Proceedings of the 6th International Conference on Statistics: Theory and Applications (ICSTA'24)
Barcelona, Spain – August 19 - 21, 2024
Paper No. 129
DOI: 10.11159/icsta24.129

An Analytical Expression for the Quotient of Odds Ratio with Applications to Cardiovascular Disease Risk

Golnaz Shahtahmassebi[1], Jose Maria Sarabia[2]
[1]Nottingham Trent University
Clifton Lane, Nottingham, UK
Golnaz.shahtahmassebi@ntu.ac.uk
[2]Universidad de Cantabria
Avda. de los Castros s/n, 39005-Santander, Spain
sarabiaj@unican.es

Extended Abstract

The concept of the Quotient of Ratios (QOR) known as odds ratio provides a potent measurement by incorporating the correlation between two risk factors [1]. QOR, defined as the relative strength of association between dual risk ratios, holds the capacity to unveil the most influential risk factors tied to a specific outcome. This knowledge yields the potential to shape preventive strategies and enhance public health interventions. Across a diverse spectrum of risk factors and outcomes, QOR stands as an adaptable tool, enriching the arsenal of both researchers and public health practitioners.

We will introduce an analytical expression governing the distribution of QOR in cases of two independent risks, each adhering to classical beta distributions. Concurrently, we provide explicit formulations for the distribution's moments. By doing so, we offer a comprehensive understanding of the distribution's statistical properties.

Through simulations conducted with various parameter settings, we elucidate the distribution's characteristics. Our aim is to showcase its versatility in capturing diverse scenarios. Illustrating its application, we use an ongoing cardiovascular study based in Framingham, Massachusetts [2]. Housing 4238 records and encompassing 15 demographic, behavioural, and medical risk factors, this study serves as a practical example. Our analysis demonstrates that the proposed distribution aptly models the relationship between Coronary Heart Disease (CHD) risk and potential contributing variables such as age, gender, education level, and smoking.

In conclusion, this presentation introduces an analytical expression for the distribution of the QOR as a powerful metric. By demonstrating its efficacy in a substantial cardiovascular study, we underline its practical value for comprehending and quantifying the interplay between risk factors and health outcomes.

References

[1] Altman, D. G., & Bland, J. M. (2013). Statistics notes: Odds ratios. BMJ, 347, f5792.
[2] Dawber, T. R., Meadors, G. F., & Moore, F. E. (1951). Epidemiological approaches to heart disease—The Framingham Study. American Journal of Public Health and the Nations Health, 41(2), 279-286.