

## Documentation for Confidence Interval of median or percentiles for a given sample size

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For non-Normal distribution, the median of the sample or population is preferable to the mean as a measure of location (Rank). Medians are also appropriate in other situations- for example, when measurements are on an ordinal scale.

This module calculates confidence interval around a selected percentile for a sample size given. Entering sample size and desired percentile will calculate 95% confidence interval as a default confidence limit. The user can change the confidence interval by typing in new value. Please note that the selected percentile should be within 1-100%";

<input type="button" value="Calculate"/>		
<input type="button" value="Clear"/>		
<b>Confidence Interval of median or other percentile for a sample size</b>		
Sample Size	100	
Desired percentile	50	e.g. enter '50' for Median (50 <sup>th</sup> percentile)
Confidence Level (%)	95	% (of 100)

The output from the default example is as below:

<b>Confidence Interval of median or other percentile for a sample size</b>			
		<b>Input Data</b>	
Sample Size		100	
Desired percentile		50	
Confidence Level (%)		95	
<b>Confidence Interval for 50<sup>th</sup> percentile of sample size 100</b>			
<b>Method</b>	<b>Lower Limit</b>	<b>Rank</b>	<b>Upper Limit</b>
Normal Approximation	40	50.5	61
<b>Results from OpenEpi open source calculator--CI-Median</b>			
file:///C:/OpenEpi%20March%2011%202005/Median/CI-Median.htm			
Source file last modified on 04/01/2005 15:03:47			
Print from the browser, or select all or part of the text and then copy and paste to other programs. Many browsers have an optional setting to print background colors.			

The interpretation is we are 95% confident that the median position of observation (eg. systolic blood pressure) in the sample may be between 40<sup>th</sup> – 61<sup>th</sup> position among observations arranged in increasing order. This confidence interval is calculated by normal approximation method of large sample size theory. Then, read the corresponding values of observation (eg. systolic blood pressure) at 40<sup>th</sup> and 61<sup>th</sup> position in the sample dataset. They will be 95% confidence interval of median systolic blood pressure of the sample. Currently, all confidence intervals calculated are two-sided confidence intervals, and lower limit and upper limit are rounded to nearest integer. The formulae for the method are provided below.

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### Formulae

The notation for the formulae are:

$N_{1-\alpha/2}$  = z-statistics from the standard Normal distribution for the 100(1-  $\alpha$ /2) percentile.  
n = sample size

$$\text{Lower lim} = \frac{n}{2} - (N_{1-\alpha/2} * \frac{\sqrt{n}}{2})$$

$$\text{Upper lim} = 1 + \frac{n}{2} + (N_{1-\alpha/2} * \frac{\sqrt{n}}{2})$$

**References:**

"Normal approximation" method based on Martin J Gardner, Douglas G Altman, Statistics with confidence, Chapter 8, pp 71-73.

**Acknowledgement:**

Default values are derived from the same chapter: sample size=100, median (50th percentile) and 95% confidence interval.