ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 5, Issue, 07, pp.1735-1736, July, 2013

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

REVIEW ARTICLE

ROLE OF STARATIFICATION IN SAMPLE SURVEY

***Maqbool, S., Nageena Nazir and Iqbal Jeelani, M.**

Division of Agriculture-Statistics, Skuast-Shalimar, Kashmir, J&K, India

ARTICLE INFO

Article History:
Received 28th April, 2013
Received in revised form
11th May, 2013
Accepted 15th June, 2013
Published online 18th July, 2013

Key words:
Stratified sampling, Stratification,
Variance function, Simple random.

ABSTRACT

The precision of an estimate of the population mean or total, besides sample size depends on the variability among the units of the population. To increase the precision of the estimate, we could divide the population into number of groups (called strata) such that variability within the group is minimum and maximum between the groups. In this paper, we examine the role of stratification in sample surveys and illustrate through a numerical illustration as to how stratification reduces the sampling variance which is the main objectives of a good sampling technique.

INTRODUCTION

A sampling method is a scientific and objective procedure of selecting units from the population and provides a sample that is expected to be representative of the population A sampling method makes it possible to estimate the population parameters while reducing at the same time the size of survey operations. The main problem in sample surveys is the choice of Cl proper sampling strategy which essentially comprise of a sampling method and the estimation procedure. Various authors such as Deming (1950). Cochran (1977), Sukhatme, *et al.* (1984), Mukhopadhyay (1998) and S. Maqbool (2001) have discussed the use of stratified sampling and various stratification and estimation procedures.

STRATIFIED SAMPLING AND STRATIFICATION

In case of simple random sampling without replacement, the sampling variance of sample mean is $V(\bar{y}_n) = \left(\frac{1}{n} - \frac{1}{N}\right) S^2$ Clearly the variance decreases as the sample size 11 increases while population variability decreases. One of the objective of a good sampling technique is to reduce the sampling variance. So, we .have to either increase n or decrease S^2. Therefore the only way of increasing the precision of an estimate is to devise a sampling procedure which will effectively reduce S^2, i.e, the heterogeneity in the population. In fact, S^2 is a population parameter and is inherent with the population. Therefore it cannot be decreased. Instead population may be divided into number of group's thereby controlling variability within each group. Stratification is a process by which, the survey population is divided into subgroups or strata that are homogeneous as possible using certain criteria. The principal objective of stratification is to reduce sampling error. In stratified sampling, the sampling error depends on the population variance existing within the strata but not between the strata. For this reason, it is important to create strata with low internal variability. Stratification allows flexible sample designs separate for each group. Stratification can be single -Ievel or multi-level. Single level stratification is used to divide the population into strata according to certain criteria. Multi-level stratification is used to divide the population into first level strata according to certain criteria and then to subdivide the first-level strata into second level strata and so on. An example of typical two-level stratification is region crossed by urban-rural stratification.

Corresponding author: Maqbool Nageena Nazir, Division of Agriculture-Statistics, Skuast-Shalimar, Kashmir, J&K, India

NUMERICAL ILLUSTRATION

The data below pertains to the total geographical area in 20 villages of a block. Treating this as a population of 20 units, we stratify this population in three strata taking stratum sizes to be villages with geographical area, 50 ha or less, 60ha to 100ha and more than 100ha area. A sample of 6 villages is to be selected by taking 2 villages in each stratum. We compare the efficiency of stratified sampling with corresponding unstratified simple random sampling.

Village SI. No.	01	02	03·	04	05	06	07	08	09	10
Geographical Area (ha):	020	080	050	100	150	070	020	250	220	010
Village SI. No.	11	12	13·	14	15	16	17	18	19	20
Geographical Area (ha):	050	140	080	020	050	030	070	090	100	220

Solution

Clearly: N=20, n=6

Population Mean $\bar{y}_N = \frac{1}{20}\sum y_i = \frac{180}{20} = 91ha$

Population Mean Square $S^2 = \frac{1}{N-1}\sum(\bar{y}_i - \bar{Y}_N)^2$ =96180/19=5062 ha^2

Sampling Variance of Simple Random Sample Mean WR $V(\bar{y}_n) = \left(\frac{1}{n} - \frac{1}{N}\right) S^2 = 590ha^2$

Now stratify the population according to given strata sizes into three strata

Strata	SI.No.	Units
I	Less than 50ha	020 050 020 010 050 020 050 030
II	Between 60 and 100 ha	080 100 070 080 070 090 100
III	More than 100ha	150 250 220 140 220

From each stratum, a sample of 2. villages is to be taken so n1 = n2 = n3 = 2(equal allocation method)

$$V(\bar{y}_n) = \sum_{i=1}^{n} p_i^2 \left(\frac{1}{n_i} - \frac{1}{N_i} \right) S_i^2 = 67ha^2$$

Obviously the stratification has reduced the sampling variance of the sample mean from *590 hc/* (in case of simple random sampling) to 67 *ha'* (in case of stratified sampling) i.e. a reduction of about 89 per cent.

REFRENCES

Cochran, W.G. (1977). *Sampling Techniques*. John Wiley and Sons, New York.

Deming, W. E. (1950). *Some theory of sampling.* New York, Wiley. Mukhopadhyay, Parmial (1998). *Theory and methods of survey sampling.* Prentice Hall of India, New Delhi.

Maqbool S. (2001). *Optimization techniques in sample surveys.* Ph. D thesis submitted to Aligarh Muslim University, Aligarh. India.

Sukhatme, P.V., Sukhatrne, B.V., Sukhatme, S. and Ashok, C. (1984). *Sampling theory of surveys with applications. (First edition 1954,Second edition 1970).* Iowa State university Press, U.S.A.

****