



Sample Size, Sample Selection and Representativeness of the Results

Chapter 3 in the book *Citizen Surveys: How To Do Them, How To Use Them, What They Mean, 2nd edition* (authored by Tom Miller and Michelle Kobayashi, President and Vice President, respectively, of National Research Center, Inc.) covers much of the information summarized here.

Sample Selection

It would be quite expensive to contact each adult in any given jurisdiction and have them respond to a citizen survey. If we had unlimited resources, we could attempt to hear from each person in a community. However, this is rarely possible, and thus citizen surveying (and other types of polling) represent a compromise made to the scarcity of resources.

Not only would it be expensive to contact every adult in a jurisdiction of a thousand or more adults, statistical sampling practices make that expense unnecessary. The number of respondents required to achieve a valid and reliable profile of a community opinion usually remains unchanged no matter how large the jurisdiction's population is. For example, a sample of about 1,000 American adults is what is required for a representative sample of opinions of U.S. residents in a population of about 100 million. If the U.S. population were only 10 million or 1 million or 500,000, the sample size would not need to change to achieve the same reliability and validity.

The trick to selecting which people to survey is ensuring that those you choose are **representative** of the entire population. This is much more important than the proportion of people chosen to be surveyed. In the typical Gallup poll, good information on the opinions of Americans is gathered from the responses of only 1,000 Americans, representing 0.001% of all American adults.

The first step in choosing your sample is deciding who is eligible for the survey. In the case of most citizen surveys, all adults who reside in the jurisdiction are "eligible" for the survey. The next step would be to create a "sampling frame" that lists all eligible individuals. For a mailed citizen survey, the sampling frame is a mailing list of all addresses in the carrier routes inside of the jurisdictions.

A representative sample is generally chosen by "randomly" selecting residents to be surveyed from the sampling frame. In this case, there are two steps in randomly choosing an adult resident of the jurisdiction to participate. First, households are randomly selected from the mailing lists by using the technique of systematic sampling in which every Nth address is selected from the list until the desired number of households are chosen.

Of course, many households have more than one adult household member. So the second step requires us to randomly select the household member. We do this by employing the "birthday method," which is a process to remove bias in the selection of an adult within the household by asking the "adult (18+) whose birthday has most recently passed" to complete the questionnaire. The underlying assumption in this method is that day of birth has no relationship to the way people respond to surveys.

Sample Size

The next step is to determine how many residents to survey. There are several factors to consider when deciding how many residents to include in the sample. One of these factors is the expected response rate. If the expected response rate is 25%, then four times as many households would be sent a mailing as the final expected completed number of surveys. If the expected response rate is 33%, then only three times as many households would be sent a mailing as the final expected completed number of surveys. Using our methods, we find that mailed citizen surveys yield anywhere from a 25% to a 50% response rate.

The number of people to be surveyed does not depend on the size of the population to be surveyed. As noted previously, the Gallup poll (and many others, such as the Roper, etc.) predicts election results and provides reasonably accurate information on the opinions of all Americans by surveying only a tiny fraction of a percent of the total population in America.

Sample size is generally determined by the precision of results needed. Polls as reported in the media generally refer to a “margin of error” which is defined by statistical theory. It quantifies how closely your sample is likely to reflect the sentiments of the adults living in your jurisdiction had you been able to contact all of them. Survey researchers generally refer to the “margin of error” as the 95% confidence interval. It refers to the statistical confidence in our results. Generally the 95% confidence interval is given as “plus or minus a certain number of percentage points.” This means (in a technical definition) that had we taken 100 samples of the same size of the same population, 95 of those times the results would have been within the range given. For example, if we had sampled 300 residents, and 60% said that public libraries provide “excellent” service, we can be confident that, had we asked all residents of the community, between 54.5% and 65.5% would have said that public libraries provide excellent service. This 95% confidence interval is dependent only on the sample size, and not on the size of the target population. (Actually, when the target population is very small, under about 4,000, small adjustments can be made to these estimates, but for any population size over 4,000, the target population size has no practical bearing on these calculations.)

The relationship between sample size and precision (the 95% confidence interval or margin of error) is shown in the table below:

<u>Sample Size</u>	<u>Margin of Error</u>
100	10%
300	5½%
400	5%
800	3½%
1,000	3%
1,500	2½%

A sample size of 400 is one commonly chosen by local governments for resident policy surveys because a margin of error of $\pm 5\%$ is felt to be acceptable to government officials and the public at large. Larger sample sizes are used when a priority of the survey is to compare responses over time or by subgroups of the population. A sample of 400 completed surveys is approximately the number that would be yielded by a mailing to 1,200 residents. If 25% of the

surveys are returned from a mailing to 3,000 households in a jurisdiction, the sample size will be 750, and the 95% confidence interval will be plus or minus 3.6 percentage points. If 33% of the surveys are returned, the sample size will be 1,000 and the 95% confidence interval will be plus or minus 3 percentage points.

Methods Used to Reduce Non-Response Bias

Of much more concern to survey research than the sample size or proportion of the population sampled is ensuring that those surveyed are representative of the target population.

We discussed in the first section how the sample is chosen to reduce bias. (If, for example, we had not chosen all households included in a mailing list, but had chosen all addresses from vehicles registered to Porsche owners, our sample would not be representative of all adults in the community.) Even when the sample chosen is representative, though, we have to be concerned because not everyone we chose to include in our sample will respond to the survey. Those who choose not to respond may have different opinions or behaviors than those who do choose to respond. Thus, we need to make efforts to reduce this “non-response bias.”

We employ several methods to reduce this bias. First, we give residents multiple opportunities to respond. Households receive three mailings. The first is a postcard, signed by the mayor or other community luminary, notifying the household that it has been selected to participate in the survey. About a week later the same households are mailed a survey with a cover letter signed by the mayor. Then a second survey is mailed, with a cover letter asking those who had not yet participated to do so, while informing those who had already completed the survey not to do so again. Having the surveys signed by the mayor, with a cover letter explaining the importance of the survey, helps to increase the response rate by appealing to the civic sense of community residents.

Once the surveys have been received, we compare the demographic characteristics of the sample to the demographic profile of the community as a whole. If necessary, we will make statistical adjustments to account for the lower response of certain demographic subgroups. For example, we typically find that younger residents who rent their homes respond less frequently than older residents who own their homes. When this is true, we will statistically inflate the responses of younger renters, and statistically deflate the responses of older owners, so that the demographics of the sample reflect the demographics of the jurisdiction. We do this on the assumption that the younger renters who did not respond are more similar to the younger renters who did respond than they are like the whole group of those who responded.