# TESTING OF STRATIFIED CLUSTER SAMPLING TECHNIQUE TO PRODUCE UNBIASED ESTIMATOR FOR PARAMETER OF POPULATION

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**Abstrak**

*This research is done based on the importance testing of sampling technique before the real survey is done. The aim of this research is to test stratified cluster sampling technique in producing unbiased estimator of population. Based on theory, stratified cluster sampling technique is able to produce unbiased estimator. The reserch method used survey technique where the subjects are the whole the twelveth grade ofSenior High School in lubuklinggau and Musi Rawas. The calculation sample shows that the real number of population is 54,45 % whereas the result of sample is 55,5 %with sampling error 0,0464,therefore the samples have estimated parameter of population accuratly.*

## Introduction

This research isbased onthe importance research activity in public opinion that should be done by LP2M as anInstitute of ResearchManager at Islamic Higher School (STAI)of Bumi Silampari of Lubuklinggau. Before the real survey has been continued, the researcher who is curently a head of LP2M needsto test sampling tehnique which theoretically can produce estimator unbiased for its population.

The research where is unavailable frame of sampling therefore taking sampling tehnique has to be modified in such a way, therefore the survey accuracy can increase.

Formulation of problem

The problem answered in this research is what stratified cluster sampling tehnique producing unbiased estimator for parameter of population.

Scope of problem

The paremeter of population estimated on this research is the proportion of population. The subjects are twelveth grade students of Senior High School which arelocated in lubuklinggau and Musi Rawas. The data collected in this research werethe studentschoicesin study program at Islamic Higher School (STAI)Bumi Silampari Lubuklinggau.

Purpose and benefit of research

The aim of this research is to test what stratified cluster sampling produce unbiased estimator of population. The theoretical benefit of this research is as information to design surveyin large population. Practically, this research is as a guidance for academic community and society in doing public opinion survey.

## Theory Foundation, Thinking Framework And Research Hypotheses

### Theory Foundation

Probability Sampling Theory

This theory explain,if taking sampling done with principle of probability, then sampling distribution of estimator can be known which covers parameter of population will be estimated. Therefore, it can be made interval estimation accompanied a statement of confident that interval calculated will be contained parameter of value unknown.

Stratified Random Sampling

Stratified random sampling method is to take sampling tehnique which divided population into groups homogenous which is called stratum, Then sample is taken randomly each stratum (Sugiarto: 2000). According Suppranto (2007)The heterogeneous population need to divided in clusters, it is mentioned subpopulation. Stratified sampling method consist of proportional and disproportional sampling. The way taking proportional stratified sample done with selecting each unit sampling appropriate with size it, whereas disproportional stratified sampling is conversly. Although this technique have high representative but there are weaknesses as Heru and Yasriel said (2003)that taking sampel with this technique is no more easy and cheap than simple random sampling because frame samplig have to be arranged for each stratum before sampel is taken.

Cluster Random Sampling

Cluster random sampling is a proccess of sample taking that choose cluster not individual. All groups have same opportunity to become sample member.This technique is done mainly research which there is no frame of sampling.Asep and Agus Iskandar also wrote that it is used by researchers to determine sample which devide population into some districts.

Stratified Cluster Sampling Theory

Yamane in Megawati (2013)explain that stratified cluster sampling combines the characteristics of stratified sampling and cluster sampling. It break down the population into strata which is internaly homogenous, therefore heteregenous among one another and cluster are selected from each stratum.Acording to Eriyanto (2007) firstly researcher do identification each one cluster. Then researcher is grouping the clusters into stratums. After that sample is taken based on stratums which are made before. If clusters can be identified based on similarity of it characteristic then sampling error can be reduced.

Estimation of population

This theory explain that one of estimator is well if it is unbiased. A estimator is told good if value of estimator same as it estimator value.Acording to Joko Adi Nursiyono (2014) decent

estimator is which have realibility and strength so that it can aproach parameter of populatioan. In the survey research, estimation able to be done with the way to determine how many deviation of sample value to certain number with its population.it could be obtained with standar error numeral. The formulation below are used for estimation of population parameter mainly to nominal data.

$$\sqrt{\frac{P(1-P)}{N}}$$

P (1-P) : Variation of population
N : Number of sample

Parameter of Population Theory

Population parameters or universs are all objects or individuals that have certain characteristics.To explain the attributes of the population, the term statistics and parameters are used. This is the sum of summary data that shows the attributes of the sample and population. AwalIsgiyanto said that parameters and statistics are measures or constants that indicate the character of the population. Population parameters are denoted by capital letters "N"

**Framework of Thinking**

The Framework of thinking in this research is if taking of sample in large population combine between stratified and cluster technique then it will produce unbiased estimator for parameter of population.

**Hypotheses of Research**

Stratified cluster sampling able to produce unbiased estimator for parameter of population.

**Procedure of Research**

Research Method

Research method which used for testing formulation of hypotheses is survey method.

Population and Sample

The population in this research are students of senior high school 12 grade in 2018 in Lubuklinggau and Musi Rawas region as there is to the table.

Tabel 1. The number of population based on region

| NUMBER | DISTRICT | NUMBER OF STUDENT | NUMBER OF SCHOOL |
|---|---|---|---|
| 1 | LUBUKLINGGAU | 2424 | 26 |
| 2 | MUSI RAWAS | 2671 | 34 |
| | TOTAL | 5095 | 60 |

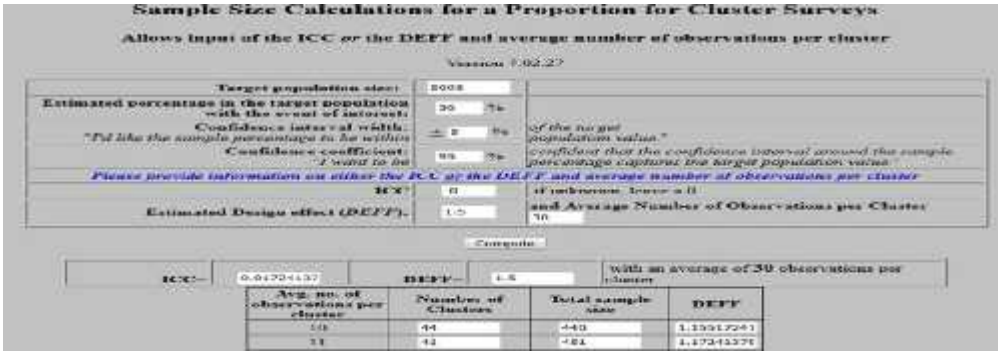
Sample in this research is some students of senior high school at 12 grade in Lubuklinggau and Musi Rawas Region which amount 440 person, and consist of 44 school. The table 1.2 bellow is the number of sample which is taken randomly.

Tabel 2. The Number of sampel

| NUMBER | DISTRICT | NUMBER OF STUDENT | NUMBER OF SAMPLE SCHOOL |
|---|---|---|---|
| 1 | LUBUKLINGGAU | - | 19 |
| 2 | MUSI RAWAS | - | 25 |
| | TOTAL | **440** | 44 |

The number of sample in this research is counted to use software develoved by EPI bellow:

Gambar 1. The calculation ofsample size with Epi software



The ficture show that total pupulation is about 5095 with proportion of pulation 50% margin of error 5% level confident 95% desing effect 1.5 produce number of sample about 440 which is divided into 44 cluster where there are 10 responden for each cluster.

Sampling Technique

Sample is taken with to combine stratified and cluster sampling. The first step researcher choose school randomly, next step researcher do taking responden in each school which is choosen as sample. Before sample is taken, firstly be done stratified based on number of school in lubuklinggau and Musi Rawas. The next stage is taken sample proportionaly. Areas that have more populations will get more samples. Based on table 1.2 showed Musi Rawas area geting 25 sample whereas lubuklinggau to get 19 school.

Data Collecting

Data collected are choice of student about study program in islamic higher school of Bumi Silampari ofLubuklinggau. Data collecting done with way sensus. After data has collected the next stage take sample from population then it be continued to counting. Instument used in data collecting in this research is quetioner. Example bellow is one of question which are asked to students.

Tabel 3. Example of survey question

| If you register to islamic higher school of Bumi Silampari of Lubuklinggau,which would you choose of study progam bellow? |
|---|
| A. Islamic of education |
| B. Comunication and islamic broadcasting? |

Data Analysis Technique

Data of sensus is taken it sample and then are done estimation. The result of sample will be compared with data of population that notice margin of error tolered. If the statistic of sample exceed bound of error means that the estimation is biased while number of margin of error lower assumed that estimation have estimated his parameter. Prediction parameter of population use interval of confidence. The level of confidence is range of value from one to certain number which is inside it predicted there is real of population number(Eriyanto: 2007).

Acording to Association of Public Opinion Research of Indonesia (AROPI), level of confidence which often be used are 90%, 95% and 99%. Level of confidence 90% means probability the result of sample same as population is 90%, possibility error is 10%.

While level of confidence 95% means probability value of sample same as population is 95% and possibility of error is 5%. Whereas level of confidence 99% means probably proportion of sample same as populatian is 99% and possibility the sample do not same as population is 1%. Bellow is formula which is used to count level of confidence for proportion of population.

$$\hat{p}-Z_{a/2}\frac{\sqrt{\hat{p}(1-\hat{p})}}{n} < p < \hat{p} + Z_{a/2}\frac{\sqrt{\hat{p}(1-\hat{p})}}{n}$$

In this research counting of data use*Microsoft Excell Software.*

Data Analisys

a. Data of Population

Table 4. Proportion of Student Choices to Islamic Education Program

| DISTRICT | NUMBER OF STUDENT |
|---|---|
| LUBUKLINGGAU CITY | 1443 |
| MUSI RAWAS REGENCY | 1331 |
| TOTAL | 2774 |
| PERSENTAGE(%) | **54,4** |

The table show that there are 1443 students in Lubuklinggau region choices islamic education program and 1331 students in Musi Rawas regency so that total of student are 2774 or 54,4% which express theirself to choose Islamic Higher School of Bumi Silampari of Lubuklinggau if their register in this college.

b. Sample Data

| DISTRICT | NUMBER OF SAMPLE |
|---|---|
| LUBUKLINGGAU CITY | 111 |
| MUSI RAWAS REGENCY | 133 |
| TOTAL | 244 |
| PERSENTAGE (%) | **55,5** |

The table show that there are 111 students choices islamic education program in lubuklinggu city and 133 students in Musi Rawas regency so that total of students choices of Islamic Education Program are 244 person or 55,5%.

c. Standar Of Error

$$SE = \frac{\sqrt{P(1-P)}}{N}$$

$$= \frac{\sqrt{0{,}5545(1-0{,}5545)}}{440}$$

$$= \frac{\sqrt{0{,}24702975}}{440}$$

$$= \sqrt{0{,}0005614321}$$

$$= 0{,}02369954$$

d. Interval Of Estimation

$$\hat{p}\text{-}Z_{a/2}\frac{\sqrt{\hat{P}(1-\hat{P})}}{n} < p < \hat{p} + Z_{a/2}\frac{\sqrt{\hat{P}(1-\hat{P})}}{n}$$

$$= 0{,}05545\ (1{,}96)\frac{\sqrt{0{,}05545(1-0{,}05545)}}{440}$$

$$= 0{,}05545\ (1{,}96)\ \sqrt{0{,}0005614321}$$

$$=$$

$$= 0{,}05545\ (1{,}96)\quad 0{,}02369954$$

$$= 0{,}05545 - 0{,}046451$$

$$= 0{,}5080$$

$$= 0{,}05545\ (1{,}96)\frac{\sqrt{0{,}05545(1-0{,}05545)}}{440}$$

$$= 0{,}05545\ (1{,}96)\ \sqrt{0{,}0005614321}$$

$$= 0{,}05545\ (1{,}96)\quad 0{,}02369954$$

$$= 0{,}05545+0{,}046451$$

$$= 0{,}6011$$

Based on the statistical computation above it is found that the calculation of interval estimation is in 0,5080 to 0,6011 Whereas proportion of population is 0,544 and standar of error is 0,0464. The number of SE 0,0464 is still lower than margin of error so that there is no biased on estimation.

**Conclution**

From data analysis is concluded that stratified caluster sampling technique have estimated acuratly parameter of population so that this technique produced unbiased estimator.

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