

Sample Size Calculation Guide - Part 7: How to Calculate the Sample Size Based on a Correlation

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INTRODUCTION

In the previous educational articles, we explained how to calculate the sample size for a rate or a single proportion, for an independent cohort study, for an independent case-control study, for a diagnostic test accuracy study, for a superiority clinical trial, and for a non-inferiority or equivalence clinical trial (1-6). In this article, we will explain how to calculate the sample size for a clinical study with the aim of detecting the correlation coefficient between two variables.

WHEN TO USE THE SAMPLE SIZE CALCULATION PROCEDURE OF A CORRELATION

The methods explained hereafter should be used in case of a clinical study designed to determine the correlation between two variables. This study might be a cross-sectional study, a cohort study, a case-control study, or a clinical trial as long as the primary objective is to determine the correlation

between two variables.

REQUIREMENTS

- 1) Expected correlation coefficient
- 2) Statistical power
- 3) Alpha
- 4) Correlation coefficient for the null hypothesis (usually 0 or 0.2)

CALCULATION STEPS ON STATS DIRECT SOFTWARE

- 1) Open a new report
- 2) From "analysis" menu, select "sample size."
- 3) Then select "correlation."
- 4) Then submit the data

CALCULATION STEPS ON THE STATISTICS AND SAMPLE SIZE CALCULATION ANDROID APP (FIGURE 1)

- 1) Open the app
- 2) Select "sample size calculator"

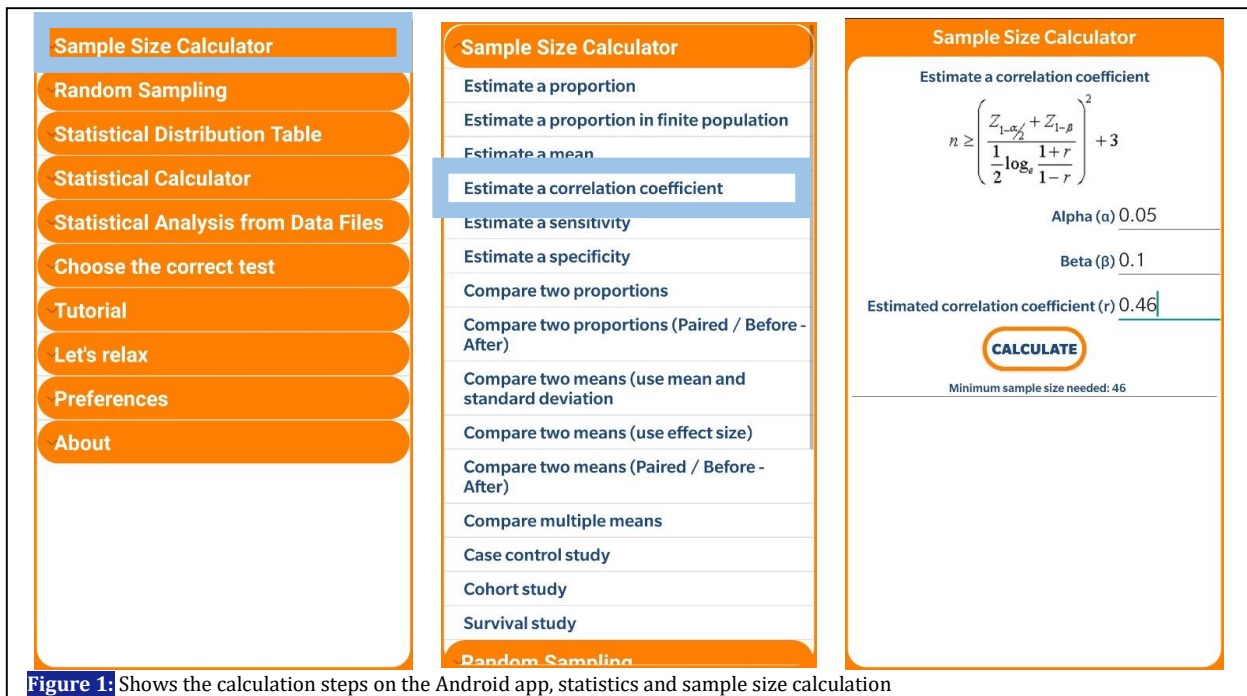


Figure 1: Shows the calculation steps on the Android app, statistics and sample size calculation

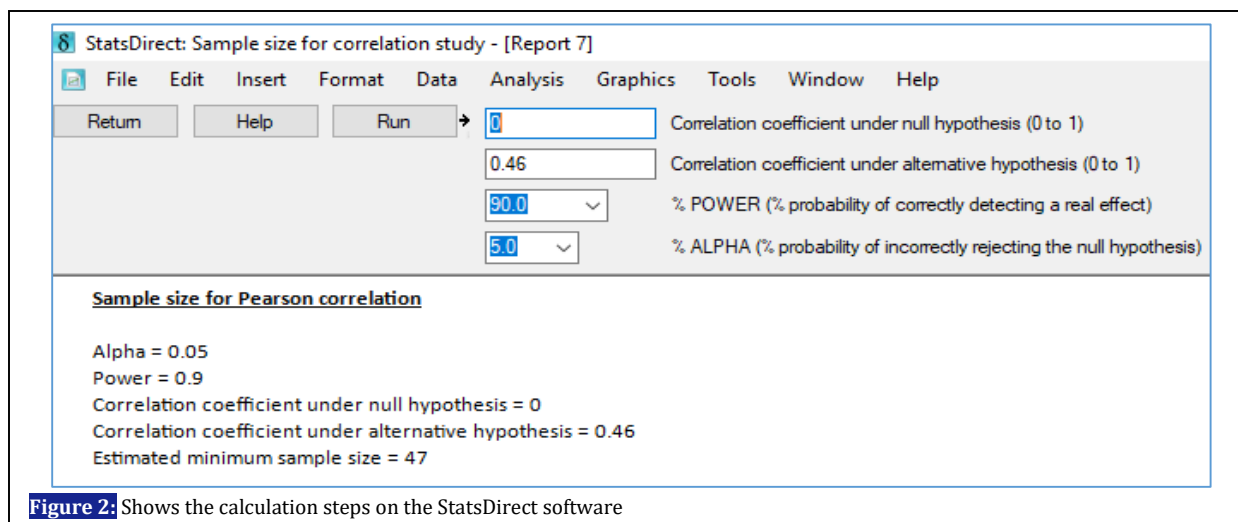


Figure 2: Shows the calculation steps on the StatsDirect software

- 3) Select "estimate the correlation coefficient"
- 4) Then submit the data

CASE STUDY OF MICRORNA PLASMA LEVELS AS BIOMARKERS FOR EARLY DETECTION OF PROSTATE CANCER

Assume that we are conducting a study to investigate the role of microRNAs in plasma as potential biomarkers for early detection of prostate cancer (defined as elevated PSA). A recent study by McDonald et al. (7) reported the following sentence: "moderate positive correlations with serum PSA were observed for ... miR-34a among cases ($r = 0.46$; $P\text{-value} = 0.02$)". The null hypothesis is that there is no correlation between microRNAs in the plasma and serum PSA ($r=0$). The alternative hypothesis based on McDonald et al. is that there is a moderate correlation between microRNAs in the plasma and serum PSA ($r=0.46$).

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