HLTH AGE 716

Quantitative Research Methods in Health and Aging

Course Outline

Instructor: Housne Begum MSc, PhD

Department of Health, Aging and Society

Department of Health Research Methods, Evidence and Impact

Room HS 2C13, ext 22074

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Winter 2018

Thursday 6:30 pm to 9:30 pm Wilson

Hall (LRW) Room 5001

COURSE OBJECTIVES

This course provides an introduction to and overview to the use of numbers ("quantitative") and formal logic ("hypothetico-deductive") in research on the social aspects of health and aging.

What this course is not: I will not teach you a series of recipes ("how to") on a bunch of statistical methods that are commonly used in quantitative research.

What this course wants to do: We will look for reasons why social scientists use (or should use) such or such method. The "why" has to do with the following:

1. The type of question one wants to answer (or explore further)
2. The type of data that are available
3. The underlying theoretical model one has in m i n d

The detailed intended learning outcomes are as follows (I add the names of methods in italics):

1. To explain the difference between qualitative/inductive and quantitative/deductive approaches to social science questions *(study designs)*
2. To discuss the Experiments in the field of health and aging (*the Experimental study design*)
3. To explain the role of theoretical frameworks in hypothesis generation and the use of empirical restrictions in hypothesis testing (*study design and hypothesis*)
4. To explore different health related data sources in Canada and outside Canada
5. To explain the role of information in induction (*variables, types, and measurements*)
6. To explain why social scientists, use a stochastic approach called statistical inference (survey research, sampling techniques, *sampling*, *hypothesis testing*, *decision rules*.)
7. To explain what causality, correlation, bias, confounding are and the role of identification in the determination of causality (concepts of *correlation, causality, bias and confounding)*
8. To explain the difference between statistical inference and theoretical inference.

9. To explain vital statistics and its use in health research

10. Explore SPSS for data analysis in health research

Specificity of Aging and Health Studies within Social sciences

Health and aging can be studied from a variety of perspectives (clinical, biological, molecular, or social). Social scientists study health and aging as they relate to "society" (more detail below) and ask questions such as:

- What are the perceptions of age, aging, old, age groups, health, healthy, illness, sickness, disease, disability, treatment, rehabilitation in societies and groups within societies?
- What are the effects of changes in the age distribution of the population on the economy, society, and perceptions of age and a g i n g ?
- What are the effects of health and medicine on the economy, society, and perceptions of and expectations toward health and treatment?

These questions have in common an interest in health and aging from the perspective of human beings living in society (groups of human beings linked by norms, institutions, rules, or resource allocations). The methods and re- search designs used by social scientists to address such questions are generic methods and designs used by social scientists in general. There is no specific method or design used in health studies or studies of aging that is not used elsewhere in the social sciences. However, some specific issues, designs or concepts distinguish social scientists studying health and aging: among others, the use of chronological data, the distinction between population level and individual level phenomena, and proximity to health sciences and their methods (systematic reviews, knowledge transfers, randomized controlled trials).

Organization of the course

This course is divided into four parts:

1. Scientific method in social sciences and the role of quantified information.
   (a) The scientific method (study designs) and social sciences.
   (b) Hypothesis formulation and formalization and qualitative

comparative analysis.

(c) Experiments and randomization

(d) Sources of health data

2. Statistical (stochastic) analysis and inference for health research.

(a) Variables, Measurements (*Mathematical and epidemiological)*

(b) Questionnaire design, Sampling techniques, Sampling and inference

(c) Hypothesis testing and decision making

3. Inference and identification for health research.

(a) Systematic literature review

(b) Correlation, causality, and biases, confounding

4. Health research methods (Statistical analysis) in the social world:

(a) Vital statistics

(b) Use of statistical software SPSS to interpret the health research data

We meet once a week for three hours. Each session will be used as f o l l o w s :

1. Discussion of material, based on textbook or papers and chapters distributed in advance. These discussions follow a seminar format and are led by small groups of students, with the help of the instructor.

2. Hands-on applications (either examples provided by the instructor or based on students' research projects)

COURSE EVALUATION

To achieve its objectives, this course requires a good understanding of the readings, active participation in seminar discussions, and interest in research and writing. The evaluation of your understanding, participation, and research will be based on the following components:

1. Seminar Preparation (20%), Week 2 to Week 1 1
2. Seminar Leadership and Participation (20%)
3. Research: Three short Seminar Papers (20% each) due any time before the end of the term (but not accepted after the end of term) including research articles critical appraisal.

Late submissions of the seminar preparation documents will not be accepted.

Seminar Preparation

You must arrive in class having carefully done the readings and well-prepared to engage in the seminar discussion. In order to contribute to a better understanding of the readings, you are expected to come to the seminar with documents (one document for each of the required readings), which have the following three components:

1. List of core concepts and terms
2. Brief summary statement of the central arguments (written in your own words)
3. List of important questions and i s s u e s

Documents should be prepared for 9 out of 10 weeks (Week 2 to Week 11). Upload these documents on the dropbox on Avenue.

Seminar Participation

You will take turns leading the course. As a seminar leader, you should:

1. ask participants to define and clarify the core concepts and terms
2. ask participants to summarize and discuss the central arguments
3. ask participants to raise important issues and questions related to the readings
4. ask participants to discuss the strengths and weaknesses of the readings

I do not expect you to have all the answers (I don't), but to do your best to understand the question raised in the reading and be ready to discuss what you understand and compare it with what others understand.

Slides are **NOT** recommended - I do not ban slides but I do not encourage their use to lead a seminar discussion. Firstly, producing slides while preparing for a seminar is a waste of your time (especially if you use PowerPoint) and will distract you from the main task, which is to read, understand, and discuss. Also, human beings are so built that they cannot think deeply and fine tune presentation details at the same time. In this course, you should privilege substance over packaging. Secondly, presenting slides kills discussion: your listeners will focus on what is written on a screen and will not listen to what you have to say. If you simply say out loud what is already written on your slides, what is the point? If you feel more comfortable with an outline of the discussion (the main points you want to cover during the discussion) projected on a screen behind you, and used as a reference, that is fine with me. Also, if you prefer to think and discuss based on graphs and diagrams, that is fine as well. But shy away from the never ending slide deck that simply paraphrases what is in the reading.

As a seminar participant, you are expected to answer the questions raised by seminar leaders and other participants, respond to their contributions to our seminar discussions, provide information and examples, and raise your own questions and issues. The seminar is not only about making sure we understand the readings but also about using them as a springboard for our discussion of the day.

All: feel free to use the black or paper board to write down ideas or suggest charts that we might then discuss. All suggestions are welcome and no idea is a silly one. I strongly encourage active participation to the seminar, even though that might seem a bit chaotic at times.

Seminar Papers

Each short paper will discuss issues of research design and methods in the study

of health and aging. I do not have any recommendation for the length of these papers. I am only interested in the logic of your argument and how you support it with logic and evidence, not packaging. Having said so, keep in mind that it takes time to write short pieces but it pays off (a well-organized short piece presenting all the argument but nothing but the argument will be better received than a long and winding one that I will have to read 10 times to understand). Please use class time (so-called hands-on periods) to discuss your papers and get feedback and suggestions from your peers (and me). Here are the topics (you can start right away and hand them in any time before the end of the t e r m):

1. Select an interesting topic or problem in health and aging (possibly your MRP or thesis topic) and define a research question, based on a theoretical framework. Detail how you came upon your research question and how it will add to knowledge.

2. Causal inference: explain what empirical restrictions you will use to reject competing hypotheses (empirical tests) to answer your research question (has to build on paper 1).

3. Statistical strategy: explain how you would statistically test your empirical restrictions and how you would address measurement issues (has to build on papers 1 and 2).

COURSE READINGS

- Required:

  - Textbook: Paul S. Maxim, Quantitative Research Methods in the Social Sciences, Oxford University Press.

  - Lilienfeld's Foundations of Epidemiology Fourth Edition, Dona Schneider and David E. Lilienfeld

  - Epidemiology / Leon Gordis, 5th edition

  - Andy field Andy Field. 2009. DISCOVERING STATISTICS USING SPSS, 3rd edition. SAGE Publications Ltd 1 Oliver's Yard 55 City Road London EC1Y 1SP. (free online http://www.soc.univ.kiev.ua/sites/default/files/library/elopen/andy-field-discovering-statistics-using-spss-third-edition-20091.pdf)

- Recommended:

- Booth, Wayne C., Gregory G. Colomb and Joseph M. Williams (2008) 3rd edition), *The Craft of Research* Chicago: University of Chicago Press.

- David Bartholomew, Statistics Without Mathematics, Sage, 2015 ($55.00)

I will post on the course shell on Avenue a series of weekly documents (class preparation) providing information on required readings, expectations for seminar/discussion, optional readings as well as resources you may find helpful.

IMPORTANT NOTICES

COURSE MODIFICATION NOTICE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check his/her McMaster email and course websites weekly during the term and to note any changes.

FACULTY OF SOCIAL SCIENCES E-MAIL COMMUNICATION POLICY

In order to encourage participation outside of class, we will use the discussion tools of Avenue To Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure.

Effective September 1, 2010, it is the policy of the Faculty of Social Sciences that all e-mail communication sent from students to instructors (including TAs), and from students to staff, must originate from the students own McMaster University e-mail account. This policy protects confidentiality and confirms the identity of the student. It is the student's responsibility to ensure that communication is sent to the university from a McMaster ac- count. If an instructor becomes aware that a communication has come from an alternate address, the instructor may not reply at his or her discretion.

ALTERNATE/ACCESSIBLE FORMAT

If you require this information in an alternate/accessible format, please contact the Department of Health, Aging & Society at 905.525.9140 ext. 27227 or hasdept@mcmaster.ca

ACADEMIC INTEGRITY

Academic Integrity: You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster. ca/academic integrity

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not ones own or for which other credit has been o b t a i n e d .
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Academic Accommodation of Students with Disabilities

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for Academic Accommodation of Students with Dis- abilities: http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

Avenue to Learn

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Tentative Class Schedule and Key Topics

Class time	Major topic	Notes, content details	Materials/Activities	**PowerPoint, media and other links**
Week 1 January. 11th 2018	Introduction to course SCIENTIFIC METHOD IN SOCIAL SCIENCES INTRODUCE RESEARCH DESIGN PROPOSAL	**Scientific Method in Social Sciences** **Types of research:** * Framing Researchable Questions	Outline Research Design summary	**PP: Framing Researchable Questions**
Week 2 January 18th 2018	DESIGN: OVERVIEW	* Longitudinal observational studies: Prospective Cohort study Retrospective Cohort study Case-Control stud * Cross-sectional studies (surveys, one-time obs)	Research Design summary	**PP: INTODUCTION TO STUDY DESIGNS** **PP: Observational study**
Week 3 January 25th 2018	DESIGN: OVERVIEW CRITICAL APPRAISAL, SCOPING REVIEW	* Experimental /intervention studies, randomized controlled trials (RTC) * Adv/Disadvantages of design types * Selection criteria, starting "groups" with each method; examples.	Research Design summary Article for Critical appraisal	PP: Experimental study
Week 4 February 1st 2018	Systematic Literature review (SR) : Objectives and Steps of systematic review	*Systematic Literature review:Meta analysis * Adv/Disadvantages *Construct Search strategies *Sample Full text screening form *Sample Data extraction form		PP: Systematic Literature review

Week 5 February 8th 2018	INTRODUCTION TO HEALTH DATA, SOURCES OF HEALTH 'DATA AND INFORMATION' IN CANADA MAJOR SOURCES OF MEDICAL & HEALTH DATA IN CANADA	International (WHO, CDC, ...etc.) National (StatsCan, Health Canada, CIHR...etc.) Provincial (Ont. Min.H., Ont Cancer Reg. Ontario Ministry of Health and Long-Term Care, ... etc.) Regional/local (Toronto Pub.H. Tor H/Alliance, ICES etc.) Institutional/clinic/practice	Reports and articles on sources of data	**PP: SOURCES OF HEALTH DATA**
Week 6 February 15th 2018	MEASUREMENT THEORY	Measures of disease frequency & Association		**PP: Measures of disease frequency** **PP: Measures of Association**
February 22 – Reading Week				
Week 7 March 1st 2018	IDENTIFYING VARIABLES Hypothesis formulation and formalization	Types of Variables Hypothesis Hypothesis generation Confidence Limits (CL) Causality	Hypothesis formulation	**PP: Variables** **PP: HYPOTHESIS Testing** **PP: Confidence Limits** **PP: CAUSAL ASSOCIATIONS**
Week 8 March 8th 2018	SURVEY RESEARCH Questionnaire design	Question writing, questionnaire design, administering the survey SURVEY RESEARCH METHODS	Research question selection	**PP: QUESTIONNAIRE DESIGN**

Week 9 March 15th 2018	EVALUATION: VITAL STATISTICS -PLOTTING AND DISPLAYING DATA -CENTRAL TENDENCY -WORKING WITH CONTINGENCY TABLES -STATISTICAL INFERENCE IN THE SOCIAL WORLD: CORRELATION	**METHODS REVIEW==========** Plotting data, histograms, normal distribution, central tendency: mean, median, mode...) (Standard deviation, confidence limits, "normal distribution", importance and characteristics)	Prepare list of variables for research questions	**PP: PLOTTING DATA** **PP: STD DEVIATION** **PP: CHI-SQUARE** **PP: REGRESSION** **pp: CORRELATION**
Week 10 March 22nd 2018	Sampling Methods Sampling Sample size calculation		Finalize Selection of Research question and Questionnaire preparation.	**PP: SAMPLING METHODS** **PP: SAMPLE SIZE**
Week 11 March 29th 2018	SPSS FOR HEATH DATA ANALYSIS: Understanding SPSS, data entry and exporting data, importing data from one program to another, Sorting data, SPSS Table to APA Format	Using SPSS for Heath data analysis: Analysing the data and Reporting the results by using SPSS and Excel Descriptive statistics, Chi-square, correlation and regression.	Introduction to SPSS and Excel learn how to use excel and SPSS for data analysis and interpretation	**PP: SPSS FOR DATA ANALYSIS AND REPORT WRITING**
Week 12 April 5th 2018	Analysing the data and Reporting the results by using SPSS and Excel: Comprehensive exercise and discussion the outcomes of that exercise.	Questionnaire for data entry and analysis	Practice SPSS	**PP: SPSS FOR DATA ANALYSIS AND REPORT WRITING**