



Figure 1: Areas of London supplied by the Southwark & Vauxhall (blue, now green) and Lambeth (red) water companies during the 1849-1854 cholera epidemic in London (Snow 1855). Source: Wellcome Collection via [Wikimedia Commons](#).

# Preface

One day at lunch at the Harvard School of Public Health, I overheard Professor Murray Mittleman say: “I love epidemiology. It all fits together like a diamond.” As a second-year doctoral student in epidemiology, I was surprised to hear the subject described with such perfect enthusiasm. It has taken years of study and experience for me to understand what he meant. On the way, I too have fallen in love.

## Who this book is for

This book is intended primarily for two audiences:

- Epidemiologists are often protected from the mathematical foundations of their field. The long-term price of this is “dogmatism, that is, a tendency to rigidly protect a partially understood theoretical heritage” (Morabia 2004). The mathematics needed for a deeper understanding of epidemiologic methods is within reach of everyone who has come far enough to need it. Whether you master this material or just learn to approach it with more patience than fear, you will be doing a service to epidemiology and to public health.
- Biostatisticians are familiar with probability and statistical inference, but applying statistics to solve scientific problems in public health requires skills different from those needed to prove that a method works under given assumptions. Epidemiology is a living example of the interplay between theory and practice in applied statistics, and epidemiologists have shown integrity, courage, and ingenuity in confronting causal questions with statistical tools. It is one of the most important applications of statistics, and it has quite possibly already saved your life.

Beyond these audiences, I hope to explain the logic of epidemiology to any interested reader. Anyone is welcome, and clear thinking about public health is in everyone’s best interest.

## How to use this book

Difficult chapters, sections, subsections, and exercises are marked with an asterisk (\*). These can be skipped without harming the logic of the book, but none of them is beyond the reach of a determined reader. The starring is recursive: Starred sections can be skipped within a starred chapter, starred subsections can be skipped within a starred section, and so on.

Footnotes offer context or hint at more advanced material; all of them can be ignored if they do not seem useful or interesting.

## Acknowledgements

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My parents, Chris and Kate Kenah, courageously allowed me to travel to places they had never been to and do things I had been told to avoid. These experiences in the United States, India, South Africa, and especially Bangladesh opened my eyes to the terrible importance of clarity and rigor in public health research. My wife, Asma Aktar, and our sons Rafi, Rayhan, and Rabi remind me every day how important it is to destroy everything that stifles humanity. To that end, I hope this book is useful.

Morabia, Alfredo. 2004. “Epidemiology: An Epistemological Perspective.” In *A History of Epidemiologic Methods and Concepts*, edited by Alfredo Morabia, 3–125. Springer.

Snow, John. 1855. *On the Mode of Communication of Cholera*. Second edition. John Churchill.  
<https://wellcomecollection.org/works/uqa27qrt>.