

Chapter 117

Confidence Intervals for One Proportion in a Stratified Design

Introduction

This procedure calculates sample size and half-width for confidence intervals of a proportion from a stratified design in which the outcome variable is binary. It uses the results from elementary sampling theory which are presented in many works including Yamane (1967) and Levy and Lemeshow (2008).

Suppose that the response proportion of a binary outcome variable of a sample from a population of subjects (or items) is to be estimated with a confidence interval. Further suppose that the population can be separated into a few subpopulations, often called *strata*. If these strata are created so that items are similar within a particular stratum, but quite different between strata, then a *stratified design* might be adopted for a number of reasons. Note that the population may be finite or infinite.

This procedure allows you to determine the appropriate sample size to be taken from each stratum so that various parameters of the confidence interval are guaranteed. These parameters include the confidence level and width of the interval.

Technical Details

The following discussion summarizes the results in Yamane (1967).

Suppose you are interested in estimating the disease response rate of a particular population. Further suppose that response rate is known to be related to other covariates (such as age, race, or gender). It may be possible to improve estimation efficiency by stratifying on one or more of these covariates.

Population Proportions

In this design, assume that a simple random sample is drawn from each stratum. Let Y_{hi} indicate the binary outcome (0 or 1) of the i^{th} subject in stratum h . Denote the total number of subjects in this stratum as N_h . Let the number of strata be denoted by L .

Let $P = \frac{\sum_{h=1}^L \sum_{i=1}^{N_h} Y_{hi}}{N}$, where $N = \sum_{h=1}^L N_h$, represent the population proportion that is to be estimated. This formula can be rearranged using strata proportions as follows.

$$P = \sum_{h=1}^L \frac{N_h}{N} \sum_{i=1}^{N_h} \frac{Y_{hi}}{N_h} = \sum_{h=1}^L \frac{N_h}{N} P_h$$

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where

$$P_h = \sum_{i=1}^{N_h} \frac{Y_{hi}}{N_h}$$

is the response proportion within stratum h .

Sample Proportions

Let the size of the sample from stratum h be n_h . The sample proportion is estimated as follows.

$$p = \sum_{h=1}^L \frac{N_h}{N} \sum_{i=1}^{n_h} \frac{Y_{hi}}{n_h} = \sum_{h=1}^L \frac{N_h}{N} p_h$$

where

$$p_h = \sum_{i=1}^{n_h} \frac{Y_{hi}}{n_h}$$

is the sample response proportion within stratum h . Thus, p estimates P .

It can be shown that the expected value and variance of p are as follows.

$$E(p) = P$$

$$V(p) = \sum_{h=1}^L \left(\frac{N_h}{N} \right)^2 \left(\frac{N_h - n_h}{N_h n_h} \right) \left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)$$

An unbiased estimator of $V(p)$ is

$$\hat{V}(p) = \sum_{h=1}^L \left(\frac{N_h}{N} \right)^2 \left(\frac{N_h - n_h}{N_h n_h} \right) \left(\frac{N_h}{N_h - 1} \right) p_h (1 - p_h)$$

If the common assumption is made that p is asymptotically standard normal, then a confidence interval for P can be constructed as follows.

$$CI(P) = p \pm z_{1-\alpha/2} \sqrt{\hat{V}(p)}$$

The lower and upper limits of this confidence interval are denoted as LCL_P and UCL_P .

Sample Size Estimation

Proportional Allocation

Proportional allocation assumes that the overall sample size is allocated across strata using $n_h = \frac{N_h}{N} n$. Using this allocation method, the overall sample size is estimated as follows.

$$n = \frac{N \sum_{h=1}^L N_h \left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)}{N^2 D^2 + \sum_{h=1}^L N_h \left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)}$$

where $D = d/z_{1-\alpha/2}$ and $d = (UCL_P - LCL_P)/2$ which is the *half width* of the confidence interval.

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Optimum Allocation

Optimum allocation assumes that the overall sample size is allocated across strata using

$$n_h = n \left(\frac{N_h \left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)}{\sum_{h=1}^L N_h \left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)} \right)$$

Using this allocation method, the overall sample size is estimated as follows.

$$n = \frac{\left(\sum_{h=1}^L N_h \sqrt{\left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)} \right)^2}{N^2 D^2 + \sum_{h=1}^L N_h \left(\frac{N_h}{N_h - 1} \right) P_h (1 - P_h)}$$

where $D = d/z_{1-\frac{\alpha}{2}}$ and $d = (UCL_P - LCL_P)/2$ which is the *half width* of the confidence interval.

Procedure Options

This section describes the options that are specific to this procedure. These are located on the Design tab. For more information about the options of other tabs, refer to the Procedure Window chapter.

Design Tab

The Design tab contain most of the parameters and options of interest for this procedure.

Solve For

Solve For

This option specifies the parameter to be solved for using the other parameters. The parameters that may be selected are *Sample Size* or *Half-Width of C.I.* Select *Sample Size* when you want to calculate the sample size needed. Select *Half-Width of C.I.* when you want to investigate the precision of a certain sample size.

Confidence

Confidence Level

Enter the confidence level (or confidence coefficient). This is the proportion of confidence intervals (constructed with this same confidence level, sample size, etc.) that contain the population proportion.

The practical range is between 0.5 and 1. Common values are 0.95 and 0.99. Use 0.9973 if you want z to be 3.0 and 0.977249 if you want z to be 2.0.

A single value may be entered here or a range of values such as *0.8 to 0.95 by 0.05* may be entered.

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Precision

d (Precision, Half-Width)

Enter d , the precision, margin of error, or confidence interval half-width. This is half the distance between the lower and upper confidence limits of the proportion.

The formula is $d = |UCL(P) - LCL(P)|/2$.

The range is $0 < d < 0.4999$.

Typical values are 0.01, 0.02, 0.03, or 0.05.

You can enter a single value or a list of values.

Sample Size (when Solve For = Sample Size)

Sample Size Allocation

Specify the way the total sample size is to be specified and then allocated to the individual strata. The choices are

- **Proportional**

The program will determine the overall sample size using the formula given in the help file. This value will be allocated to the individual strata so that the strata sample size proportions match the strata population size proportions (within rounding).

- **Optimal**

The program will determine the overall sample size using the formula given in the help file. This value will be allocated to the individual strata so that the width of the confidence interval of the proportion is as narrow as possible.

- **Equal**

The program will determine the overall sample size using equal strata sample sizes. This value will be just large enough that the half-width requirement is met.

Sample Size (when Solve For = Half-Width of C.I.)

Sample Size Allocation

Specify the way the total sample size is to be entered and then allocated to the individual strata. The choices are

- **Proportional**

Enter the total sample, n , in the box below. This value will be allocated to the individual strata so that the strata sample size proportions match the strata population size proportions (within rounding).

- **Optimal**

Enter the total sample, n , in the box below. This value will be allocated to the individual strata so that the width of the confidence interval of the proportion is as narrow as possible.

- **Equal**

Enter a single strata size that will be used for all strata.

- **Custom**

Enter custom stratum sample sizes in the 'Stratum Sample Size' column in the 'Strata Information' section below.

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n (Total Sample Size)

Enter one or more values of n , the total number of items in the sample. This parameter is the sum of the subjects in all strata. These subjects are then divided among the individual strata.

The total sample size you enter must be large enough so that there is at least one sample item available for each stratum. Also, the total sample size must be smaller than the total population size.

nh (Strata Sample Size)

Enter a single stratum sample size that is to be used for all strata. The strata sample sizes will all be equal.

The value must be an integer greater than zero and less than the smallest strata population size.

Strata Information

This section lets you enter the settings for each of the L individual strata.

Set

This is an identification number used on the reports.

Number of Strata

Specify the number of strata specified on this line. Usually, you will enter a “1” to specify a single stratum, or you will enter a “0” to ignore this line. However, this option lets you specify several strata that have the same parameter values.

The total number of strata is equal to the sum of these values.

Examples

0 which means ‘ignore this line’.

1 which means ‘one stratum defined by this line’.

2 which means ‘two strata defined by this line’.

Stratum Population Size

Enter the total population sizes of each of the strata in this column. If this line defines more than one stratum, this is the amount used FOR EACH stratum.

These values can be any positive integers greater than zero.

Only enter one number, even if there are more than one stratum being defined by the line.

If the stratum population size very large and unknown, just enter a large value such as 100000.

Stratum Proportion

Enter the average response proportion of the items in this stratum. This is the probability that an item (subject) has the event of interest.

The range is $0 < P < 1$.

If you have no idea what the proportion is, you can enter 0.5 since this value will result in the largest sample size.

Stratum Sample Size

Enter a custom sample size the strata defined on this line.

This value must be an integer greater than zero and less than the corresponding stratum population size.

Show More Strata Sets

Check this box to show ten more Strata Information sets. If this option is not checked, any active strata sets (Strata Count > 0) with set identification numbers > 5 will be ignored.

Example 1 – Finding Sample Size with Proportional Allocation

A study using a stratified design is being planned to estimate the effectiveness of a certain drug in treating a certain disease. Since age is known to affect the disease rates, the population is stratified into four age groups. The sizes of these four age groups are 14000, 18000, 6000, and 10000. The overall sample size will be allocated across strata proportional to the strata population size.

Prior studies had shown the probability of this disease continuing after receiving the baseline treatment was 0.25, 0.20, 0.15, and 0.10, respectively, among the four age groups.

The confidence level is set to 0.95 and d is set to three values 0.01, 0.03, 0.05.

Setup

This section presents the values of each of the parameters needed to run this example. First, from the PASS Home window, load this procedure. You may then make the appropriate entries as listed below, or open **Example 1** by going to the **File** menu and choosing **Open Example Template**.

<u>Option</u>	<u>Value</u>
Design Tab	
Solve For	Sample Size
Confidence Level	0.95
d (Precision, Half-Width).....	0.01 0.03 0.05
Sample Size Allocation	Proportional
Set 1 Number of Strata	1
Set 1 Stratum Population Size.....	14000
Set 1 Stratum Proportion	0.25
Set 2 Number of Strata	1
Set 2 Stratum Population Size.....	18000
Set 2 Stratum Proportion	0.2
Set 3 Number of Strata	1
Set 3 Stratum Population Size.....	6000
Set 3 Stratum Proportion	0.15
Set 4 Number of Strata	1
Set 4 Stratum Population Size.....	10000
Set 4 Stratum Proportion	0.10
Set 5 Number of Strata	0
Show More Strata Sets.....	Unchecked

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Annotated Output

Click the Calculate button to perform the calculations and generate the following output.

Numeric Results

Numeric Results

Number of Strata: 4
 Population Size (N): 48000
 Solve for: Sample Size
 Allocation: Proportional

Actual C.I. Half-Width d(A)	Target C.I. Half-Width d(T)	Sample Size n	Prop P	Lower 95.0% Conf Limit LCL(P)	Upper 95.0% Conf Limit UCL(P)	Standard Error of p SE(p)	Conf Level
0.0100	0.0100	5126	0.1875	0.1775	0.1975	0.0051	0.950
0.0300	0.0300	630	0.1875	0.1575	0.2175	0.0153	0.950
0.0499	0.0500	229	0.1875	0.1376	0.2374	0.0255	0.950

References

Yamane, Taro. 1967. Elementary Sampling Theory. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.
 Levy, P.S. and Lemeshow, S. 2008. Sampling of Populations. Fourth Edition. John Wiley & Sons. New York.
 Cochran, William G. 1977. Sampling Techniques. Third Edition. John Wiley & Sons. New York.

Report Definitions

d(A) is the actual half-width of the confidence interval of P. $d(A) = [UCL(p) - LCL(p)] / 2$.
 d(T) is the target half-width of the confidence interval of P. It may be slightly different from d(A) because of rounding.
 n is the total sample size, i.e., the total number of subjects summed across all strata.
 P is the population proportion based on all strata. This is the weighted average of the individual strata P's.
 LCL(p) is the lower limit of a confidence interval for P.
 UCL(p) is the upper limit of a confidence interval for P.
 Conf Level is the confidence level of the confidence interval for P.

Summary Statements

A confidence interval for P will be computed from a stratified design, which divides the sample among 4 strata. A sample of 5126 subjects is obtained from the 48000 subjects in the population. This scenario has a confidence interval half-width of 0.0100 when the confidence level is 0.950 and the average response proportion is 0.1875.

This report gives the results for each of the three values of p .

Strata-Detail Report

Strata-Detail Report for Row 1

Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph
1	14000	29.2	1495	29.2	0.2500
2	18000	37.5	1922	37.5	0.2000
3	6000	12.5	641	12.5	0.1500
4	10000	20.8	1068	20.8	0.1000

(report continues)

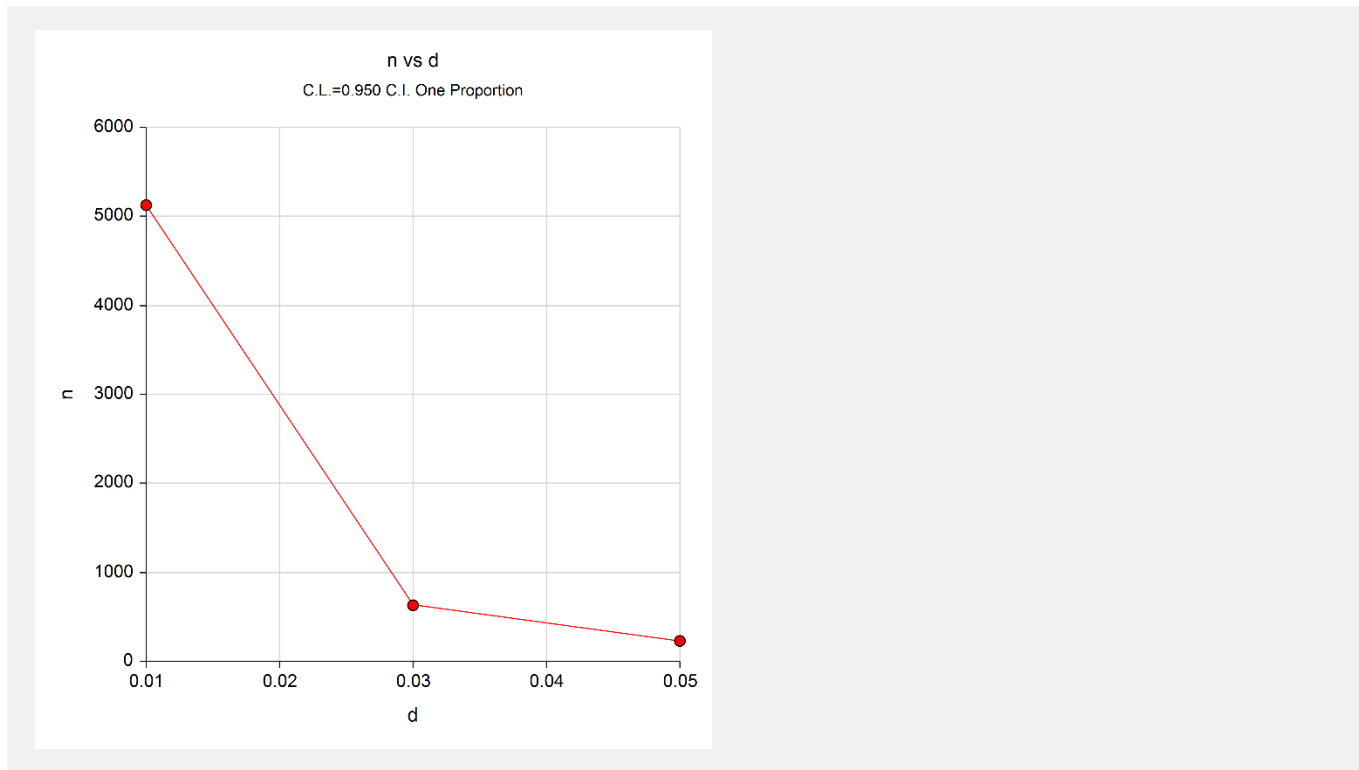
Strata-Detail Report Definitions

Strata h is an arbitrary sequence number for each stratum.
 Pop Size Nh is the population size of stratum h.
 Pct(Nh) is the percentage of the population size that is comes from this stratum.
 Sample Size nh is the sample size of stratum h.
 Pct(nh) is the percentage of the total sample size that comes from this stratum.
 Prop Ph is the response proportion in stratum h of the event of interest.

This report shows the values of the individual, strata-level parameters.

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Plots Section



The values from the Numeric Results report are displayed in this plot.

Example 2 – Validation using Yamane (1967)

Yamane (1967) page 155 provides an example of a stratified design that we will use to validate this procedure.

A study using a stratified design is being planned to estimate the proportion of families with two or more TV sets in a population comprised of three cities. These cities will form the strata. The number of families in the three cities is 2000, 3000, and 5000. Previous studies place the estimated proportions within the cities at 0.10, 0.15, and 0.20. The value of d is 0.03. The confidence level is set to 0.9973 which results in a z value of 2.99999.

They calculated the sample size as 1210. However, we found that this is a typo. It is easy to see that the sample size should be 1200. The individual strata sizes should be 240, 360, and 600.

Setup

This section presents the values of each of the parameters needed to run this example. First, from the PASS Home window, load this procedure. You may then make the appropriate entries as listed below, or open **Example 2** by going to the **File** menu and choosing **Open Example Template**.

<u>Option</u>	<u>Value</u>
Design Tab	
Solve For	Sample Size
Confidence Level	0.9973
d (Precision, Half-Width)	0.03
Sample Size Allocation	Proportional
Set 1 Number of Strata	1
Set 1 Stratum Population Size	2000
Set 1 Stratum Proportion	0.1
Set 2 Number of Strata	1
Set 2 Stratum Population Size	3000
Set 2 Stratum Proportion	0.15
Set 3 Number of Strata	1
Set 3 Stratum Population Size	5000
Set 3 Stratum Proportion	0.2
Set 4 Number of Strata	0
Set 5 Number of Strata	0
Show More Strata Sets	Unchecked

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Output

Click the Calculate button to perform the calculations and generate the following output.

Numeric Results

Numeric Results							
Number of Strata:	4						
Population Size (N):	48000						
Solve for:	Sample Size						
Allocation:	Proportional						
Actual C.I. Half-Width d(A)	Target C.I. Half-Width d(T)	Sample Size n	Prop P	Lower 95.0% Conf Limit LCL(P)	Upper 95.0% Conf Limit UCL(P)	Standard Error of p SE(p)	Conf Level
0.0300	0.0300	1200	0.1650	0.1350	0.1950	0.0100	0.9973

This report shows that PASS also obtains an n of 1200 which validates the procedure.

Strata-Detail Report

Strata-Detail Report					
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph
1	2000	20.0	240	20.0	0.1000
2	3000	30.0	360	30.0	0.1500
3	5000	50.0	600	50.0	0.2000

This report shows the values of the individual, strata-level parameters. They match those given above.

Example 3 – Finding Sample Size with Optimal Allocation

This example will rerun Example 1 with the Sample Size Allocation set to *Optimal*.

Setup

This section presents the values of each of the parameters needed to run this example. First, from the PASS Home window, load this procedure. You may then make the appropriate entries as listed below, or open **Example 3** by going to the **File** menu and choosing **Open Example Template**.

<u>Option</u>	<u>Value</u>
Design Tab	
Solve For	Sample Size
Confidence Level	0.95
d (Precision, Half-Width)	0.01 0.03 0.05
Sample Size Allocation	Optimal
Set 1 Number of Strata	1
Set 1 Stratum Population Size	14000
Set 1 Stratum Proportion	0.25
Set 2 Number of Strata	1
Set 2 Stratum Population Size	18000
Set 2 Stratum Proportion	0.2
Set 3 Number of Strata	1
Set 3 Stratum Population Size	6000
Set 3 Stratum Proportion	0.15
Set 4 Number of Strata	1
Set 4 Stratum Population Size	10000
Set 4 Stratum Proportion	0.10
Set 5 Number of Strata	0
Show More Strata Sets	Unchecked

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Output

Click the Calculate button to perform the calculations and generate the following output.

Numeric Results

Numeric Results							
Number of Strata:	4						
Population Size (N):	48000						
Solve for:	Sample Size						
Allocation:	Optimal						
Actual C.I. Half-Width d(A)	Target C.I. Half-Width d(T)	Sample Size n	Prop P	Lower 95.0% Conf Limit LCL(P)	Upper 95.0% Conf Limit UCL(P)	Standard Error of p SE(p)	Conf Level
0.0100	0.0100	5045	0.1875	0.1775	0.1975	0.0051	0.950
0.0300	0.0300	620	0.1875	0.1575	0.2175	0.0153	0.950
0.0500	0.0500	225	0.1875	0.1375	0.2375	0.0255	0.950
Strata-Detail Report for Row 1							
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph		
1	14000	29.2	1662	32.9	0.2500		
2	18000	37.5	1974	39.1	0.2000		
3	6000	12.5	587	11.6	0.1500		
4	10000	20.8	822	16.3	0.1000		
Strata-Detail Report for Row 2							
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph		
1	14000	29.2	204	32.9	0.2500		
2	18000	37.5	243	39.2	0.2000		
3	6000	12.5	72	11.6	0.1500		
4	10000	20.8	101	16.3	0.1000		
Strata-Detail Report for Row 3							
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph		
1	14000	29.2	74	32.9	0.2500		
2	18000	37.5	88	39.1	0.2000		
3	6000	12.5	26	11.6	0.1500		
4	10000	20.8	37	16.4	0.1000		

For proportional allocation, the sample sizes are: 5126, 630, 229.

For optimal allocation, the sample sizes are: 5045, 620, 225.

For equal allocation, the sample sizes are: 6088, 748, 272.

We note the equal allocation requires a much larger sample size.

Example 4 – Finding Sample Size with Equal Allocation

This example will rerun Example 1 with the Sample Size Allocation set to *Equal*.

Setup

This section presents the values of each of the parameters needed to run this example. First, from the PASS Home window, load this procedure. You may then make the appropriate entries as listed below, or open **Example 4** by going to the **File** menu and choosing **Open Example Template**.

<u>Option</u>	<u>Value</u>
Design Tab	
Solve For	Sample Size
Confidence Level	0.95
d (Precision, Half-Width)	0.01 0.03 0.05
Sample Size Allocation	Equal
Set 1 Number of Strata	1
Set 1 Stratum Population Size	14000
Set 1 Stratum Proportion	0.25
Set 2 Number of Strata	1
Set 2 Stratum Population Size	18000
Set 2 Stratum Proportion	0.2
Set 3 Number of Strata	1
Set 3 Stratum Population Size	6000
Set 3 Stratum Proportion	0.15
Set 4 Number of Strata	1
Set 4 Stratum Population Size	10000
Set 4 Stratum Proportion	0.10
Set 5 Number of Strata	0
Show More Strata Sets	Unchecked

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Output

Click the Calculate button to perform the calculations and generate the following output.

Numeric Results

Numeric Results							
Number of Strata:	4						
Population Size (N):	48000						
Solve for:	Sample Size						
Allocation:	Equal						
Actual C.I. Half-Width d(A)	Target C.I. Half-Width d(T)	Sample Size n	Prop P	Lower 95.0% Conf Limit LCL(P)	Upper 95.0% Conf Limit UCL(P)	Standard Error of p SE(p)	Conf Level
0.0100	0.0100	6088	0.1875	0.1775	0.1975	0.0051	0.950
0.0300	0.0300	748	0.1875	0.1575	0.2175	0.0153	0.950
0.0499	0.0500	272	0.1875	0.1376	0.2374	0.0255	0.950
Strata-Detail Report for Row 1							
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph		
1	14000	29.2	1522	25.0	0.2500		
2	18000	37.5	1522	25.0	0.2000		
3	6000	12.5	1522	25.0	0.1500		
4	10000	20.8	1522	25.0	0.1000		
Strata-Detail Report for Row 2							
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph		
1	14000	29.2	187	25.0	0.2500		
2	18000	37.5	187	25.0	0.2000		
3	6000	12.5	187	25.0	0.1500		
4	10000	20.8	187	25.0	0.1000		
Strata-Detail Report for Row 3							
Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph		
1	14000	29.2	68	25.0	0.2500		
2	18000	37.5	68	25.0	0.2000		
3	6000	12.5	68	25.0	0.1500		
4	10000	20.8	68	25.0	0.1000		

For proportional allocation, the sample sizes are: 5126, 630, 229.

For optimal allocation, the sample sizes are: 5045, 620, 225.

For equal allocation, the sample sizes are: 6088, 748, 272.

We note the equal allocation requires a much larger sample size.

Example 5 – Finding C.I. Half-Width

A study using a stratified design is being conducted. The sizes of the three strata are 14257, 18632, and 10908. The sample sizes drawn from the three strata are 215, 269, and 193. The response rates are expected to be 0.23, 0.19, and 0.12. The half-width of the confidence interval is desired at confidence levels of 0.95 and 0.99.

Setup

This section presents the values of each of the parameters needed to run this example. First, from the PASS Home window, load this procedure. You may then make the appropriate entries as listed below, or open **Example 5** by going to the **File** menu and choosing **Open Example Template**.

<u>Option</u>	<u>Value</u>
Design Tab	
Solve For	Half-Width of C.I.
Confidence Level	0.95 0.99
Sample Size Allocation	Custom
Set 1 Number of Strata	1
Set 1 Stratum Population Size.....	14257
Set 1 Stratum Proportion	0.23
Set 1 Stratum Sample Size	215
Set 2 Number of Strata	1
Set 2 Stratum Population Size.....	18632
Set 2 Stratum Proportion	0.19
Set 2 Stratum Sample Size	269
Set 3 Number of Strata	1
Set 3 Stratum Population Size.....	10908
Set 3 Stratum Proportion	0.12
Set 3 Stratum Sample Size	193
Set 4 Number of Strata	0
Set 5 Number of Strata	0
Show More Strata Sets.....	Unchecked

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Output

Click the Calculate button to perform the calculations and generate the following output.

Numeric Results

Numeric Results

Number of Strata: 3
 Population Size (N): 43797
 Solve for: Half-Width
 Allocation: Custom

C.I. Half Width d	Sample Size n	Prop P	Lower 95.0% Conf Limit LCL(P)	Upper 95.0% Conf Limit UCL(P)	Standard Error of p SE(p)	Conf Level
0.0292	677	0.1856	0.1564	0.2147	0.0149	0.950
0.0383	677	0.1856	0.1473	0.2239	0.0149	0.990

Strata-Detail Report for Row 1

Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph
1	14257	32.6	215	31.8	0.2300
2	18632	42.5	269	39.7	0.1900
3	10908	24.9	193	28.5	0.1200

Strata-Detail Report for Row 2

Strata h	Pop Size Nh	Percent of Pop Size Pct(Nh)	Sample Size nh	Percent of Sample Size Pct(nh)	Prop Ph
1	14257	32.6	215	31.8	0.2300
2	18632	42.5	269	39.7	0.1900
3	10908	24.9	193	28.5	0.1200

Increasing the confidence level from 0.95 to 0.99 has increased the half width from 0.029 to 0.038.