The University of Michigan
School of Social Work

Statistics in Policy Analysis and Evaluation
Instructor: José A. Tapia
SW 673-002
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Fall Term 2003
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Course Description
This course will develop students’ ability to use quantitative methods to describe real world situations in social work settings and to make inferences based on that information to improve social policy decisions and service delivery programs. Students will develop skills to assess the value and limitations of program data for important organization and policy decisions and to understand, apply and describe measures of central tendency and variability to various data. Students will learn the appropriateness of statistical methods in policy and program evaluation situations. Students will apply statistical techniques to construct meaningful charts, tables, and graphs. Students will learn to use appropriate language with their statistical analyses to clarify meaning and to explain the inferences that can be made from specific data.

Credit Hours: 3.
Location: Methods course in the Social Policy and Evaluation Concentration.
Prerequisites: Foundation Research Course.
Primary Class Location: SSWB 696 (computer classroom)
Secondary Class Location: SEB 2302 (please check calendar for particular dates)

Course Content
This course focuses on learning the direct application of analytical skills. Students will conduct, interpret, and present statistical analyses of data to various audiences. Students will receive an orientation to the theoretical foundations of descriptive and inferential statistics. Students will be introduced to models of statistical design and analysis derived from social science theory and research, and will learn to apply these models as they develop skills to assess statistical analysis and reports in contemporary social work practice, program and policy. Students will learn to apply techniques for policy analysis and evaluation.

Course Objectives
Students will be able to:
• identify appropriate statistical methods to use in common policy and program evaluation situations;
• assess the advantages and disadvantages of different design strategies;
• apply basic statistical techniques to common policy and program evaluation situations;
• apply common measures of central tendency and variability and a variety of scales to data;
• construct meaningful charts, tables, and graphs of statistical analyses;
• prepare written, oral and visual reports using appropriate statistical language.

Relationship to Four Curricular Themes
Multiculturalism and Diversity — Students will develop the capacity to identify ways in which gender, race, ethnicity, social class, age and other forms of social stratification and disenfranchisement in community related issues influence and are affected by the decisions made from statistical analyses and related methodologies.
Social Change and Social Justice — The ability to assess policies and programs analytically is necessary if the social work profession is to play an important role in shaping the outcome of ongoing program and policy debates to reflect issues in social change and justice. This course provides students
with the capacity to understand and influence the role that statistical analysis and the interpretation of such analysis play in the formation and implementation of policy, practice and program development.

Promotion and Prevention — Prevention and promotion activities are difficult to evaluate and therefore raise special challenges in statistical analysis. It is important to expose students to the language of statistics so that they may comprehend useful and appropriate statistical techniques for different problems. In this way they may analyze and evaluate promotion and prevention activities prior to the development, implementation, and analysis of any relevant policy issue or initiative that they encounter in the course of their professional activities.

Social Science — Social workers need to be able to identify statistical methods that optimize a combination of rigor and feasibility. Social workers should also examine the ways in which social science data is translated into current policy and practice and the consequences (both positive and negative) that emerge. This course provides students with tools to understand the role of statistical analysis in the analysis of policies and to apply basic statistical methods to the analysis of social problems.

Relationship of this Course to Social Work Ethics and Values
Ethical standards of research methods (NIH guidelines), social work practice (NASW Code of Ethics) and evaluation practice (Program Evaluation Standards) are relevant in the statistical analysis of social data. The ethical standards of utility, feasibility, accuracy and propriety are particularly relevant to statistical analysis and evaluation and will therefore be emphasized and discussed.

Materials for the course

These two books will be used as basic materials for the course. Both should be available at local college bookstores. The book by Moore will be the basic source for theory. Readings are chosen from this book, but lectures will not necessarily follow it closely. The book by Holcomb will be used as a source for problems and must be purchased to be used in problem solving.

A basic aspect of the course is to learn how to use SPSS for basic statistical analysis. If SPSS HELP and web resources are not enough, books like *SPSS for Windows*, by George & Mallery, or *Data analysis with SPSS—A first course in applied statistics*, by Sweet & Grace-Martin, may help. These two books will be on reserve at the SSW library.

Since statistical concepts are the same regardless of whether they are applied to rats, electrons or human beings, and there have not been important changes in basic statistical concepts in the last century, statistics textbooks (there are hundreds) include the same concepts with different presentations. For that reason students are encouraged to look at other basic level books on statistics (for instance the *Introductory Statistics* by Weiss or Wonacott). Old editions or old textbooks (like *Statistics and Probability* by Brocket and Levine or *Social Statistics* by Blalock) can often be bought for a few dollars and they may provide an alternative presentation that is useful to you. There are also plenty of statistical resources on the web.

*How to lie with statistics*, by Darrell Huff (Dover, 1954), is a little book that has been reprinted many times, so it is very cheap and easy to find. Huff describes how misused statistics can lead people astray. Many pitfalls are described in humorous fashion, along with suggestions for how to avoid problems.

*Innumeracy: mathematical illiteracy and its consequences*, by John A. Paulos (New York, Vintage, 1989) presents in 200 pages some of the causes and detrimental effects of mathematical illiteracy, and ways to improve the situation. Many statistical concepts are skillfully discussed in this book. It is strongly recommended that one of these two books be read during the semester.
Other matters
Except when otherwise announced, class will meet at SSWB 696 (computer classroom). If the computer classroom is taken, class will take place at SEB 2302. To avoid disruption cell phones and pagers are not permitted in class.

Students registered for this class will have access to a Course-Tools web site for the class. Background materials, the class schedule and other materials will be provided on the class web site.

Grading
Classroom attendance is expected. Roll will be taken during the first part of the class until the instructor learns the names of the students. Attendance does not directly affect grade, but given the nature of the material to be assimilated, it is the truly exceptional student who can afford to miss more than one or two classes. Falling behind is a major problem in terms of completion of the course and grading. On the other hand, participation is not evaluated, but asking questions (even "silly" questions) is the way to learn new concepts.

Grades will be assigned by weighting three components with the following values: 1/3 homework assignments, 1/3 midterm exam, 1/3 final exam. Following standard school policies, "A" grades will be given for exceptional individual performance and mastery of the material. "B" grades will be given to students who demonstrate mastery of the material. "C" grades are given when mastery of the material is minimal. Both the midterm and the final will be in-class exams. There will be four or five homework assignments throughout the course. Late assignments will be accepted with a strong penalty.

Office Hours
Tuesdays, 9 a.m. to 11 a.m., at 3784 SSWB (phone 936-4894), by appointment preferably. To set up an appointment, please email me or call to my regular office at ILIR, Victor Vaughan Building, 1111 East Catherine Street, #308, phone 763-0071.

Weekly Class Schedule
This schedule is subject to change. Numbers in brackets refer to chapters in Moore's *The basic practice of statistics* (3rd. ed.). It is recommended that students read materials before class.

**WEEK 1 — Sept. 5th** [Class will meet at SEB 2302]
What is statistics? Sets, elements, populations and individuals. Ratios, proportions, rates, percentages [0]. Variables: quantitative, qualitative, nominal, categorical, ordered. Data collection, measurement, counting, self-reporting. Distribution graphs: pie charts, bar graphs, histograms, scatterplots, line graphs, etc. [1].

**WEEK 2 — Sept. 12th**
Summary measures—measures of central tendency (averages): arithmetic mean, median, mode, weighted average (mean). Summary measures—measures of dispersion or variation: standard deviation, variance, coefficient of variation. Range, quantiles, tertiles, quartiles, quintiles, percentiles. Interquartile range. Five number summary, box plot [2].

**WEEK 3 — Sept. 19th**
The normal (Gaussian) distribution. Standard normal distribution. Non-normal distributions: skewed, bimodal [3].

**WEEK 4 — Sept. 26th**
Correlation. Correlation coefficient $r$. Correlation and causation [4]. Sampling. Observation versus experiment. Simple random sampling and other sample designs [7].
WEEK 5 — Oct. 3rd
Relationships between categorical variables. Two way tables [6]. Experiments. Randomized comparative experiments. Matched pairs designs. Block designs [8].

WEEK 6 — Oct. 10th

WEEK 7 — Oct. 17th

WEEK 8 — Oct. 24th
MIDTERM.

WEEK 9 — Oct. 31st
Inference about a population mean. The $t$ test. The comparison of two population means [16] [17].

WEEK 10 — Nov. 7th
Inference about a population proportion [18]. Comparisons of two proportions [19]

WEEK 11— Nov. 14th
Regression. Variables in regression: independent, dependent, explanatory, covariate, outcome, response. Regression line. Outliers. Regression coefficient $b$. Coefficient of determination $r^2$. Relationship between the correlation ($r$) and regression ($b$) coefficients [5]. Inference about regression parameters [21]

WEEK 12 — Nov. 21st
The chi-square test [20]. The analysis of variance (ANOVA) test [22].

WEEK 13 — Nov. 28th
NO CLASS — Thanksgiving Recess

WEEK 14 — Dec. 5th
General Review

WEEK 15 — Dec. 12th
FINAL EXAM.