APPLICATION OF HARMONIC MEAN OF VARIANCES FOR TESTING ORDERED ALTERNATIVE HYPOTHESIS UNDER VARIANCE HETEROGENEITY

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ABSTRACT

In this paper, we examined a test statistic for testing ordered alternative hypothesis under unequal group variances. The proposed modified t-test statistic obtained by replacing the pooled sample variance with the corresponding harmonic mean of variances in other to avoid the Behren - Fisher's problem. The distribution of the sample of harmonic mean of variances which is known to be generalized Beta is approximated by the chi-square using a condition that is easily satisfied.

The result shows that the modified t-test statistic is found to be appropriate for the data set obtained from Kwara Agricultural Development Project (KWADP) where the crop yields of the treatment means were known to be in a particular order because of ecological conditions.

1. Introduction

This work primarily concerns itself with the application of test hypothesis with directional alternatives. This has application in many fields. For examples, there may be a number of cures for a particular ailment. Orthodox chemotherapy, non-orthodox herbal and "body cure" (allowing the body to perform the cure) may be three methods of cure. The best, in terms of duration of treatment before cure could be chemotherapy, followed by the herbal. Thus, if time to realize the cure is the concerned variable, then the means would be ordered from the shortest (obtained from orthodox) to the one obtained by herbs, while the time for body cure is the last. Several authors have provided adequate literature in this area of Analysis of Variance such as Ott (1984), Montgomery (1981) amongst. Many authors have also developed method of testing of homogeneity of means. Such authors include Abidoye et. al (2016a), (2016b), (2016c) Jonckheere (1954), Bartholomew (1959), Yahya and Jolayemi (2003), Dunnett (1964), Barlow et. al (1971), Dunnett (1980), Dunnett and Tamhane (1997), Keselman and Wilox (1999), Gupta et al (2006), and several others.