Pilot Testing and Sampling

An important component in the data collection process is that of the pilot study, which is ". . . a small-scale trial run of all the procedures planned for use in the main study" (Monette et al., 2002, 9). For instance, the ConQIR project plans to field test a product on a smaller scale either twice or three times. Subsequently, a pilot test, adapted to the individual needs of each state will occur and a larger scale test will happen in individual states. Pilot testing of an instrument (e.g., questionnaire) administered for research purposes is the standard in social sciences. While self-evident on one level, researchers enumerate their obvious benefits. 1) an opportunity to test hypotheses; 2) allowance for checking statistical and analytical procedures; 3) a chance to reduce problems and mistakes in the study; 4) the reduction of costs incurred by inaccurate instruments (Isaac and Michael, 1995, 38). Moreover, the researchers can seek information from the participants (including the interviewers and their subjects) in the pilot study to determine the degree of clarity of questions and to identify problem areas that need attention (Neuman, 1997, 232; Borg and Gall 1979). If any technological devices are part of the project, e.g., computers, audio or video recorders, the pilot study can decipher their effectiveness in the interview process and make appropriate adjustments drawn from observation and feedback.

On pilot tests, there is some variation of opinion in the size of the group selected for this task. One researcher simply suggests a "small set of respondents" (Neuman, 1997, 232) while others are more specific: "For surveys, a small part of the sample, say, 20 people, should be contacted and interviewed" (Monette et al., 2002, 98). As far as the format of this testing, a variation of the test-retest method can be useful. In this design, there is an experimental group and a control group, in which the experimental group receives the initial test while the control group does not. Then, the experimental group receives the retest along with the control group. Optimally, consistent results will result from the three testing sessions. Cost and time factors may find this avenue prohibitive. (Monette et al., 2002, 119). The use of the technique of double coding whereby two interviewers secure information from the same subjects with a subsequent comparison and evaluation of their results, looking for inconsistencies (Monette et al., 2002, 447) might also be implemented.

Another technique in the research process is that of sampling: "Sampling . . . is a process of systematically selecting cases for inclusion in a research project" (Neuman, 1997, 201). Routinely, researchers select a few cases out of a much larger set of cases for the purposes of study. But why? In the first place, studying the entire population such as all migrant families deemed eligible for educational services, is simply not feasible. Cost factors alone render the task unwieldy when dealing with larger populations. At the same time, examining a smaller subset of the larger group can often yield more accurate information than attempting to study the entire population. With smaller groups, the researcher can train smaller numbers of interviewers insuring competence while controlling for factors not possible with larger groups (Monette et al., 2002, 132).

Defining a population entails an understanding of four dimensions: content, units, extent, and time (Kish, 1965, 7). The content describes shared characteristics of the group under study, e.g., migrant families deemed eligible for educational services. Units refer to the level of analysis, e.g., individuals, groups, organizations, or communities. Geographical or spatial coverage is the extent of the population, hence, the selection of a particular county within a state. Temporal considerations highlight the time period during which a unit (e.g., a family) retains the appropriate qualifying characteristics for the study (Monette et al., 2002, 133).

Of especial significance is the sampling frame, defined in this manner: "That list or quasi-list of units composing a population from which a sample is selected. If the sample is to be *representative* of the population, it is essential that the *sampling frame* include all (or nearly all) members of the population" (Rubin and Babbie, 1997, G-8). Phone directories, records from driver's license bureaus, and tax records are typical sampling frames (Neuman, 1997, 203). Inconsistencies between the sampling frame and the population under study will result in major errors.

Naturally, a question arises about the size of the sample. How large should it be? One rule of thumb is that larger is better, in most instances. But there are arguments for the value of a smaller sample size. When there is a paucity of financial resources and when exploratory or pilot studies are under consideration, samples with N's between 10 and 30 can be advantageous (Isaac and Michael, 1995, 101). For the most part, however, research wisdom points to larger sample sizes. But exactly how large?

There are some guiding principles adhered to by conventional social science researchers. For instance, the smaller the population under study, the larger the sampling ratio. If the study population is 1000 or under, the sample ratio would need to be 30% or 300 individuals. As the population for study increases, the sampling ratio decreases. For a population of 10,000 the sample size would be 1000 (about 10%); and for populations over 150,000, smaller sampling ratios (1%) are acceptable (Neuman, 1997, 222).

Another principle in the selection of the sample size relates to either the heterogeneity or homogeneity of the study population. A homogenous population would be one in which members have highly similar traits, e.g., the country of Japan is just such a group from the vantage point of ethnicity. Heterogeneous groups, however, have a multiplicity of traits, hence, Canada and the U.S. are certainly heterogeneous when it comes to ethnicity. The principle goes this way: ". . . the more *homogeneous* the population under study, the *smaller* the sample needs to be *to accurately reflect* the characteristics of that population, assuming random selection procedures" (Adams and Schvaneveldt, 1991, 183). Conversely, the more diverse the research population, the larger the sample would need to be. What this means in terms of sampling size, then, is that more diverse populations would have a larger sample size than their counterparts. Designations of homogenous and heterogeneous populations on calculation tables are the 80/20 split, indicating that the population is less varied (homogeneous) and the 50/50 split, illustrating a more varied group (heterogeneous). Drawing from the table in the **Appendix B**, then, the sample size for a population of 10,000 would be 370 for a heterogeneous grouping (50/50 split) while 240 for the homogeneous group (80/20 split). To be on the safe side in the event that the variation in the population study is unclear, researchers suggest taking the sample size for the heterogeneous grouping (50/50 split and the larger sample size).

Other considerations in this determination of sample size would have to do with the accuracy required in the study and the number of variables being examined. When less accuracy is the goal, smaller samples would be appropriate. And when fewer variables are under study, a smaller sample would suffice (Neuman, 1997, 222). Also, more costly forms of data collection such as face-to-face interviews might predicate smaller samples. However, it is evident that larger sample sizes contribute toward greater precision and are capable of encompassing more variables that are under review.

Thankfully, there are widely accepted tables that convey a formula for calculating sample size based on the dimensions of confidence level, sampling error, population heterogeneity, and population size (Monette et al., 2002, 146). Based on simple random sampling procedures, this form of calculation is quite useful to social science researchers. Incidentally, simple random sampling refers to the following:

> "The simplest technique for drawing probability samples is simple random sampling (SRS), in which each element in the population has an equal probability of being chosen for the sample. Simple random sampling treats the target population as a unitary whole. . . If the sampling frame is computerized, random selection can be accomplished by merely programming the computer to select randomly a sample of whatever size is desired (Monette et al., 2002, 136-137).

Without belaboring the point, reading the table is straightforward. To determine the sample size for a population of 1000, there are two variants to consider: 1) the degree of heterogeneity or homogeneity in the population studied; and 2) the desired margin of sampling error. The 50/50 split reflects numbers for a heterogeneous population while the 80/20 split reflects a more homogenous group. Sampling errors range from +/- 3% to +/- 10%. Thus, if the population is 1000 and heterogeneous (50/50 split) and the researcher wants a sampling error of +/-5%, the sample size would be 278. Using the same parameters on error rates and heterogeneity, the sample size for a population of 10,000 would be 370, and for 50,000 it would be 381 and so on. Again, these are sample sizes for the 95% confidence level. There are more complex formulas for calculating sample size which surpass the scope of this review.

In another vein, Adams and Schvaneveldt (184), citing the work of Sudman (1976), discuss the scenario in which the determination of sample size involves a research proposal being reviewed by a funding agency. From Sudman's perspective, it is ideal if there is agreement on sample size between a representative from the funding agency and the researchers and it would be strategic to err on the side of a larger sample in this case.

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