

## Letter from the Director

Credibility and confidence in research findings are built by how we conduct our research. The faculty leaders in CHRP have committed to strengthening our expertise in the "how." To this end, we have launched two series to cross the academic year: the "Grants Boot Camp" series, in cooperation with the Office of Research and Compliance Services, and the "Research Methods Journal Club," conducted monthly to advance our expertise about a wide spectrum of cutting-edge and contemporary issues in research methods and their optimal use. The University community is encouraged to attend and participate in these opportunities.

Warm Regards,

Kimberly Galt, Pharm.D., Ph.D.  
Director, Center for Health  
Services Research and Patient Safety

## Coming Soon

### "Research Methods Journal Club"

**Date:** Oct. 18  
**Time:** 9:30 a.m.  
**Location:** Thune Conference  
Room, Health Sciences Library

For complete details see page 4

### "Grants Boot Camp" Series

**Speaker:**  
Beth Herr, director  
Creighton University  
Grants Administration

**Topic:**  
Formatting a Proposal and Using  
Language Effectively

**Date:** Oct. 18  
**Time:** 10:30 a.m.  
**Location:** Thune Conference  
Room, Health Sciences Library

To RSVP please contact:

Mavis Hall  
Program Administrator  
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## Volume 3, Issue 4

October 2012

## Sampling Considerations in Research: Quantitative Design

By Xiang Fang, Ph.D., Regional Clinical Information Coordinator, Catholic Health Initiative

### Introduction

Researchers usually cannot make direct observations of every individual in the population they are studying (a census). Instead, they collect data from a subset of individuals – a sample – and use those observations to make inferences about the entire population. Generally, sampling is the technique of selecting a subset of individuals from a target population to acquire the knowledge of the whole population.

Compared to census, sampling has some advantages:

1. Sampling will save the source of data from being all consumed. One example would be needing to inspect eggs on a farm or inspecting bullets in an ammunition factory. Obviously, a census cannot be conducted in these cases.
2. Sampling will save time and cost. The 2010 United States Census cost \$13 billion and took more than six months to complete. As the size of the sample is small compared to the population, the time and cost involved in a sample study is much less than a census.

3. Census is not always an option. Sampling allows the study of a target population, for which a census is impossible. One example would be a study of wild honeybees.

Using a sample to represent a population is subject to errors, such as selection bias, measurement bias and random sampling error. These errors cannot be eliminated completely, but their effects can be reduced by increasing sample size, using carefully designed tools (e.g., survey questionnaire) and selecting an appropriate sampling frame and sampling method.

### Sampling design

Sampling design refers to the technique used to choose a sample from the population. Two general techniques are probability and nonprobability sampling. With probability sampling, all individuals in the population have a chance of being included in a sample and the probability can be calculated. In contrast, with nonprobability sampling, some individuals in the population have no chance of selection and the probability cannot be determined.

Probability sampling always starts with a sampling frame, which can be thought of as a list of all individuals in the

population of interest (e.g., names of individuals, telephone numbers, house addresses). The sampling frame operationally defines the target population from which the sample is drawn and to which the sample data will be generalized. The simplest form of probability sampling is the simple random sample, for which all individuals in the sampling frame have an equal chance of selection, and sampling is done in a single stage with each individual selected independently. Other common types of probability sampling include systematic sampling, stratified sampling and cluster sampling.

Nonprobability sampling is selected based on the availability of the individual or sometimes based on the researcher's judgment that an individual is representative of the population. Therefore, an unknown portion of the population is excluded. The most common type of a nonprobability sample is a convenience sample. One example would be volunteers who are used as subjects for a study.

### Sample size and sampling error

The use of an appropriate sampling method and sampling frame are necessary for a

(Continued on page 2)

(Continued from page 1)

## Sampling Considerations in Research

representative sample, but not sufficient. In addition, the sample size must be evaluated. Factors that could determine the sample size in a study include population size, variation in the population, level of precision, confidence level and cost of the sample.

Increasing sample size benefits a research study by increasing the confidence and reliability of the confidence interval, and as a result, the precision with which the true population value can be estimated. Smaller samples have greater sampling error than larger samples.

To better understand sampling error, it is helpful to recall that data from a sample merely provides an estimate of the true population value

(i.e., proportion of the population that has a particular characteristic). If 1,000 different samples with the same sample size are drawn from the same sampling frame, they could potentially result in 1,000 different estimates of the true value. These estimates, however, would converge around the true value in the population.

The sampling error describes the precision of an estimate from any one of those samples. It is usually expressed as a margin of error associated with a statistical level of confidence. For example, a presidential preference poll may report that the incumbent is favored by 60 percent of the voters, with a margin of error of plus-or-minus five points at a confidence level of 95 percent. This means that if the same survey were conducted with 1,000 different samples of same size, 95 percent of them would be expected to show the

incumbent favored by between 55 percent and 65 percent of the voters (60 percent  $\pm$  five percent). The margin of error due to sampling decreases as the sample size of the survey increases.

### Other considerations

Many other factors affect the quality of a sample, such as selection bias and measurement bias. Selection bias occurs when some part of the target population is not included or not sufficiently represented in the sampling frame. Therefore, this part of the target population is not included in the sample, or is less likely to be included than others in the sample. Measurement bias results from inaccuracies in measuring data. For example, a scale tends to add a few pounds to the weight of every person, or a particular interviewer may affect the accuracy of the response by misreading a question. ▲

### References:

Asher, H. (2010). *Polling and the public should know* (8th ed.). Washington, DC: CQ Press College.

Fuller, W. (2009). *Sampling statistics*. New York: Wiley.

Kish, L. (1965). *Survey sampling*. New York: Wiley.

Raj, D., & Chandhok, P. (1998). *Sample survey theory*. London: Narosa.

## Staff Spotlight—Mavis Hall

By Jamie Steemken, Senior Administrative Assistant

Mavis Hall, M.A., is the program administrator for the Creighton Center for Health Services Research and Patient Safety (CHRP). Hall began her career at Creighton University in 2003. She worked as a senior administrative assistant in the School of Medicine Faculty Affairs and Development and Research Offices until May 2006 when she moved to the School of Pharmacy and Health Professions as the assistant director of the Office of Research and the CHRP program administrator.

Hall received her Bachelor of Science degree in management of human resources from Bellevue University and her Master of Arts degree in theology from Creighton University.

As the CHRP program administrator, Hall provides administrative management of the Center. She oversees CHRP sponsored grants, contract submissions and awards, manages budgets for the Center and externally funded projects, and works closely with CHRP faculty and students to ensure they have

completed all required research and compliance training prior to participation on research projects. She also serves as production manager for the CHRP newsletter, overseeing the editorial process.

Hall's office is located in the Boyne Building, room 143A. ▲



Mavis Hall, M.A., program administrator

## Journal and Author Impact Factors

By Jim Bother, Associate Vice President for Health Sciences and Director of the Health Sciences Library; Jeanne Burke, Education Coordinator, Health Sciences Library; John Mitchell, User Services Department Head, Health Sciences Library

The first journal citation index to be calculated for a large set of journals was the Journal Impact Factor (JIF). This was the brainchild of **Eugene Garfield**, founder of the Institute of Scientific Information. Despite some limitations, citation indices are used to assist in determining which journals to access and read, which authors are the best researchers and which are the best research institutions. Essentially, the impact factor is a measure of the relative importance of a journal, article or researcher. Each of the following examples of an index or a database uses a different metric and produces a different result. Other terms used to describe this process include bibliometric analysis and citation analysis.

**Journal Citation Reports (JCR)** is a quantitative tool for ranking, evaluating, categorizing and comparing journals. The impact factor is one of these. It measures the frequency with which the average article in a journal has been cited in a particular year

or period. It does not measure researchers or individual articles. The Health Sciences Library (HSL) and Reinert-Alumni Library license allows access to this database. The **JCR** may be accessed from the **Journal Citation Reports** link on the HSL website. [To access this link, click on **Resources** on the HSL homepage ([hsl.creighton.edu](http://hsl.creighton.edu)). From the **General Reference Works** screen, scroll down and locate the **Journal Citation Reports** link.]

The **Eigenfactor** is a rating of the total importance of a journal. The **Eigenfactor** rating measures how frequently a journal is likely to be used. Essentially it measures the journal price as well as the citation influence. It ranks scholarly journals as well as newspapers, theses, popular magazines, etc. Calculations are based on citations received over a five-year period vs. a two-year period in JCR. Access to the Eigenfactor is free. It can be accessed at: [www.eigenfactor.org](http://www.eigenfactor.org). The

drawback is that higher ranked journals carry a higher impact so the Eigenfactor may not always accurately reflect the quality of a journal.

The **Author Impact Factor** calculates the apparent value of a given researcher or author. Examples of this include the **H-Index** and the compilation of cited references using Web of Science or Google Scholar.

The **H-Index** is used to quantify the impact of a researcher's output in a given area. The index is based on the set of the researcher's most cited papers and the number of citations that the researcher has received in other publications. The **H-Index** may be the best overall tool but it, too, has drawbacks. There are several attempts to correct some of the flaws but there is no consensus as to the best way to do so. The H-Index can be calculated using Web of Science.

Cited references are a way to find other documents that are related by topic or subject. One way to find this is to use the **Web of Science (WoS) Cited Reference Search** or **Google Scholar (GS) Cited References**. WoS indicates the number of times the reference has been cited in all the years of Web of Science regardless of how many years you are searching. Google Scholar Cited References cover peer-reviewed papers, theses and other scholarly literature across the web. This is a free service from Google Scholar (<http://scholar.google.com/schhp?hl=en>).

There are advantages and drawbacks to each measure, so the caveat is not to rely on a single metric tool. Careful use of these impact tools is essential and a comprehensive approach should be used to determine the rank and impact of research. Combining several metrics is the best approach. ▲

## Grants Boot Camp Workshop Series: Early Lessons Learned

By Kevin Fuji, Pharm.D., Resident Assistant Professor and Clinical Scientist Development Program Award Recipient

The first two sessions in the Grants Boot Camp Workshop Series were held on Aug. 16 and Sept. 20. "Grant Writing Tips and Tricks," presented by Barbara Bittner, technical editor/writer for the Office of Research and Compliance Services, focused on presenting an overview of the grants process from planning to submission. "Locating

Funding Opportunities: Reading and Interpreting Guidelines," presented by Beth Herr, director of Grants Administration, and Bittner, focused on identifying appropriate funding opportunities to optimize the potential for a successful proposal. Key lessons learned from these two sessions included:

- Learn about the organization and funding opportunity to ensure that your project is a good fit for the mission and vision of the funder, and is in line with what they have funded in the past.
- Utilize the resources available at your university to help you

identify funding opportunities and develop a competitive proposal.

Please visit the CHRP website for more information about the workshop series and to access materials from the presentations: <http://chrp.creighton.edu/GrantsBootCamp.aspx>. ▲

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The Creighton University Center for Health Services Research and Patient Safety was founded to coordinate and support research and training efforts among faculty within an interdisciplinary and collaborative research environment. Faculty and staff serve the research interests of governmental agencies, health care facilities, employers, health care industry companies and educators.

**Mission Statement:** The Center for Health Services Research and Patient Safety conducts health services research to improve quality, safety and efficiency of patient care through the discovery, translation and dissemination of new knowledge.

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## Publications

- Abbott AA, Fuji KT, Galt KA, Maio A, Kasha TA. Engaging in Self-Care Through Use of a Personal Electronic Health Record. Creighton University School of Nursing – Caring in a Complex World: Reducing Readmissions Through Collaboration and Communication, September 2012, Omaha, NE. (Podium Presentation).

## Research Methods Journal Club

The Research Methods Journal Club is sponsored by the Center for Health Services Research and Patient Safety (CHRP). This monthly research methods discussion series is an opportunity for University faculty to come together to gain knowledge and discuss diverse research topics with other University faculty from across disciplines.

The next Research Methods Journal Club will be held on Thursday, Oct. 18 from 9:30 to 10:30 a.m. in the Thune Conference Room, Health Sciences Research Library and Bio Information Center.

Session discussion topics will be:

- “Action Research” led by William Raynovich, Ed.D., director, Creighton University Emergency Medical Services Education Program
- “What patients want: Relevant health information technology for diabetes self-management” led by Kevin Fuji, Pharm.D., research assistant professor, School of Pharmacy and Health Professions, Clinical Scientist Development Program award recipient

If you would like to attend, please contact Mavis Hall at [mavishall@creighton.edu](mailto:mavishall@creighton.edu) to RSVP.

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