

Exercise, Wednesday 7, 15-16 Power and Sample size

Sample size

1. In a study evaluating a new model NICU care called MNICU as compared to the traditional NICU, the stress levels in the mothers and neonates resident of these two ICUs were compared. Estimate the sample size to compare maternal and neonatal stress in these two models of NICUs.

A couple of previous studies by Milica Rancovic et al. (2016), Evalotte Morelius et al. (2005), and Sze m Ng et al. (2017) are available in this area. The mean levels reported in the studies were as follows: maternal cortisol 57 ± 15 (mean \pm SD) vs. 52.7 ± 15 , and neonatal cortisol 10 ± 4 vs. 8 ± 4 . For an α error of 5% and a power of 90%, let's estimate the sample size needed to compare the mean levels of salivary cortisol in mothers and neonates (NICU vs. MNICU).

***sample size for studying maternal stress
power twomeans 57 52.7, sd(15) power(0.9)**

***sample size for studying neonatal stress
power twomeans 10 8, sd(4) power(0.9)**

2. In a cohort study to investigate the risk factors associated with acute pancreatitis, the focus was on alcohol consumption as the primary risk factor. The anticipated proportion of acute pancreatitis in the non-alcoholic group is estimated to be 1 in 1000, while the proportion in the alcoholic group is estimated to be 5%. Your objective is to compare the proportions of acute pancreatitis between the alcoholic and non-alcoholic groups. The prevalence of alcoholics in the cohort was 25%. The desired significance level (alpha) is set at 0.05, and a power of 0.9 is desired for the study. What would be the estimated sample sizes for the non-alcoholic and alcoholic groups, respectively, and what would be the total sample size required for the study?

power twoproportions 0.001 0.05, test(chi2) nratio(3) power(0.9)

Power

3. For question 1, we have collected data from 200 participants, assuming the same estimate for the means. What is the power of the study regarding maternal stress and neonatal stress?

***Power for studying maternal stress
power twomeans 57 52.7, sd(15) n(200)**

***Power for studying neonatal stress
power twomeans 10 8, sd(4) n(200)**

4. Plot a power curve for the previous question by varying the sample size from 10 to 600 and observe how the power changes.
***Power curve for studying maternal stress**
power twomeans 57 52.7, sd(15) n(10 (10) 600) graph
***Power curve for studying neonatal stress**
power twomeans 10 8, sd(4) n(10 (10) 600) graph
5. For question 2, with data collected from 500 participants assuming the same estimate for the proportions and allocation ratio, what is the power of the study?
power twoproportions 0.001 0.05, test(chi2) n(500) nratio(3)
6. Plot a power curve for the previous question by varying the sample size from 100 to 1000 and observe how the power changes.
power twoproportions 0.001 0.05, test(chi2) n(100 (10) 1000) nratio(3) graph