

Evaluation Tool—Addressing Sampling Challenges: Case Examples from the Field

Prevention practitioners rely heavily on high-quality primary and secondary survey data to inform their strategic planning efforts. To ensure that the data they use is reliable and valid, practitioners are often expected to meet certain guidelines regarding survey response rate and sample representativeness. For example, when assessing outcomes of interest in the Partnership for Success (PFS) grant, the Office of Management and Budget has indicated that samples surveyed must represent the population in which outcomes are anticipated and that response rates must be at least 70%.

This tool is designed to help evaluators and other data collectors understand how to improve sample representativeness and survey response rates when gathering primary data. We provide a brief overview of key concepts and terms related to representative sampling, followed by examples of how four different states that received SAMHSA prevention funding have tackled these two data collection challenges. For more details about how to influence the quality of the data collected, and potential strategies for avoiding low response rates and non-representative samples, refer to the companion tool: [Sample Representativeness and Nonresponse Bias: Frequently Asked Questions](#).

WHAT IS A REPRESENTATIVE SAMPLE?

A sample that is *representative* is one that closely resembles the larger group from which it was chosen. So, for example, if your population of interest is 40% female, then your sample should also be 40% female.

Having data from a representative sample allows us to draw conclusions about the entire population of interest. Although a survey completed by everyone in the population of interest might seem ideal, such a census survey is often not practical or even possible. In addition, while samples need to be large enough to provide the desired level of statistical precision for analyses, simply increasing the size of a sample does not guarantee that the sample will be representative of the entire population of interest. Rather, sample representativeness largely depends on three factors independent of its size:

- the **selection process** used for determining members of the sample to participate in the survey;
- the quality of **coverage of the sampling frame** (that is, the list of members of the population of interest from which the sample will be selected); and

- the survey **response rate**—particularly when there are differences between people who respond to the survey and those who do not respond.

The Selection Process

People can be selected for survey participation in several ways. The preferred method, which allows us to draw the most accurate conclusions about the population of interest, is *probability sampling* because of its effort to reduce sampling bias.

The simplest form of probability sampling is random selection, which is similar to using a lottery process. Implementing random selection correctly requires that all people in the population have an equal chance of being selected into the sample. For example, using random selection of home phone numbers to reach young adults may not be the best approach, since this population predominately uses cell phones for communication. This approach may eliminate those who only communicate via cell phone from your sample, thus influencing the selection process since not all potential young adults have an equal chance of being selected into your study. In addition, the characteristics of young adults who use home phone numbers may be significantly different than those who only use cell phones, thus skewing your sample.

The option of *stratified random sampling* can be used to ensure that your sample proportionally represents the varying characteristics of the full sample. Using this process, survey researchers divide the *sampling frame*¹ into groups and apply random sampling to each group. For example, to ensure that you get adequate sample representation from both your urban and rural populations, you could stratify the sample into two groups—urban and rural—and then randomly select a percentage of your sample from each group.

Coverage of the Sampling Frame

Assuming random selection is used to draw the sample, lack of representativeness more typically arises from the process of obtaining and applying an inappropriate *sampling frame*. This is because lists that include accurate, up-to-date information on all members of a population of interest are often unavailable or difficult to obtain. For example, it can be difficult to obtain lists of members of hard-to-reach priority populations, such as homeless youth; lists of college students frequently have errors of duplication, omission, or inaccuracy; and lists used by surveying agencies to create sampling frames with secondary data sources often are incomplete. Any of these scenarios can disrupt an otherwise effective probability sampling process because you would not be drawing a random sample from a complete list of your target population in the first place.

Response Rates

Even when the selection process is done well and an appropriate sampling frame is used, the quality of a survey sample still depends on the level of participation of those invited to complete the survey.

¹ For further discussion of sampling frames, see [*Sample Representativeness and Nonresponse Bias: Frequently Asked Questions*](#).

Low response rates are a concern because they may reflect a difference between respondents and non-respondents, thereby making it less likely that the participating sample is representative of the population. For example, people with addiction problems may be less likely to participate in a survey regarding personal substance use than people without addiction problems. Additionally, low response rates can reduce the overall size of the sample to such an extent that analyses of the full sample may lack adequate statistical power, and subgroup analyses may become impossible.

When your data does not represent the population in which you expect to see change, you must be careful not to draw conclusions about the population of interest that could misinform policy decisions. This potential for misrepresentation underscores why it is important to learn from those who have identified and used strategies that can help achieve high-quality survey data. The tool [*Sample Representativeness and Nonresponse Bias: Frequently Asked Questions*](#) provides a list of strategies to improve response rates.

WHAT HAVE SAMHSA PREVENTION GRANTEES DONE?

SAMHSA prevention grantees have made major strides in improving sample representativeness, including increasing response rates for samples of students and other youth populations. We spoke with representatives of four states—Missouri, Iowa, Vermont, and Nevada—and reviewed their data collection methods to learn more about how each of these grantees have enhanced their sampling processes, including: modifying their methods of selecting or recruiting their samples, finding ways to address weaknesses in their sampling frames, and implementing strategies to improve their response rates. We present the learnings from these grantees’ experiences in the four case examples that follow. The table below summarizes which states made which modifications.

Enhancement	State			
	Missouri	Iowa	Vermont	Nevada
Changed method of selecting or recruiting their sample	✓		✓	✓
Found ways to address concerns with weaknesses in their sampling frame			✓	✓
Implemented strategies to improve their response rates	✓	✓	✓	✓

MISSOURI: OVERCOMING THE LIMITATIONS OF A CONVENIENCE SAMPLE

Since 2000, the Missouri Department of Mental Health (MDMH) and the Missouri Department of Elementary and Secondary Education have been conducting the Missouri Student Survey every two years. According to the MDMH website:

The Missouri Student Survey (MSS) is conducted in even-numbered years to track risk behaviors of students in grades 6–12 attending public schools in Missouri. The survey includes questions on alcohol, tobacco, and drug use and other behaviors that endanger health and safety.

Researchers at the Missouri Institute of Mental Health (MIMH), housed at the University of Missouri-St. Louis, help to administer and analyze the results of the survey.

Before 2014, the Missouri Student Survey (MSS) was administered to a convenience sample of public schools (that is, schools self-selected into the survey), with about 100,000 students participating. Yet several problems resulted from using this convenience method. First, while the group of students surveyed was extremely large, it actually comprised less than 10% of the total number of 6th through 12th grade students in the state. Using this convenience sample also opened up the possibility that the students in the sample differed from the entire student population in meaningful ways—for example, by income, test scores, or degree of parent involvement or monitoring. As the 2014 MSS report notes, “Because school district participation in the MSS is encouraged but not mandatory, and because districts choose the classrooms they will survey, the raw data set does not evenly represent the Missouri public school population as a whole.”

Recognizing these limitations, the MIMH began looking for another way to obtain a more representative sample of students. They could not use a census approach (that is, survey all students) because Missouri’s student population was too large. So, instead, they decided to draw a multi-stage random sample.² Though the sample would be smaller than the convenience sample, it would be superior because it would better represent the entire statewide public school population. MIMH also decided to continue administering the survey to the original convenience sample so that they could continue to compare data over time.

To conduct the new study, MIMH researchers randomly selected 96 schools to participate (48 high schools and 48 middle schools). They asked each school for a complete list of second period classes, along with the size of each class. They then randomly selected classrooms from each list until they reached a sample size of approximately 60 students (2–3 classrooms) from each school. The schools were then instructed to survey all students in these classes.

In neither sample did participating schools or students receive incentives to participate. MIMH staff reported that the motivation for Missouri schools to participate had always been receipt of their local study results. Staff were also concerned that offering additional incentives might set a precedent: that if there ever came a time when incentives could no longer be offered, schools that had come to rely on them might be less likely to continue participating.

In 2016, MIMH administered the first survey using this new process. Benefits of the new approach included the following:

² A multi-stage sample is a type of sample that involves dividing the population into groups then choosing one or more of those groups at random such that everyone in the group is included in the sample.

- **Schools were notified earlier.** Since many schools had asked to be notified about the survey earlier in the school year, an email was sent in September 2015 to alert selected schools to the January–March 2016 collection window. These data collection months were chosen carefully to avoid busy times, such as Measures of Academic Progress (MAP)/common core testing, holidays, and ends of grading periods.
- **More schools participated.** Some large urban school districts that had never participated in the MSS before, in part because they conduct their own student surveys, were included in the random sample study, and those selected schools agreed to participate.
- **Overall response rate increased.** Of the 96 sampled schools, 56 participated, generating a unit response rate of 58%. Across the 56 schools, 3,397 of 4,835 possible participants completed surveys, generating an individual response rate of 70%. MIMH staff attributed the high individual response rates to that fact that Missouri only requires passive parental consent (that is, students take letters home informing parents of the survey, and only need to have them signed and returned if their parents do not permit them to participate).

Researchers also faced some challenges related to the new survey process:

- **Coding confusion.** All schools included in the random sample were also included in the convenience sample. These “random sample” schools were encouraged to survey additional students in their school—beyond the 60 students who were part of the random sample—in order to collect convenience sample data for their local report. However, these schools were asked to use one code for classrooms that were part of the random sample, and a second code for classrooms that were not part of the random sample. This coding system introduced some confusion to the process.
- **Limited support for survey implementation.** Because this was a first-time effort, Missouri’s Prevention Resource Centers, who provide the bulk of technical assistance for community coalitions in Iowa, were not involved in providing support to schools on survey implementation.

For the next round of surveying in 2018, MIMH is considering some possible changes to improve response rates in the random selection study. These include:

- **Carving out a larger role for the Prevention Resource Centers.** In the next round, these centers will play a central role in school recruitment and in supporting survey implementation.
- **Administering a shorter survey.** In response to complaints about the survey being too long, researchers are considering using two versions of the survey, with the questions divided between the two. Some schools or classrooms will receive one version of the survey and others the second version. This may mean that they will have to increase the overall size of the sample so that they have enough data from each set of questions.

MAINTAINING BUY-IN FOR THE IOWA YOUTH SURVEY (IYS)

The Iowa Youth Survey (IYS) was first administered in 1975 and has existed in its current form since 1999. The IYS website describes it as follows:

The Iowa Youth Survey is conducted by the Iowa Department of Public Health's Division of Behavioral Health in collaboration with the Iowa Department of Education, the Governor's Office of Drug Control Policy, the Iowa Department of Human Rights' Criminal and Juvenile Justice Planning and Statistical Analysis Center, and the Iowa Department of Human Services.

In the fall of 1999, 2002, 2005, 2008, 2010, 2012, 2014, and 2016, students in the 6th, 8th, and 11th grades across the state of Iowa answered questions about their attitudes and experiences regarding alcohol and other drug use and violence, and their perceptions of their peer, family, school, and neighborhood/community environments.

The IYS uses a convenience sample approach with extremely high coverage, typically surveying between 75,000 and 90,000 students. This means that 70–80% of all Iowa public school students in grades 6, 8, and 11 participate, representing about 85–90% of the state's public school districts. This high participation rate is impressive, especially when you consider that about 7% of Iowa's public school students attend schools in the state's largest school district, Des Moines, which doesn't participate in the IYS because they use a local survey instead.

One reason for the high participation rate is that the IYS has been required by state law for over 40 years and so has become part of Iowa's education landscape. Even though school participation is voluntary, most schools have grown accustomed to participating over the years. In the past, funding was available to provide incentives to schools to participate; however, there hasn't been any such funding since around 2008, and the IYS has seen a corresponding drop in numbers of participants from 2008 onward across all grades.³

Despite this degree of success, researchers report that they still face challenges securing schools to participate. For example, several schools stopped participating when their school leadership changed. Also, the survey itself is quite long (over 200 questions) and so requires a significant time investment from respondents. Because of this, IYS administrators have had to be creative in getting schools to participate and maintain high response rates. Examples include:

- **Administering the survey online.** Since 2008, IYS researchers have been administering the survey online using the online tool SurveyMonkey. This has made it easier for schools to participate, since it means that teachers no longer have to hand out and collect paper surveys from their students. The online survey also uses "question skip logic," meaning respondents automatically skip over certain questions that are irrelevant based on their answer to a previous question. This reduces the length of the survey, which has been especially helpful for younger students (6th and 8th grade students). Finally, online administration enables researchers to begin cleaning and analyzing the data while administration is still underway, thus allowing them to create and deliver survey reports much sooner.
- **Exploring new recruitment strategies.** Since district participation begins when the school superintendent visits the IYS website and agrees to participate, the IYS engaged the Iowa

³ See: http://www.iowayouthsurvey.iowa.gov/images/trend_reports/IYS_State_Trend_Report_2014.pdf

Department of Public Health to reach out to those schools and school districts whose superintendents had not yet agreed to participate. The IYS also asked the Iowa Department of Education, which sends regular newsletters to school nurses and guidance counselors to advertise the survey and encourage IYS participation. Many of the school officials who read the newsletters had been or might be involved in survey administration, so were in a good position to encourage the superintendent to visit the website to find out more.

- **Supporting local-level analysis.** IYS generates annual survey reports that include responses to every survey question, with total percentages and breakdowns by grade and gender for a given year. The reports include 26 variables organized by nine domains, but some of these variables are composites, created by combining responses to several items. To increase the utility of the survey findings, IYS researchers have begun offering guidance to local users on conducting their own analyses on individual items, so they do not have to rely solely on what is reported for composite variables. Researchers have also started offering trend analysis on a sampling of 25 or so key items, so users can spot patterns over time.
- **Reducing turnaround time on data reports.** After receiving feedback that annual reports were arriving too late to inform school policy or programming changes, IYS reduced the turnaround time to only 4-5 months after data collection was completed. Historically, IYS had also generated customized, school-specific ancillary reports that examined trend data. IYS staff are currently considering doing away with these ancillary reports, as they take a long time to complete (12 months or more), few schools were using them, and trend data is now included for many items in the regular annual report.

VERMONT YOUNG ADULT SURVEY: USING FACEBOOK AS A RECRUITMENT TOOL

Since 1993, Vermont has been collecting high school data through the Centers for Disease Control and Prevention’s biennial Youth Risk Behavioral Surveillance System (YRBSS). In 2011, they also began using this survey to collect middle school data. The YRBSS monitors health risk behaviors among high school students in the United States, such as alcohol, tobacco, and other drug use; unhealthy dietary behaviors; and inadequate physical activity. It uses random sampling procedures to identify participating schools. Vermont typically has high response rates: in 2015, it had a 99% school response rate and a 77% individual response rate.

Vermont’s former Strategic Prevention Framework-State Incentive and current Partnerships for Success grant initiatives both relied heavily on the YRBSS data collection system, specifically the Vermont Youth Risk Behavior Survey (YRBS). However, since these grant initiatives addressed youth up to age 25, Vermont decided that it needed to collect additional data in order to get adequate representation of the young adult population (18- to 25-year-olds). The problem was that young adults, with the exception of college students, are notoriously difficult to reach, and existing data sources didn’t use a large enough sample size or cover enough geographical area to provide meaningful results to the state’s different health districts. Two other surveys—the Vermont Behavioral Risk Factor Surveillance Survey and the National Survey on Drug Use and Health—both collect data from this population, but it was too expensive to expand those surveys in Vermont for the purposes of this project.

So, Vermont contracted researchers from the Pacific Institute for Research and Evaluation to create the Vermont Young Adult Survey (YAS)—a new, voluntary online survey designed to capture a sample of 18-to 25-year-olds that the previous school surveys missed.

The state administered the YAS in 2008, 2010, 2014, and 2016, recruiting participants primarily through Facebook ads. Because of this recruitment method, researchers understood that their sample may not be representative (as it only included young adults who used Facebook). However, they did learn several important things:

- **Facebook is a viable way to recruit young adults.** Thanks to Facebook advertising, over 3,200 young adults (out of approximately 45,000 total in all of Vermont) participated in the 2014 survey. Demographic analyses suggest similarities between the participants and Vermont's young adult population in terms of race/ethnicity, age, gender, and location. Although researchers could not assume that this sample represented the entire age group in terms of substance misuse behaviors, this method of recruitment allowed the survey to reach a large number of young adults who would otherwise be difficult to reach.
- **Facebook advertising is more effective than mailed postcards.** In addition to advertising through Facebook, in 2014 researchers also mailed postcards with information about the survey to a random sample of individuals with the prescribed age range who held driver's licenses. Analyses revealed that nearly all respondents came to the survey via Facebook, rather than via the postcards, so researchers abandoned the driver's license approach in 2016.
- **Facebook advertising allows for geolocation.** Based on questions that asked users to report their zip code, researchers were able to determine that the Facebook advertising reached participants across the geographic area of interest; and this reduced the risk of including non-eligible participants outside this geographic area.
- **Facebook advertising recruits equal proportions of participants from all counties.** Facebook data, which provides the numbers of clicks on the advertisements, indicate that responses come fairly evenly from all counties across state.

Other states have attempted to use Facebook advertising to recruit participants, but not all with equal success. Researchers in Vermont are currently looking at the effectiveness of these other efforts to try to figure out which factors make Facebook advertising successful.

NEVADA'S YOUTH RISK BEHAVIOR SURVEY: THE IMPORTANCE OF INCENTIVES AND RELATIONSHIP-BUILDING

Like Vermont and many other states, Nevada participates in the YRBSS, which includes 32 randomly selected high schools. Nevada also uses state funding to administer an expanded YRBS to a larger sample of students. To implement the expanded survey, Nevada's Department of Public and Behavioral Health contracts with researchers from the University of Nevada, Reno (UNR) to sample all 17 school districts in the state. Multiple agencies in Nevada use these data to inform their planning efforts, including the Substance Abuse Prevention & Treatment Agency that oversees Nevada's PFS grant.

To implement the Nevada YRBS, the UNR research team used a sampling frame that included 9th through 12th grade students in all of Nevada's regular public, charter, and alternative high schools. Researchers then used a two-stage cluster sample design to ensure that every eligible student had an equal chance of being selected for participation. In the first sampling stage, researchers grouped all 17 school districts into seven regions to reflect Nevada's substance misuse prevention coalition structure. They randomly selected schools from each region, generating a sample of 100 schools. In the second sampling stage, they randomly selected intact classes (from a school sampling frame of either all second period or all required English courses) from each of the 100 schools.

To optimize school and classroom response rates, the UNR team used state funding to provide incentives, donating one \$50 gift card to the principal of each participating school, one to each participating teacher, and an additional gift card to each teacher whose classroom achieved a response rate above a designated level. Principals and teachers could use the gift cards however they chose, although they were encouraged to use them for school supplies.

When this approach was first launched in 2015, 97 of the 100 selected schools agreed to participate. In the participating schools, the participation rate among teachers was 100%. This left one remaining challenge: ensuring high individual response rates.

To address this challenge, researchers set different incentive thresholds based on the type of consent required for individual student participation. In Nevada, nine school districts require active parental consent, and the other eight require passive consent. Because active consent is more difficult to obtain than passive consent, researchers determined that teachers from the nine active consent districts only needed to achieve a 70% individual response rate in their classrooms to receive a gift card. By comparison, teachers from the passive consent districts needed to achieve an 85% threshold to receive their gift cards. The threshold rate for the active consent districts was based on the Office of Management and Budget recommendation of 70% for adequate response to avoid a nonresponse bias analysis. The threshold rate for the passive consent districts, on the other hand, was based on the response rates for passive consent districts in 2013, all eight of which were 82% or above, with six of the eight exceeding 85%.⁴

Generally speaking, the incentive system has been very successful. While the individual response rate for the overall sample dropped somewhat from 71% in 2013 to 65% in 2015, the UNR team reports that the likely explanation is that some active consent schools were added between those years, and it's not unusual for a school to have difficulty meeting response rate goals in the first year they participate. Additionally, one district saw a big drop in response rates after they decided to mail the active consent forms home rather than sending them home in the students' backpacks.

The UNR team emphasizes, however, that building close relationships with school principals is just as important as providing incentives. To do this, the team typically starts by asking someone at the superintendent's office to identify a person who works closely with principals and who works with

⁴ It is uncertain as to whether having different levels of minimum response for active and passive consent schools affected who was surveyed. There may be certain characteristics of students in the active districts that differ from students in the passive districts (e.g., socioeconomic status, racial/ethnic makeup) that affect outcomes.

data. In larger districts, this might be a research coordinator; in smaller districts, it might be an administrative staff member who is comfortable working with data. The team begins by engaging this person in the survey process, then leverages this relationship to engage the principal. The team also looks for opportunities to meet principals in person, such as by hand-delivering survey-related materials to schools and trying to meet the principal/vice principal in person. The high, school-level response rate likely reflects these efforts of the team.

SUMMARY

Overcoming barriers to sample representativeness can be complex. Examples from Missouri, Iowa, Vermont, and Nevada highlight practical solutions for modifying sampling methods, addressing weaknesses in sampling frames, and implementing innovative strategies to improve response rates. These steps can help to increase the rigor of the research, making findings more reliable for use in strategic prevention planning.