

R 4 Epidemiology

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Welcome

Welcome to R for Epidemiology!

This electronic textbook was originally created to accompany the Introduction to R Programming for Epidemiologic Research course at the [University of Texas Health Science Center School of Public Health](#). However, we hope it will be useful to anyone who is interested in R, epidemiology, or human health and well-being.

Acknowledgements

This book is currently a work in progress (and probably always will be); however, there are already many people who have played an important role (some unknowingly) in helping develop it thus far. First, we'd like to offer our gratitude to all past, current, and future members of the R Core Team for maintaining this *amazing, free* software. We'd also like to express our gratitude to everyone at [Posit](#). You are also developing and *giving away* some amazing software. In particular, we'd like to acknowledge [Garrett Grolemund](#) and [Hadley Wickham](#). Both have had a huge impact on how we use and teach R. We'd also like to thank our students for all the feedback they've given us while taking our courses. In particular, we want to thank [Jared Wiegand](#) and Yiqun Wang for their many edits and suggestions.

This electronic textbook was created and published using [R](#), [RStudio](#), the [Quarto](#), and [GitHub](#).

Introduction

Goals

We’re going to start the introduction by writing down some basic goals that underlie the construction and content of this book. We’re writing this for you, the reader, but also to hold ourselves accountable as we write. So, feel free to read if you are interested or skip ahead if you aren’t.

The goals of this book are:

1. To teach you how to use R and RStudio as tools for applied epidemiology. Our goal is not to teach you to be a computer scientist or an advanced R programmer. Therefore, some readers who are experienced programmers may catch some technical inaccuracies regarding what we consider to be the fine points of what R is doing “under the hood.”
2. To make this writing as accessible and practically useful as possible without stripping out all of the complexity that makes doing epidemiology in real life a challenge. In other words, We’re going to try to give you all the tools you need to *do* epidemiology in “real world” conditions (as opposed to ideal conditions) without providing a whole bunch of extraneous (often theoretical) stuff that detracts from *doing*. Having said that, we will strive to add links to the other (often theoretical) stuff for readers who are interested.
3. To teach you to accomplish common *tasks*, rather than teach you to use functions or families of functions. In many R courses and texts, there is a focus on learning all the things a function, or set of related functions, can do. It’s then up to you, the reader, to sift through all of these capabilities and decided which, if any, of the things that *can* be done will accomplish the tasks that you are *actually trying* to accomplish. Instead, we will strive to start with the end in mind. What is the task we are actually trying to accomplish? What are some functions/methods we could use to accomplish that task? What are the strengths and limitations of each?
4. To start each concept by showing you the end result and then deconstruct how we arrived at that result, where possible. We find that it is easier for many people to understand new concepts when learning them as a component of a final product.
5. To learn concepts with data instead of (or alongside) mathematical formulas and text descriptions, where possible. We find that it is easier for many people to understand new concepts by seeing them in action.

Text conventions used in this book

- **Bold** text is used to highlight important terms, file names, and file extensions.
- `Highlighted inline code` is used to emphasize small sections of R code and program elements such as variable or function names.

Other reading

If you are interested in R4Epi, you may also be interested in:

- [Hands-on Programming with R](#) by Garrett Golemund. This book is designed to provide a friendly introduction to the R language.
- [R for Data Science](#) by Hadley Wickham, Mine Çetinkaya-Rundel, and Garrett Golemund. This book is designed to teach readers how to do data science with R.
- [Statistical Inference via Data Science: A ModernDive into R and the Tidyverse](#). This book is designed to be a gentle introduction to the practice of analyzing data and answering questions using data the way data scientists, statisticians, data journalists, and other researchers would.
- [Reproducible Research with R and RStudio](#) by Christopher Gandrud. This book gives you tools for data gathering, analysis, and presentation of results so that you can create dynamic and highly reproducible research.
- [Advanced R](#) by Hadley Wickham. This book is designed primarily for R users who want to improve their programming skills and understanding of the language.

Contributing

Over the years, we have learned so much from our students and colleagues, and we anticipate that there is much more we can learn from you – our readers. Therefore, we welcome and appreciate all constructive contributions to R4Epi!

Typos

The easiest way for you to contribute is to help us clean up the little typos and grammatical errors that inevitably sneak into the text.

If you spot a typo, you can offer a correction directly in GitHub. You will first need to create a free GitHub account: [sign-up at github.com](https://github.com). Later in the book, we will cover using [GitHub in greater depth][Introduction to git and GitHub]. Here, we're just going to walk you through how to fix a typo without much explanation of how GitHub works.

Let's say you spot a typo while reading along.

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Part I

Getting Started