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EBL 101

Research Methods: Sampling

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Research often involves choosing a certain number of people or items in order to answer a question. A frequent question is how does one choose a sample? Another question is how many individuals or items is enough? What sample size will give the best results for the question at hand? Well, the answer to the latter is: "it depends". It depends on the question, on the method one uses to administer the research project, on what kind of results one is hoping for.

Sampling is a consideration in both qualitative and quantitative research. Survey methodology, interviews, focus groups, bibliometrics, content analysis, usability testing, etc., all rely on an appropriate number of people or items being selected and examined. For the purposes of this brief column, I'll look at sampling as it pertains to survey methodology, as much of this information can be applied to other types of research methodologies. A valid sample must be considered in order to obtain generalizability in quantitative research and trustworthiness in qualitative research.

There are various types of sampling methods, including nonprobability sampling and probability sampling. Below is a very brief examination of the methods under each, adapted from Basic research methods for librarians, 5th ed. (Connaway & Powel, 2010). Sampling is a complex exercise, depending on the type. As usual, the brevity of this column necessitates only the briefest overview of the topics.

Nonprobability sampling: the researcher cannot be sure of a "specific element of the population [i.e. the particular grouping that is being looked at] being included in the sample" (p. 117). The weakness of a nonprobability sample is that it "does not permit generalizing from the sample to the population because the researcher has no reassurance that the sample is representative of the population" (p. 117). Still, these types of samples are easier and often cheaper to obtain than the alternative (which we will get to later), and they can be adequate depending upon the research question.

There are various types of nonprobability samples:

- Accidental (or convenience) sampling: selecting the cases at hand until the desired number of people/items is reached.
- Quota sample: the same as accidental sampling, except that "it takes steps to ensure that the significant, diverse elements of the population are included" (p. 118).
- Snowball sample: a cumulative sample is generated by starting with a few people and asking them to recommend more people.
- Purposive sample: based on the researcher's "knowledge of the population and the objectives of the research" (p. 119).
- Self-selected sample: people self-identify with the desired population criteria and select themselves to participate in the study.

Probability sampling: this type of sampling comes closer to the objective of sampling, that is, "to select elements that accurately represent the total population from which the elements were drawn" (p. 119). The critical piece in probability sampling is that "every element in the population has a known probability of being included in the sample" (pp. 119-120).

There are various types of probability samples:

- Simple random sampling: this is the basic sampling method in survey research and it "gives each element in the population an equal chance of being included in the sample" (p. 120). The simple random sample is generated most often by using a table of random numbers. There are variations of the random sample, differentiated by the way the samples are generated.
    - systematic sample: involves "taking the every nth element from a list until the total list has been sampled" (p. 123).
    - stratified random sample: the population elements are divided into categories, then independent random samples are selected from each category.
    - cluster sample: the population (not the population's elements as in stratified random sampling) are divided up into clusters and samples are drawn from the clusters. This is particularly helpful when a population cannot be easily listed for sampling purposes.

This has been a whirlwind trip through types of sampling, as the other main point I would like to address is the "how many" question. How many people/items are enough to be representative of any given population? The rule of thumb for sample sizes is the larger the better. However, time, funding, and a host of other issues also have a role to play in determining how big to go. Connaway and Powell state that there are four criteria that you can think about to help determine the necessary sample size:

1. The degree of precision required (the less accuracy needed, the smaller the sample you can get away with)
2. The variability of the population (the greater the variability, the larger the sample size)
3. The method of sampling (i.e. "stratified sampling requires fewer cases to achieve a specified degree of accuracy" (p. 129).
4. How the results are to be analyzed (small samples have limitations in terms of the types of statistical analyses that can be used)

There are formulas that can be used to determine the ideal number. Luckily, for the mathematically challenged (like me) there are

tables and calculators that researchers can use that already have the formulas applied:

- Table: http://www.research-advisors.com/tools/SampleSize.htm
- A sample size calculator: http://www.raosoft.com/samplesize.html
- Calculator: http://www.surveysystem.com/sscalc.htm
- Simple random sample calculator: http://www.nss.gov.au/nss/home.nsf/pages/Sample+size+calculator

Other resources related to sampling:

Beck, S.E. & Manuel, K. (2008). Practical research methods for librarians and information professionals. New York: Neal-Schuman. (includes sampling across a variety of research methods).

Bouma, G. D., Ling, R., & Wilkinson, L. (2009). The research process, Canadian edition. Don Mills, ON: Oxford University Press. (includes a chapter on selecting a sample and a table of random numbers).

Cochran, W.G. (1977). Sampling techniques. 3rd ed. New York: Wiley.

Kish, L. (1995). Survey sampling. New York: Wiley.

References

Connaway, L.S. & Powell, R.R. (2010). Basic research methods for librarians, 5th ed. Santa Barbara, CA: Libraries Unlimited.