elderly or persons with underlying serious health conditions, its infection course is now well established to be benign, not unlike other coronaviruses known to cause common colds. So, why are we running from it, covering up from it, preparing vaccines against it, developing drugs for it, so much more than we do for colds? What accounts for this remarkable void of common sense and science?

Elected officials and the experts at the podiums are also responsible for the growing coronavirus testing hysteria. We know why, in a situation like this one with new tests of limited experience, testing is limited to clinical cases, suspected clinical cases, and those with known or suspected communicable contact with cases and suspected cases. Willy-nilly testing everyone and anyone will create uninformative and misleading data. Why? Because testing and tests are not perfect; and when there is limited experience with them, they must be used even more cautiously. So, why are the experts at the podiums focused on a test arms race? Not a single one of them has addressed publicly the crucial policy issue of investigating whether the “new” coronavirus is actually not new to the U.S. population, but just undetected until now. For the increasing number of reports of hysteria-promoting “community

transmission” cases, this possible explanation needs to be evaluated.

When a disease surveillance system is addressing a possible new health threat, the key health care and health policy issue must be whether a significant new increase in either mortality or morbidity is occurring in a defined population group. Even if a detected increase in incidence is initially small, its impact if the agent were to spread to more people must be considered and evaluated. However, the responsible calculus for policy decisions thereafter should balance the degree of potential harm from the projected health effects against the potential harm of the response to it. If the response is based on irrational and erroneous processes and motivations, then it can cause more harm to both affected and non-affected people than the health effect itself. I fear that is exactly what is occurring in America today, to my great disbelief. I am hopeful that more judicious and courageous experts will take over the podiums soon, before more damage is done to us all. I am not advocating for no response to coronavirus, but instead a much more tempered one, more consistent with the available data and designed to continue to inform us on the effects and the natural history of this agent.

¹<https://ocw.mit.edu/courses/biological-engineering/20-104j-chemicals-in-the-environmenttoxicology-and-public-health-be-104j-spring-2005/lecture-notes/>

James L. Sherley, M.D., Ph.D.

At the writing of this book, the COVID-19 crisis in the U.S. is about to enter its third year. Like for many other nations, in the U.S., “COVID” continues to be an extended season of hardship and despair for many people and their families. There is little, if indeed any, disagreement that, since the early months of 2020, the lives of most Americans have been thrown into an initially surreal turmoil, which has now become a

reluctant resignation to a loss of personal control, loss of general public freedoms, loss of economic well-being, loss of many previous life certainties, and loss of lives. With the emergence of government responses to the most recent COVID-19 variant announcement, the omicron variant, the sacrifice of civil liberties justified by fearful projections of sickness and death continues to spiral to greater levels.

Many people now speak of distressing experiences of having lost co-workers, neighbors, friends, family, and loved ones to “the COVID”. Now, in the present post-vaccine season of COVID, many wrestle with resentment and anger with family members who died unvaccinated and with disappointment and frustration with losing vaccinated loved-ones who were thought safe. Anger and hostility continue to mount against the nearly equal number of citizens who shun vaccinations and question, or even scoff at, the severity of the current moment that is professed by those who believe that the COVID disease spread narrative is truth.

This book was not written to disapprove or approve either of these divergent sets of beliefs, perceptions, and experiences. Instead, the main purpose of this writing is to provide a scientific examination of the probability that, although the prevalent narrative enforces the perspective that the U.S. is in the midst of a biological disease crisis named the COVID-19 pandemic, the actual crisis may be, in reality, primarily sociopolitical in origin, not biological or medical.

Though this book is focused mainly on the COVID-19 experience in the U.S., it is very likely that the ideas and concerns discussed will have a high degree of relevance to the experience of citizens of other countries as well. Readers in Europe, Asia, Africa, South America, India, Australia, New Zealand and elsewhere may find that they can substitute the name of their own country in these pages, or even their own municipal locale, and find that similar assessments make sense and apply to their own specific experience. This transcendence is

possible because this book is not intended to be a treatment based on criticism and argument over so called “facts” – neither purported “scientific facts” nor other types of information that saturate the new COVID universe. Instead, its purpose is to expose and consider the impact of the absence of fundamental and essential principles of science and infectious disease epidemiology that the general public may not recognize to be missing from the reported science and medicine of the COVID-19 crisis; and, consequently, does not appreciate the scientific house of cards that the COVID-19 narrative in the U.S. has become.

From the onset, it is important for the reader to appreciate that this book is not intended to be – and is not – an academic “null hypothesis” exercise. The importance of the scientific null hypothesis in investigatory science – and more specifically in statistical analyses of the level of confidence in conclusions about the meaning of observations and measurements and data used to describe them – is not well understood by many scientists, and by even fewer physicians. In the absence of a formal course in statistics, many scientists and doctors may have little appreciation of this essential tool of scientific analysis. Even many who have had such coursework and training often make the mistake of limiting the null hypothesis concept to formal statistical analysis theory. Yet, for the best scientific investigations, especially in epidemiology, diligent evaluation of the null hypothesis is an essential element to the process of evaluating the quality and accuracy of conclusions.

Many people, including the professionally well-trained, often mistake applying the concept of the null hypothesis as arguing that “nothing” is happening. That is certainly not the case in the current crisis. The tools and methods of science are not needed to know that *something* terrible is most definitely happening. The scientific challenge of our time is accurately defining what that something is. The application of the concept of the null hypothesis is the continually and persistent analysis

of our conclusions for what is going on with the intentional perspective that our conclusions may be wrong.

There are many ways to arrive at conclusions that are wrong or full of error. In the most general sense, something else could be going on besides what was concluded. Erroneous conclusions can confidently occur for many reasons. There is a litany of many well-described categories of pitfalls that cause good scientists to come to bad conclusions. Many of them are biases, which can be conscious or unconscious – like bias in how evaluated subjects are chosen (“selection bias”); bias in how subjects are defined (“ascertainment bias”); bias in what the investigator wants or expects the outcome to be (“investigator bias” or “confirmation bias”); bias in what research subjects think the outcome should be (“subject bias”); bias in the instruments used to make measurements (“instrument bias”); bias in tests used to make measurements (“test bias”), bias in how testing is conducted (testing bias), and on and on.

The bias of scientific and medical investigations is different than how people generally think of bias. Many of the biases that compromise the quality and integrity of scientific studies are not due to prejudice or conscious intent to mislead or misrepresent. Although conscious fabrication or alteration of observations and measurements can pose problems as well, a more pervasive and insidious issue that requires addressing is intrinsic biases that may not be obvious and are overlooked if they are not systematically assessed by category using good, consistent, scientific practice.

An example of such a source of detrimental bias would be a test that lacked sufficient sensitivity to detect a large fraction of the events under investigation; or a test that detected events well when used under one condition, but poorly when used under a different condition. As an illustration of this kind of intrinsic bias, consider a study with the goal of determining whether the butterfly population of a city changed significantly from year to year. Imagine that the investigators counted

butterflies in the summer of some years, but due to personnel issues, counting them in the winters of other years. If they then evaluated butterfly numbers from year to year, they would conclude that the butterfly population changed erratically and dramatically from year to year. Their erroneous conclusion about what was actually going on would be due to intrinsic testing bias.

The scientific solution for this example would have been for the investigators to consider that a difference in the season of the testing might change the test's ability (or sensitivity) to estimate the population for an entire year. Thereafter, they could investigate this factor as an important variable in their study; standardize the testing to the same months of each year; and correct their conclusions about yearly butterfly numbers accordingly. Though this example may seem to be a far-fetched example, it is not. When reported properly, determinations of the prevalence or incidence of diseases in the U.S. are always specified for a defined period of calendar time to avoid this form of intrinsic testing or accounting bias.

Another important cause of erroneous scientific conclusions is errors *per se* – measurement errors, recording errors, calculation errors, accounting errors, reporting errors and, again, on and on. However, the most insidious demon of epidemiological conclusions goes by many different names, including normal variation, chance variation, statistical variation, or simply chance. In later chapters, there will be more consideration of this all-too-common misstep in developing conclusions from epidemiological studies and environmental health science investigations.

The potential for erroneous conclusions, as a consequence of the many biases and errors that are intrinsic to even the simplest scientific investigation, grows exponentially with the volume of data, data quality and management requirements, logistical complications, and research complexities of large-scale national investigations like those that have been

emanating from and surrounding the U.S. COVID crisis for the past two years. This inherently precarious situation for faulty conclusions has been furthered aggravated by the public normalization of science in recent years.

Over the past twenty to thirty years in the U.S., the lay public, and in particular elected officials and the news media, have assumed a new level of comfort in discussing developments and issues in the sciences. Public debates like human embryonic stem cell research and more recently climate change, fetal tissue research, and abortion rights have energized a public sea change towards not only higher regard for the importance of scientific assessments in these areas of policy debate, but also a new brash confidence in discussing and applying scientific concepts. However, the caveat is that this otherwise perhaps desirable development – a better scientifically informed and enabled populace – is not the product of an increase in the level of formal science education in the country. Instead, it more likely reflects the impact of the greater availability and accessibility of science information by way of the mobile internet and its many tentacles. The dark cloud of COVID science in the U.S. and worldwide is the case in point, as the thick lay public smoke of it has made the actual fire, whatever it may be, quite unseeable.

Ironically, the increase in public interest and awareness of science and scientific developments is a major factor causing the obscuring of a valid scientific representation of the reality of COVID, whatever it may be. “Science” and “scientific facts” are now bantered about by elected officials, members of the press, government representatives, and neighbors with the belief that they are the final word on issues of COVID. The problem is that this new normalized representation is deeply flawed, because it treats science and scientific facts with a dangerous simplification that does not include all of the many biases and errors just described. Science is at its best when it and its methods are used to temper and caution our conclusions about the world. It is at its worse when it is used

as if it were definitive, final, unimpeachable; because the world that it helps us to understand and describe is variable, diverse, constantly evolving and changing, and highly uncertain to our senses and our measurements. When science speaks, it often errs; and the way we get to a better representation of reality in the world is by continuing to critically evaluate our conclusions by diligently looking for their biases, errors, and uncertainties.

We cannot leave this opening chapter introducing and outlining factors and forces that may have prevented a valid representation of the COVID crisis without also acknowledging the unique political environment that encased the beginning of the COVID crisis in the U.S. and continues to confine it. The rancorous partisan politics during the administration of U.S. President Donald Trump in the nation's capital and Congress spread throughout every facet and walk of American life. Anti-Trump feelings and fears were just as intense in neighborhood barbershops and on playgrounds as they were in the halls of justice, learning, and science. The greatest, and certainly self-evident, biases driving COVID conclusions were the political motivations of science and medical professionals, along with their elected or appointed bosses, to either never be seen as agreeing with President Trump or never be seen as not supporting him. In the early days of the COVID crisis in the U.S., science and scientific reports were worn as badges and held up as scimitars of right by professionals and government officials on either side of the COVID divide. Science served political agenda, instead of independently and judiciously advising government policy.

The election of a new president of the competing political party, so far, has not freed the U.S. scientific enterprise from its encasement in the bitter politics of COVID. The Trump presidency and the party feuding that it provoked have developed deep roots in the U.S. government, with allegiances and grudges from the past vicious political battles driving attitudes and actions in the present, especially on the issue of COVID and its many national consequences for economics

and health. So, although this book was written with the hope of helping the country to get to a better, more accurate representation of its COVID reality by highlighting important shortcomings and missing elements in the publicly represented COVID science, the greater concern is how political motivations have and continue to allow and promote such deficiencies. At some point, no one wants to know the truth. America may be at that point for the COVID crisis. For those responsible for misleading the nation, ridicule and punishment are avoided; and for those who recognize and acknowledge that they have been misled, the admission may be just too painful.

CHAPTER II

A QUESTION THAT MUST BE ASKED

Mon, Mar 16, 2020 at 10:02 AM

To: letter@globe.com

Dear Editors:

Political inflammation to coronavirus

Like many other U.S. news sources, *The Boston Globe's* headlines are giving only the political view of the current coronavirus situation. Politics are driving the U.S. response; not science; and not medicine. Why else would schools be closed for 6 weeks for a virus that has a 2 week total infection course from exposure to clearance, in a system with no known cases, of an illness that is essentially a bad cold in healthy people? Often misguided responses like the one we now endure are guided by ignorance, but in this case, there are plenty of infectious disease professionals who know better, but are politically silent, silenced, or unreported. They also know that we need to be also evaluating archival materials to ascertain whether SARS-COV2 is only new to our testing and not actually new to our population, which would account for so called community transmission and would allow us to get back to calmer lives. At the moment, the country's leadership is treating the fear of the virus, instead of the actual physical illnesses associated with the virus. Like the immune system in the worst cases of COVID-19, our government's inflamed response is causing more harm to our economy and lives than the virus itself.

James L. Sherley, M.D., Ph.D.

At the writing of this book, the people of the U.S. are buried in information produced by and focused on the national and global COVID crisis. This book has the purpose of wading into and through this information with an eye to discern how well the information represents the actual disease activity of the COVID-19 virus in the world, with a primary focus on the U.S. experience. The essential thesis considered is that, generally, the prevailing public information overstates the actual severity of COVID-19 disease. This thesis is not motivated by charges of malicious conspiracies, deliberate misrepresentations, or even unfortunate moments of professional incompetence. The arrival of the U.S. government, health care delivery systems, scientific leadership, and populace at the predominant COVID disease spread narrative is the result of a complex interplay of non-orchestrated missteps. Nonetheless, there are agents who have benefited greatly from the narrative, and some who have worked to sustain it for continued benefit, as will be discussed later in Chapter X.

No argument is suggested or made that the people of U.S. do not continue to be in the throes of a terrible national crisis that spreads beyond health to the economy and politics. However, the quality of the information that caused and continues to fuel the crisis is questioned and scrutinized. Although publicly available data are considered in this analysis, greater attention is given to the methods by which those data were acquired, curated, and, in particular, reported. As will be learned in the pages to follow, the major concern with the current massive accumulation of COVID-19 data is not what is present in it, but what is missing from it.

This book is a project of questions. Though they are important questions, they are questions nonetheless. Their answers are more important. Even if their answers are unknown or unknowable, bringing attention to the existence of the answers to questions posed is the essence of the purpose of this book. The even greater concern is, in fact, that the important

answers to the questions posed have not been made available to the public, if they are known.

The first important question for this book, which *can* be answered now, is “Why write it?” Why write a whole book that will be essentially a critique of a global narrative that now may bring a degree of resignation and resolve to a world of many confused, worried, and fearful people. Why produce a book that might only serve to bring greater dissonance and distress to many?

None of the answers that might initially and immediately come to mind are the reason for the writing of this book. The author does not have an ax to grind with any of the unnamed protagonists and antagonists who will be reviewed and critiqued for their roles in the current prevalent COVID spread narrative, in the U.S. in particular. The author does not believe that any persons have actively conspired to create the COVID spread narrative, which is the focus of the book’s analysis. The author does not wish to increase discord and disharmony in the world, though acknowledges that this could be one unfortunate result of this endeavor.

The answer to “Why write it?” is much the same as the answer from many who believe and profess the currently pervasive COVID spread narrative. *To do good for others*. That good is grounded in the author’s belief that, both in the short-term and long-run, people and the world are better served by having the best available representation of what is happening in their lives and world. More specifically, if by proper scientific and medical method, objective and sound data evaluation, and rational analysis, a more accurate narrative is available, which is more faithful to reality, then by applying it instead of a likely misleading one, the present distress and injury occurring to many can be reduced greatly, without increased illness and without increased loss of life. This is the reason for writing this book. This and no other.

CHAPTER III

EPIDEMIOLOGY 101
AND EPIDEMIOLOGY COV

Tue, Mar 24, 2020 at 2:14 PM
To: letter@globe.com

Dear Editor:

An important coronavirus investigation needed now

I have written to the CDC, but I do not have direct access. *The Globe* editors continue to ignore my alerts, but I remain hopeful that somehow the concern that I express will somehow make it into the heads of scientists leading the coronavirus response. A crucial issue that must be addressed is whether COV-19 is actually a “new” virus in the U.S. population. “New” is an assumption based on the presumed first occurrence in China. The curious feature of this virus is its higher virulence in the elderly. Attention must be given to determining whether the incidence of deaths among the elderly is actually increasing, whether or not associated with positive COV-19 tests. This did seem to happen on the cruise liner recently quarantined outside of Japan. But, even there, 10 out 3500 passengers (800 testing COV-19 positive), 0.3%, is not that far from the general mortality rate of a largely elderly population of passengers. Though no deaths would be expected during the period of a cruise because of the better health of travelers, the quarantine conditions themselves could have contributed. Now that the president of Harvard and his wife are reporting flu-like symptoms and positive COV-19 tests without any

apparent Covid-19 exposure, perhaps someone will consider that COV-19 may already be in the U.S. and other populations, causing common colds. When the elderly succumb to their usual causes of death, some of them test positive at the COV-19 frequency in the general population, whether or not the virus is responsible for their death. We must consider this possibility and investigate it intentionally, because, if this hypothesis is supported by appropriate scientific analyses, we can stop our fears and get back to our lives.

James L. Sherley, M.D., Ph.D.

Before a *pandemic* can be established, smaller “epidemics” must be established first. The essential event required to establish any epidemic is a *change* in disease *incidence*, and more specifically an *increase* in disease incidence. Incidence is the quantitative estimate of how many *new* cases of a disease are detected during a specified period of time. Because incidence is specified for a defined period of time, it is a rate, not an amount. When the observed disease incidence in a place increases more than usual, an epidemic may be occurring. When the incidence numbers are shown to accurately represent an increase in the rate at which new disease is occurring, then an epidemic is established.

Epidemics are further defined by the essential elements of persons, place, and time. Determining who is getting the disease, where they are when they get it, and when they get it helps to confirm that an epidemic is occurring. The place could be a playground, a hospital, a town, a city, a state, a country, or even whole continents in the case of worldwide epidemics like the “COVID pandemic.” In the case of infectious diseases like COVID that are communicable, – spread easily from one person to another – this information is important for determining mechanisms of disease transmission and for monitoring the spread of an epidemic. The patterns by which increased disease incidence is related to specific persons, in particular

places, and with specific timings help public health scientists (*i.e.*, epidemiologists) and physicians to decipher the causative agent and develop interventions to reduce or prevent its continued spread.

The textbook example used to teach new students of epidemiology how relating increased disease incidence to persons, place, and time helps to establish an epidemic is the hypothetical scenario of a July food poisoning outbreak in a small town. Prior to the outbreak, the emergency room at the town hospital had a food poisoning incidence of about 2 new cases per month. One year in July, the ER had 25 persons with food-poisoning (“affected cases”) all arriving between Sunday and Tuesday of the same week. Private physicians in the town also reported calls from patients with signs and symptoms of food poisoning, some sufficiently severe that they were advised to go to the ER. Based on the increase in new food poisoning cases defined by reported symptoms and physical exams in the ER, the town’s two public health officials were notified. They rapidly deployed to talk with both patients and their well (“unaffected cases”) family members. With a few exceptions, all the persons with food-poisoning had attended one of two picnics occurring in the same park on the preceding Saturday. Well family members had been at the picnics, too. One picnic was an annual church affair with about 50 people attending; and in an adjoining park space, about 30 members of the town’s high school band had grilled hamburgers and hotdogs. Though there were a few band members among the sick, most of people at the band’s picnic did not show up in the ER. Instead, most of the ER visits were by persons from the church picnic; and they were of all ages, including children, teenagers, adults, and elderly church members.

The public health officials suspected that a food-borne infection event had occurred at the church picnic; and based on the timing of the illness from the picnic, the bacterium salmonella was thought to be the likely culprit. Subsequent testing of stool samples did show a high level of salmonella in

some affected cases, but not all of them. However, talking with participants at the church picnic about the foods they had eaten did not reveal informative patterns for identifying a possible food source or sources; and samples of the picnic food were no longer available for salmonella testing. Interestingly, among the patients with food-poisoning and a positive test for salmonella, several had not been at either picnic. The public health officials noted that these persons shared the pattern of living within three neighboring houses. When the public health officials visited them, they discovered that these persons were neighbors with a friend who raised chickens for egg-laying in a backyard. They had all recently been given eggs by the same friendly neighbor. This neighbor was also an active and generous member of the church and had prepared the potato salad for the church picnic using eggs from the backyard chickens, which were soon found to also test positive for salmonella infections.

Hypothetical examples of this type have two purposes in formal epidemiology education. The first is the one of usual and greater focus. It is the purpose of setting the foundation of how relating the factors of persons, place, and time to an unusual increase in disease incidence informs the investigation of the cause of an established disease outbreak, an epidemic. The essential goals of the epidemiological process are to define and understand the cause of a disease outbreak. Knowing causation enables and empowers the development of effective interventions. So, epidemiology is not just the “study of epidemics.” It is the study of the cause and nature of epidemics for the purpose of preventing and stopping them.

The second purpose of commonly taught examples of this type needs more emphasis than it is usually given, even by epidemiology instructors. Similar to medicine, epidemiology has an intrinsic investigatory intent to diagnose the cause of an increase in new disease, so that it can be mitigated. The practice of differential diagnosis is a core principle of medicine, because the consequences of overlooking ever-present