Research Methods for Public Health

Develop, read, critique, design, and conduct high-quality scientific research in public health

PHHBHP 7534 • Spring 2024
College of Public Health
Ohio State University
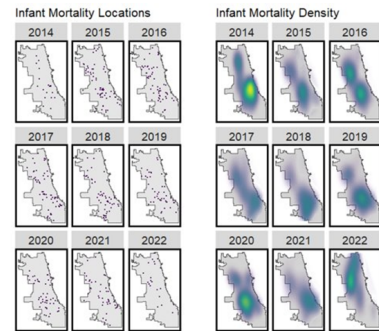
Infant Mortality Locations — Infant Mortality Density (2014–2022)

Instructor

- 👤 [Dr. Gia Elise Barboza-Salerno](#)
- 🏛 307 Stillman Hall
- ✉ barboza-salerno.1@osu.edu
- [bigdataforsocialjustice](#)
- [Medium](#)
- [Zotero](#)
- ☑ [Schedule an appointment](#)
  T/TH 12:00PM-1:30PM

Course details

- 📅 Tue/Thus
- 📆 Jan 8– Apr 22, 2024
- 🕐 9:35 AM - 10:55 AM
- 📍 Smith Lab 2186
- [Slack](#)

Contacting me

Please feel free to contact me at any time. I am always working anyway. You have multiple forms of contact including texting me. I will return your email or text within 3 hours. If I do not, chances are something happened, so try again. Please be aware that I am very busy and I always try my best to respond.

Syllabus

Instructor

👤 Dr, Gia Elise Barboza-Salerno
🏛 307 Stillman Hall
✉ barboza-salerno,1@osu,edu
🐦 bigdataforsocialjustice
📅 Schedule an appointment

Course details

📅 Tue/Thus
📅 Jan 8– Apr 22, 2024
🕐 9:35 AM - 10:55 AM
📍 Smith Lab 2186
🔲 Slack

Course Description

This course provides an overview of research methods that are commonly used in health behavior and health promotion research. The course will address topics such as: choosing a research design, using a theoretical framework, conducting observational and experimental research, measurement and sampling issues, basic analytic approaches of observational and experimental research, and scientific writing. An important goal of this course is to help students develop the necessary skills to read, critique, design, and conduct high-quality scientific research in health behavior and health promotion and, more broadly, public health. The course involves instructor lectures, student discussions, and in-class activities. Therefore, attendance and active participation are essential to completing the course.

Class Format

This in-person class is taught in a traditional lecture/discussion format. If needed (e.g., due to illness), a class can be conducted online via Carmen Zoom. If a move to online is needed for a particular class, the instructor will notify the students via email or our course Slack page in advance. **Make sure you regularly check your email and sign up for Slack updates so you get important messages relevant for the class.**

Course objectives

By the end of this course, you should be able to:

1. Understand variable associations, causality and causal inference; and
2. Communicate study outcomes effectively using open source tools; and
3. Understand data structures and data types; and
4. Identify appropriate research designs for your study; and
5. Run code written in R/Rstudio; and
6. Use geographical information systems software to conduct exploratory spatial data analysis (ESDA); and
7. Understand how to conduct a research project using a social justice framework.

To develop a better understanding of the objectives listed above, there will be several assignments. The assignments are designed to meet the following course objectives:

- Describe and execute the key steps in designing, conducting, and evaluating research in health behavior and health promotion
- Understand the potential advantages and disadvantages of various study design approaches to health behavior and health promotion research
- Understand and apply different measurement and data collection strategies used in health behavior and health promotion research
- Understand techniques for analyzing data from observational and experimental research
- Prepare a research product (i.e., proposal, paper or small grant)

> ⓘ **Note**
>
> PhD students and MPH students have different competencies and different course requirements. I have made every attempt to distinguish between these requirements in the class schedule and content area webpages located on this course website. Please reach out to me if you are confused. PhD students have a more rigorous set of requirements that are designed to culminate in a published paper.

Public Health Foundational Knowledge:

- 3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
- 6. Explain the critical importance of evidence in advancing public health knowledge
- 9. Explain behavioral and psychological factors that affect a population's health
- GIA-1) Explain how open source tools can be used to advance reproducible research
- GIA-2) Explain how advanced statistical models can be used to advance population health

Public Health Foundational Competencies:

- 2. Select quantitative and qualitative data collection methods appropriate for a given public health context
- 9. Design a population-based policy, program, project or intervention
- 11. Select methods to evaluate public health programs
- GIA-1) Identify, download and analyze big, publicly available datasets in R/Rstudio
- GIA-2) Run "advanced" statistical analyses in R/RStudio
- GIA-3) Use Geographical Information Systems (GIS) to conduct spatial "analyses"

MPH Health Behavior & Health Promotion Competencies

- 3. Apply behavioral and social science theory to the development and implementation of health promotion and disease prevention programs at multiple targets and different levels of intervention (intrapersonal, interpersonal, and community)
- 4. Critically assess the scientific literature describing health promotion interventions
- 7. Collaboratively design and carry out outcome evaluations of health promotion programs

- 8. Apply ethical principles to the planning and evaluation of social and behavioral change efforts

PhD Health Behavior & Health Promotion Competencies

- 3. Apply relevant theories and conceptual models to inform and ground research design and interpretation
- 4. Formulate hypotheses, plan and conduct a research study using appropriate research methods, and ethical approaches
- 6. Communicate in writing and orally a research study's purpose, methods, results, limitations, conclusions and public health relevance to both informed and lay audiences

Course philosophy

Many students want to learn how to use R. There are many obvious benefits of using R. R will make you more competitive on the job market. More importantly, R offers you tremendous flexibility in implementing advanced analyses for policy implementation, provides amazing graphics capabilities, offers advanced GIS functionality, and enhances reproducibility in research. You will want to use R and you will love it. However, you may not love it at first. There is a steep learning curve to learning R and it is not easy. Please do not compare yourself to me, I have been using R for over a decade and I was a computer programmer before becoming an academic. Like me, you *will* learn R, it may take some time. Be patient with yourself.

Course materials

All course readings are available for download (or via link) at the top of the webpage associated with that class day. You can access these by clicking the [Content](#) tab at the top of this page.

Books

The following texts will be used for the class. All readings for this course will be made available to you unless otherwise noted. **You do not need to purchase any of these textbooks unless you want to for your own library.**

All Students

- Cornelius & Harrington, *A Social Justice Approach to Survey Design and Analysis*, Oxford University Press, 2014.
- Crano, W. D., Brewer, M. B., & Lac, A. (2014). Principles and methods of social research. Routledge.
- Crosby, R. A., DiClemente, R. J., & Salazar, L. F. (Eds.). (2006). Research methods in health promotion. Jossey-Bass.
- Hay-Jahans, C. (2019). R Companion to Elementary Applied Statistics. CRC Press.
- Kabacoff, R. (2022). R in action: Data analysis and graphics with R and Tidyverse. Simon and Schuster.
- Wickham, H., Çetinkaya-Rundel, M., & Grolemund, G. (2023). R for data science. O'Reilly Media, Inc.
- Hayes, A. F. (2018). Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach, Second Edition. **Note:** There may be additional readings depending on how the assignments are progressing.

Resources I will use in class from time to time

- Paul J. Gertler et al., *Impact Evaluation in Practice*, 2nd ed. (Inter-American Development Bank; World Bank, 2016), https://openknowledge.worldbank.org/handle/10986/25030. (**Free!**)
- Nick Huntington-Klein, *The Effect: An Introduction to Research Design and Causality* (CRC Press, 2021), https://theeffectbook.net/. (**Free as a HTML version!** The print version is coming soon and is pre-orderable at Amazon.) ### R and RStudio

All of the statistical work we do in this class will be done using the open source programming language R. It is useful to run R code in RStudio which provides a visual interface to R.

To start you on this lifelong journey using R, I require you to install and/or utilize several additional tools. These tools are designed to ease your transition from SPSS/SAS/STATA to R. First, I am asking you to install two open source statistical packages called `jamovi` and `JASP.` Also, I set up an [RStudio.cloud](#) account for this class. RStudio provides a service that lets us access RStudio via the web browser. The good news is that by accessing RStudio Cloud, you do not need to have R or R Studio installed on your computer. The bad news is that RStudio Cloud is not built to run large datasets so we can use it only to run examples including the labs that I am requiring you to run. Of course, I will explain this in more detail during class.

I will review details about these software programs/tools in class. For now, you can [find instructions for installing R, RStudio, and important R packages for data analysis here.](#). You can find instructions for how to install the other software including add-on modules here.

Course structure

- **Meeting Location & Time**: We meet weekly from 9:35–10:55 AM on Tuesdays and Thursdays in Smith Lab 2186 **Lecture**:During each class, I will highlight important concepts and ideas from the readings, we will do lab work, and we will thoughtfully discuss the reading materials
- **Readings**: You will need to come prepared discuss the days reading in class *for that day*. This means you do the readings assigned for the class ahead of time.
- **R Labs**: You will need to come prepared to do lab work (e.g., run analyses) each day. This means you will need to bring a laptop and that any software I have asked you to install is properly installed (including the version that I ask you to install).
- **Activities**: From time to time we will have an in-class activity to illustrate course concepts.
- **Randomness**: Not every day will look exactly the same. In other words, some days the lecture will be longer, some days we may only do lab work, and some days we may want to delve into the readings. In other words, I reserve the right to structure each class as I see fit. Expect some deviation from time to time.
- **Take Responsibility for your own learning**: If you send me ideas for discussion or debate prior to class, I will gladly incorporate them into the lecture.

Attendance and participation

As I noted above, you will need to come to class prepared. Attendance is required, I am NOT able to recreate the class you missed in my office. I am willing to record a lecture that you may have to miss given advanced warning. Please come prepared to discuss the readings if I call on you to do so.

You can schedule a time to meet with me during my office hours at https://calendly.com/barboza-salerno/. Of course, there are many other ways to connect, including email, texting, and Slack. Use these as well. I am extremely busy this semester and I cannot spend hours chatting in my office as I usually do, so please let us utilize time wisely.

Course Modules

This course is divided into the following 3 modules:

- Module 1 (classes 1-9): Variables and research questions
- Module 2 (Classes 10-20): Study designs
- Module 3 (Classes 21-30): Project implementation

Assignments and grades

You can find descriptions for all the assignments on the assignments page.

Assignment	PhD	PhD Total	%PhD Total	MA Total	%MA Total
14 Weekly check-ins	yes	14	13.86%	0	0.0%
9 Problem sets	yes	27	26.73%	27	26.5%
Research Proposal	no	0	0.00%	10	9.8%
Research Proposal	no	0	0.00%	10	9.8%
Exam 1	yes	15	14.85%	15	14.7%
Exam 2	yes	15	14.85%	15	14.7%

Exam 3	no	0	0.00%	15	14.7%
Class Participation	yes	10	9.90%	10	9.8%
Publishable paper	yes	20	19.80%	0	0.0%
Total	—	101	—	102	—

Grade	Range	Grade	Range
A	93–100%	C	73–76%
A–	90–92%	C–	70–72%
B+	87–89%	D+	67–69%
B	83–86%	D	63–66%
B–	80–82%	D–	60–62%
C+	77–79%	F	< 60%

Schedule

Class	Day	Topic	Week
1	1/9	**Introduction + Overview of the research process**	1
		Begin thinking about a research topic	
2	1/11	**Introduction to variables + Units of analysis**	1
		Problem Set 1	
3	1/16	**Relationships among variables (p. 1) + associations and confounding**	2
		Select a research topic	
4	1/18	**Relationships among variables (p. 2) + mediation and moderation**	2
		Submit research topic for approval	
		Problem Set 2	
5	1/23	**Research questions and hypotheses**	3
6	1/25	**Role of theory and conceptual models**	3
		Annotated bibliography due	
		Begin writing literature review	
		Problem Set 3	
7	1/30	**Measurement (p. 1): validity and reliability**	4
		Begin identifying measures to use in your study	
		Problem Set 4	
8	2/1	**Measurement (p. 2): finding measures and scale development**	4
9	2/6	**Exam I**	5
10	2/8	**Sampling**	5
		PhD students work with professor on statistical analysis	
		Draft of literature review due	

11	2/13	**Data Collection+Survey Design**	6
12	2/15	**Analytical methods+observational**	6
		PhD student run analyses for paper	
		Problem Set 5	
13	2/20	**Analytical methods + experimental**	7
14	2/22	**Analytical methods + geospatial**	7
15	2/27	**Analytical methods + qualitative**	8
		Problem Set 6	
16	2/29	**Presentations+Feedback**	8
		PhD students begin drafting results section	
17	3/5	**Presentations+Feedback**	9
18	3/7	**Exam II**	9
		All students submit Phase I of research project	
19	3/12	**No Class - Spring Break**	10
20	3/14	**No Class - Spring Break**	10
21	3/19	**Pre-experimental designs**	11
		Begin drafting methods section	
22	3/21	**Quasi-experimental designs**	11
23	3/26	**Randomized control trials**	12
		Problem Set 7	
24	3/28	**Observational designts**	12
25	4/2	**Recruitment and retention**	13
		Problem Set 8	
26	4/4	**Ethics**	13
		PhD students complete discussion/conclusion	
27	4/9	**Reproducible research/dissemination**	14
		Problem Set 9	
28	4/11	**Student presentations I**	14
29	4/16	**Student presentations II**	15
30	4/18	**MPH students take Exam III**	15
		Final Research Product (Phase I and Phase II) is due by today	