International Journal of
Statistics and Applied Mathematics

ISSN: 2456-1452
Maths 2019; 4(1): 23-28

www.mathsjournal.com
Received: 06-11-2018
Accepted: 10-12-2018

P Rajini
Lecturer, Bhavan's Vivekananda Degree College, Sainikpuri, Secunderabad, Telangana, India

Krishna Reddy M
Professor, Department of Statistics, University College of Science, O.U., Hyderabad, Telangana, India

Jaya lakshmi C
Professor, Department of Statistics, University College of Science, O.U., Hyderabad, Hyderabad, Telangana, India

Correspondence
P Rajini
Lecturer, Bhavan's Vivekananda Degree College, Sainikpuri, Secunderabad, Telangana, India

Comparison of estimators of common mean of two normal populations using Monte Carlo simulation

P Rajini, Krishna Reddy M and Jaya lakshmi C

Abstract
Estimating common mean of several normal populations with unknown variances, which may be equal or unequal is one of the interesting problems in statistical inference. Estimation of common mean based on independent samples has some unresolved problems in literature. In this paper we considered different estimators of common mean available in the literature and compared them with respect to their bias, standard error, skewness and kurtosis.

Keywords: Common mean, normal population, unequal variances, standard error, relative bias, different estimators

1. Introduction
In estimating the common mean of several normal populations with unknown and unequal variances it is clear that the distribution of any combined estimator of μ will involve nuisance parameters. The problem of estimation of common mean μ of two or more univariate normal populations with unknown and unequal variances based on independent samples of fixed sizes has some unresolved problems. Uniformly minimum variance unbiased estimator of μ in this problem does not exist. Estimation of treatment effect in a BIBD with uncorrelated random block effects, by suitably combining the intra block estimate and the inter block estimate is the motivation to march towards the problem of estimation of common mean of several normal populations with unequal and unknown variances. The main objective of this paper is to compare the several estimators of common mean of two normal populations with respect to their Relative bias and standard error for different sample sizes using Monte Carlo Simulation.

2. Different estimators of common mean
We considered eleven estimators proposed by different authors.

2.1. The Graybill – Deal (1959) defined an estimator for common mean as,

$$T_1 = \hat{\mu} = \frac{n_1\bar{x}s_2^2 + n_2\bar{y}s_1^2}{n_1 s_2^2 + n_2 s_1^2} \quad \ldots (2.1)$$

They defined that it is an unbiased estimator of μ and is uniformly better than sample mean for $n_1, n_2 \geq 10$.

2.2. Brown and Cohen (1974) considered the estimators of the following forms

$$T_2 = \hat{\mu} = \bar{x} + (\bar{y} - \bar{x})\left\{\frac{a_0\bar{s}_1^2}{\bar{s}_1^2 + (n_2-1)\left(\frac{\bar{s}_2^2}{n_2+2}\right) + \left(\frac{(\bar{y}-\bar{x})^2}{n_2+2}\right)}\right\} \quad \ldots (2.2)$$

and $T_3 = \hat{\mu} = \bar{x} + (\bar{y} - \bar{x})\left\{\frac{a_0\bar{s}_1^2}{\bar{s}_1^2 + \bar{s}_2^2}\right\}$ ... (2.3)

Where, $a_0 = \frac{(n_1-1)(n_2-2)}{(n_1+1)(n_2+2)}$