

## Examining the Relationship between Chi-Square Test Statistics and Skewness of Weibull Distribution: Simulation Study

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**Abstract :** Most of the literature on goodness-of-fit test try to provide a theoretical basis for studying empirical distribution functions. Such goodness-of-fit tests are Kolmogorove-Simirnov and Crumer-Von Mises Type tests. However, it is likely that most of literature has not focused in details on the relationship of the values of the test statistics and skewness or kurtosis. The aim of this study is to investigate the behavior of the values of the  $\chi^2$  test statistic with the variation of the skewness of right skewed distribution. A simulation study is conducted to generate random numbers from Weibull distribution. For a fixed sample sizes, different levels of skewness are considered, and the corresponding values of the  $\chi^2$  test statistic are calculated. Using different sample sizes, the results show an inverse relationship between the value of  $\chi^2$  test and the level of skewness for Wiebull distribution, i.e the value of  $\chi^2$  test statistic decreases as the value of skewness increases. The research results also show that with large values of skewness we are more confident that the data follows the assumed distribution. Nonparametric Kendall  $\tau$  test is used to confirm these results.

**Keywords :** goodness-of-fit test, chi-square test, simulation, continuous right skewed distributions

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020