

This tutorial is on Simple Random Samples. Now, simple random samples are kind of the Big Daddy of all sampling methods. They're kind of the ideal sampling method that we can choose of all the sampling methods that we're going to study.

Now, you've probably seen simple random samples already in daily life if you've ever gone and seen a raffle. What you do is you take the tickets from the raffle, put them into a bucket, and you mix them up in the bucket, and you pull out a ticket. And the person whose ticket that is wins some kind of fantastic prize. Now, being in a simple random sample is pretty much the same thing. The only difference is that instead of winning the prize, you get to be part of the m and that's your prize.

A Simple Random Sample is a sampling method that not only does it ensure that everyone in the population has an equal chance of being in the sample, but also that every sample is equally likely to be the sample that's being selected. So names in a hat is fine. Raffle tickets in a bucket is fine.

Quick example here-- the billiard balls from pool table, put those all into a hat, shake it up, and pour out five. Or do this one. Now, notice, the 1 ball was in both of these first two examples. However, it doesn't mean it's any more likely than any of the other balls. It's the same likelihood. And any sample of five, this first sample of five and this second sample five were equally likely samples of five, as was this one, as is that one, as is even this one.

Now, notice, all five of these were striped billiard balls, not one solid ball in the bunch. is that unusual? Yeah, it's kind of unusual to happen.

Unusual samples have an equal likelihood. Just because they're strange and don't happen very often doesn't mean they can't happen. In fact, they have the same likelihood as any other selection of five.

So knowing how to take a Simple Random Sample, which is going to be constantly abbreviated SRS, is important, because most inference about the population that we do assumes that we collected data in this way. So names in a hat is fine. In our case, raffle tickets in a bucket, billiard balls in a hat, that's fine. I'm going to show you real quick two other ways to take a simple random sample using a random number generator and a random number table.

So for the random number generator, suppose that in this example we want to take a sample of 100 individuals from a population of 2,000 individuals. So here's some of those individuals lined up, and you can just imagine that individuals 10 through 1,995 are somewhere in the middle there. And we assign each individual a unique number. So no one can have the same number as anybody else.

And using technology or a calculator, a website or a calculator, you can search "random number generator" on

the internet, and websites will come up. Or you can use a calculator. This particular model of calculator whose screenshot I'm showing is a Texas Instruments calculator. Here this is saying random integer-- so an integer is a whole number-- from 0 to 1. And so it picks either 0 or 1.

Now when you put in the third number, it's saying how many of them do you want? And so I said I wanted five of them. Now, I don't want numbers between 0 and 1 in our case, and I don't want five of them. I want numbers between 0 and 2-- sorry, 1 and 2,000. And I want 100 of them.

Now, why did I write 150 here instead when I only want 100 numbers? Well, here's the thing, is we're going to ignore repeats. And it's incredibly likely that if I had just written 100 here, there would have been at least one repeat in the bunch. So we're going to ignore repeats and putting in 150 should give us plenty to do that.

And finally, we're going to select the individuals that correspond to those first 100 numbers, 100 different numbers that I picked, so, for instance, person number 8, and the person that corresponds to 1,119, and the person who corresponds to 1,996, which is this person. Now, notice, by the time I got here, I got 8 again. Now I'm not going to select that person twice because they've already been selected once. Because of these repeats, that's why I created 150 numbers just in case I get some repeats like that.

Now using a random number table is basically the same idea. It's a little bit more cumbersome, and you'll see why in just a seconds. We're going to assign each individual unique number, just like we did before. The problem is that each member's number must have the same number of digits.

Now, the number 2,000 has four digits, and the number 1 only has one digit. We need to make all of these the same number of digits. We can do this by making them all a four-digit number. So instead of that, it looks like this now. So instead of 1, it's 0001, 0002, all the way up to 2,000.

What we can then do is look up online or in a textbook a table of random digits. And so these are just random digits, randomly assigned numbers 0 through 9. And we're going to select those numbers, in this case four at a time. Because each individual has four numbers, we're going to take them four at a time. The first four numbers that I found were 1922. That corresponds to someone in my list. There is someone who is 1,922. I'm going to select them for my sample.

Notice, the next number that I find is 3950. I don't have anyone in my list that corresponds to the number 3950, so I'm going to ignore it and go on to the next one. 3405, there's no one with that number in my list either. So I'm going to ignore it and continue going.

Now, you'll notice, all these one circled in red are numbers that are unassigned in my list. This is going to make this a very cumbersome process, and I'm going to have to go for a while until I get my 100. Will this work? It will

work, but it might take me quite a while.

Notice that one of the people that do get is 0001, this very first person in the list and the only person pictured here. So when I take my sample, person 0001 will be among the sample, and so will a lot of other people, everyone else whose four-digit number was selected. Now, you'll recognize this is a longer process and more time-consuming process than using a random number generator. A random number generator typically goes faster.

And so to recap, a simple random sample again is the Big Daddy of sampling methods. It's the ideal sampling method if your goal is to obtain a representative sample. Sometimes with really big populations, it's not feasible to assign everyone a number or put everything into a hat.

So sometimes we might need to use other sampling methods. But a simple random sample will typically give an accurate snapshot of what's going on with the population. It will typically be a representative sample. And the terminology that we used in this tutorial for simple random sample and then the two methods that we used to generate simple random samples were random number tables and random number generators.

Good luck and we'll see you next time.