RAPID EPIDEMIOLOGICAL SURVEYS IN DEVELOPING COUNTRIES

This applied course will taught like a workshop with a general outline (shown here), but no daily beginning or ending times. A hard copy of the Powerpoint slides will be available for enrolled students on the course website preceding each lecture (http://www.ph.ucla.edu/epi/epi41808.html).

I. Overview of Research Methods and Issues

A. Introduction

1. EPI 418 and CHS M418
   a. Jointly listed
   b. T, Th from 4 to 6 pm, Rm. 61-269 CHS

2. Instructors
   a. Ralph R. Frerichs, D.V.M., Dr.P.H., Professor
      (1) Office hours: by appointment, 71-236B CHS
      (2) Email: frerichs@ucla.edu
      (3) Tel: (310) 825-3286

3. Opening remarks

4. Introduction of instructor and students
   a. Education and current position
   b. Experience with research and services
   c. Expectations of course

5. Objectives of course

6. Guide to course outline and readings

7. Websites
   a. EPI 418 class
      (1) http://www.ph.ucla.edu/epi/epi41808.html
   b. Rapid Surveys
      (1) Contains rapid survey references and PDF files from 1965 to the present
      (2) http://www.ph.ucla.edu/epi/rapidsurvey.html

Discussion of Reference 1 (also the reference for Problem 1)

8. Use of rapid surveys
   a. Describe health problems, knowledge, attitudes and practices in populations
   b. Determine possible causative factors
   c. Evaluate programs and projects

9. Policy issues
   a. Cost-benefit analysis and cost-effectiveness analysis
   b. Efficacy, effectiveness and efficiency
   c. Forms of evaluation
      (1) input-output
      (2) input-effect
(3) input-impact

**End of rs2008_1**

d. Evaluate efficiency
   
   (1) cost in relation to community effectiveness

10. Preventing disabled years or premature death years
   
a. Social values and mortality

11. Mortality indicators for cost-effectiveness analysis
   
a. Mortality rates
   b. Years of potential life lost
   c. Healthy life lost
   d. Disability-adjusted life years (DALYs)

**End of rs2008_2**

*Discussion of Reference 2*

12. Rapid microcomputer-assisted surveys
   
a. Components
   b. Hardware and software

B. Questions

1. Who is to be surveyed?
   
a. Target population
   b. Study population
   c. Potential bias

2. What unit is to be sampled?
   
a. Households
   b. Individuals
   c. Episodes, events or beliefs

3. How much error is acceptable?
   
a. Truth
   b. Systematic bias
   c. Accuracy

4. How valuable is the information?

C. Planning a survey

1. Frequency of surveys
2. Required information and cost
3. Standardized measurements
4. Instruments for obtaining measurements
5. Plausible values for measurements (range and logic check)

**End of rs2008_3**

*Discussion of Reference 3*
6. Determine sampling strategy and design
   a. Simple random sampling
   b. Systematic sampling
   c. Stratified random sampling
   d. Simple cluster sampling
   e. Two stage cluster sampling

End of rs2008_4

Discussion of Reference 4

D. Interview surveys

1. General comments
2. Standardization
3. Recognition of reproductive conditions
   a. Health professional
   b. Respondent
4. Recognition of events
5. Sources of bias
   a. Misclassification bias
   b. Selection bias
   c. Recall bias
   d. Observation period bias

E. Hardware and Software

1. Portable computers
2. Portable printers
3. Software
   a. Word-processing
   b. Form-making
   c. Sample management
   d. Spreadsheet
   e. Statistical software
      (1) For frequencies, univariate and bivariate analyses of cluster surveys
          (a) Epi Info
      (2) For multivariate analyses of cluster surveys
          (a) Stata, Sudaan

F. Rapid survey

1. Planning
   a. Formulate the study objectives
   b. State the aims
   c. Identify the variables
   d. Feasibility study
   e. Conduct a small pilot study
2. Organizing and conducting
a. Approval
b. Involvement of local officials
c. Language problems
d. Introduction to subjects
e. Supervision
f. Preliminary analysis in field
g. Presentation of selected findings to local officials and guests
h. Final analysis
i. Write final report

End of rs2008_5

3. Example (Myanmar)

G. Interview training

1. Types of interviews
   a. Confidential
   b. Non-confidential
2. Approach to interviews
3. Use of role playing
   a. Example
   b. Discussion

End of rs2008_6

Discussion of Reference 5

II. Statistical Methods and Issues For Rapid Surveys

A. General Notions

1. More on units
   a. Sampling and elementary units
   b. Enumeration rule
2. Value of alternative sources of information
   a. Opinion of expert
   b. Consensus of experts
   c. Synthetic estimation
   d. Sample of population
   e. Total count of population
3. Data
   a. Types of data
      (1) Binomial
      (2) Equal Interval
   b. Average value of data
   c. Analysis of data
      (1) Equal interval
      (2) Binomial
(3) Ratio estimator

d. Data and action

End of rs2008_7

4. Variability and bias  
   a. Accuracy and precision  
   b. Bias  
   c. Standard error  
   d. Confidence interval  
      (1) probability versus confidence

End of rs2008_8

Discussion of Reference 6

B. Simple Random Sampling

1. Introduction
2. With or without replacement
3. Average value and standard error
4. Samples and elements
5. Survey of smoking behavior (example)

End of rs2008_9

Discussion of Reference 7

C. Equal Probability of Selection

1. Introduction  
   a. Sampling of 10 from population of 120  
2. EPSEM sampling
3. Two-stage cluster sampling  
   a. with equal selection probabilities  
      (1) unequal sized clusters  
      (a) equal fraction at second stage  
      (2) equal sized clusters  
      (a) equal number at second stage  
   b. with unequal selection probabilities  
      (1) unequal sized clusters  
      (a) equal number at second stage
4. PPS Sampling  
   a. with equal selection probabilities  
      (1) unequal sized clusters  
      (a) equal number at second stage  
   b. Method  
      (1) without sequential sampling  
      (2) with sequential sampling
(3) with random sampling

5. Sampling and elementary units
   a. Representative
   b. Not representative

End of rs2008_10

Discussion of Reference 8

D. Variance of Cluster Sampling

1. Sampling of persons
   a. Sampling unit same as elementary unit
   b. Mean
      (1) Binomial
      (2) Equal interval
      (3) Ratio estimator
   c. Variance
      (1) Binomial
      (2) Equal interval
      (3) Ratio estimator

2. Sampling of households
   a. Sampling unit different from elementary unit
   b. Unique variance formula
      (1) Ratio estimator

3. Analysis of subgroups
   a. Complications
      (1) Incorrect analysis
      (2) Correct analysis

End of rs2008_11a and 11b

Discussion of Reference 9

E. Cluster Sampling for Common Events

1. Introduction
   a. Steps for doing a survey
   b. Potential biases

2. Steps for doing a EPI/WHO style two-stage cluster survey
   a. First stage
      (1) Identify young child population
      (2) Identify young child population that can be sampled
      (3) Select sampling units from sampling frame
   b. Second stage
      (1) Select random start household
      (2) Determine if someone is home at random-start HH
      (3) With permission, interview mother or other knowledgeable respondent
      (4) Continue to next nearest HH
Repeat process until quota of seven eligible children have been studied in each cluster

3. Sample size determination
   a. Answer three questions
      (1) Best estimate of true proportion in study population?
      (2) How precise should the estimate be?
      (3) How confident do you need to be that a derived interval brackets the true value in the study population?
   b. Use Csurvey program to derive appropriate sample size
      (1) Answer to three questions
      (2) Design effect
      (3) Intraclass correlation coefficient
      (4) Maximum standard error

4. Sample size and decision-making
5. Evaluation of WHO-style surveys

End of rs2008_12

Discussion of Reference 10

F. Other Uses of Cluster Sampling

1. Evaluation of WHO-style surveys
2. Other uses for cluster sampling
   a. Measuring changes in level of an attribute over time
      (1) Hypothesis testing versus interval estimation
      (2) Type I and II errors
      (3) Power of the test
   b. Assess the occurrence of uncommon events
      (1) Not recommended
   c. Other applications
      (1) Measure knowledge, attitudes and practices (KAP)
      (2) Deriving controls for a population-based case-control study

G. Cluster Sampling for Rare Events

1. Sample size determination
2. Approach favored by R. R. Frerichs
3. Sample size program (C Survey)
   a. Interval estimation
   b. Hypothesis testing

End of rs2008_13

Discussion of Reference 11

H. Use of design effect (and roh)
1. Variation among clusters
   a. High variation with design effect of 4.0
b. Low variation with design effect of 1.0
   (1) identical to variation if SRS
2. Values of design effect in two-stage cluster surveys
   a. Immunization surveys
   b. Infectious disease incidence surveys
3. Uses of design effect for management
   a. For health care variables
   b. For disease variables

End of rs2008_14

Discussion of Reference 12

I. Improving Precision of Rapid Surveys

1. Theory
   a. Reduction of design effect and intraclass correlation coefficient
2. Actual field experience
   a. Rural Indonesia (Bali)
   b. Urban Indonesia (Jakarta)

Discussion of References 13 and 14

J. Improving the Accuracy of Cluster Surveys

1. Difference between accuracy and precision
2. Sources of potential bias
3. Non-response errors with two-stage cluster surveys
4. Modifications to improve accuracy
5. Modifications to dispersed rural areas

End of rs2008_15

Discussion of References 15 and 16

K. Example of Rapid Survey in an Urban Area

1. Los Angeles, California
2. Enumeration and interview phases
3. Use of volunteers
4. Modifications to address bias concerns
5. Details and analysis

End of rs2008_16

L. Completion of course – what was gained?

1. Appreciate the need for rapid surveys
2. Understand the theory of...
a. sampling  
b. rapid surveys  
c. assessment for decision-making

3. Acquired practical skills to .
   a. do the field work for rapid surveys  
   b. analyze data from rapid surveys

4. Able to present analysis of surveys findings in understandable terms
   a. Objectives  
   b. Methods  
   c. Results  
   d. Discussion and recommendations

End of rs2008_17

M. Final group project

1. Presented in-class on Monday, June 9, 2008 from 6:30 am to 9:30 pm (the official “final exam” time scheduled by the University)
   a. Group A  
   b. Group B

III. Closing comments

GRADING

Problem 1 – Graphics (due beginning of class, Thursday, April 17, 2008) .......... 15%
Problem 2 – Data Analysis (due beginning of class, Thursday, May 15, 2008) ....... 35%
Group problem (contribution to class survey, 6:30 pm to 9:30 pm, June 9, 2008) ..... 50%

REFERENCES


**SUPPLEMENTARY REFERENCES**


**SUPPLEMENTARY REFERENCES FOR PROBLEM 2**

