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Analysis of the Effect of Population and Average Net Wage/Salary on the Number of Poverty in Medan Using Linear Regression Method

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Abstract. In this study, the total population along with the average net salary was selected for poverty. The data information used in this study is data derived from agencies. In obtaining the results of the analysis on the influence of variables, multiple linear regression was used. The interpretation of this study shows that there is a significant influence between population and average net salary on poverty. The larger the population and the smaller the average net wage/salary, the higher the poverty rate. It is hoped that this research will be able to show a framework of what factors influence poverty so that it can be used as a reference to overcome the problem of poverty in Indonesia, especially the city of Medan. This study does not use manual calculations, and aims to analyze the relationship between population (M1) and average wage / net salary (M2) with the amount of poverty (D). The equation D is 221105.0 - 0.0147 M1 + 0.0147 M2, with the value of the influence of M1 and M2 on D amounting to 0.341.

Keyword: Poverty, Statistical Computing, Correlation, Multiple Linear Regression

Abstrak. *Dalam penelitian ini, jumlah penduduk bersama dengan gaji bersih rata-rata terhadap kemiskinan dipilih. Data informasi yang digunakan dalam penelitian ini adalah data dari instansi. Dalam memperoleh hasil analisis terhadap pengaruh variabel, digunakan regresi linier berganda. Penafsiran penelitian ini menunjukkan bahwa terdapat pengaruh yang signifikan antara penduduk dengan rata-rata gaji bersih terhadap jumlah kemiskinan. Semakin besar jumlah penduduk dan semakin kecil rata-rata upah/gaji bersih, semakin tinggi angka kemiskinan. Diharapkan penelitian ini mampu menunjukkan kerangka kerja apa saja faktor-faktor yang mempengaruhi kemiskinan sehingga dapat dijadikan acuan untuk mengatasi masalah kemiskinan di Indonesia, khususnya kota Medan. Penelitian ini tidak menggunakan perhitungan manual, dan bertujuan untuk menganalisis hubungan antara jumlah penduduk (M 1) dan rata-rata upah/gaji bersih (M2) dengan jumlah kemiskinan (D). Persamaan D diperoleh pada 221105,0 – 0,0147 M 1 + 0,0147 M 2, dengan nilai pengaruh M 1 dan M2 terhadap D sebesar 0,341.*

Kata Kunci: *Kemiskinan, Komputasi Statistik, Korelasi, Regresi Linier Berganda*

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1 Introduction

Poverty is the most important issue for the improvement or growth of a country. It can be growth because poverty has a far-reaching impact on a country's social and economic well-being. Poverty can lead to lack of access to education, housing, healthcare, and employment opportunities [1]. Therefore, paying attention to what factors have an influence on the poverty of a region is very important in terms of providing support to the government to take a satisfactory strategy in overcoming the problem of poverty. The effect of population and average net wages/salaries on the amount of poverty in a region is an interesting topic to research. This study was conducted to analyze the relationship between the number of residents and the average net wage/salary to the number of poverty in Medan [2-3]. Medan City is a city in Indonesia from many cities that have a high population growth rate, so it is necessary to analyze the effect of the population and average net wages/salaries on the problem of poverty. This study in analyzing the results used linear regression. Linear regression is a statistical method with the aim of seeing how far the influence variable affects the affected variable. In this study, the affected variable is the amount of poverty in Medan City, while the influence variable is the number of population and the average net wage/salary in Medan City [4]. It is expected that the results of the analysis in this study provide a framework for the effect of population and average net wages/salaries on poverty levels in Medan City. Instead, the results of the analysis can be used as policy making that can reduce the poverty rate in Medan City, such as programs for poverty alleviation or in improvingthe quality of human resources [5-6].

2 Research Methods

2.1 Equipment

Several equipment in research in conducting tests are used [7]:

a. Requires Python 3.10.2.

b. Requires software / software namely SPSS v23 x64 software.

2.2 Method

a. Logging procedure

Data is grouped into 2, namely grouping based on data and grouping based on variables:

b. Data Grouping

Grouping between Poverty, Average Wage/Net Salary, and Total Population of Medan City from 2015 to 2020.Variable Grouping

The grouping for variables is divided into three variables, where two variables influence, and 1 variable dinfluence, such as M1 (number of population), M2 (average wage/net salary), and D (poverty) [8-10].

a. Settlement procedure

The completion in the proposed research is divided into 2:

1 Data processing

In the form of grouping data, determining variables, determining software, conducting tests

2 Determination of Results

Determine the results using the created method and take the results of predictions and interpretationsi.

3 Research Results and Discussion

3.1 Data Collection

The following is secondary data and obtained from BPS (Central Statistics Agency), with data on the number of positions (M 1), upah / salary (M2), poor(D) respectively from 2015 to 2020 [11].

Table 1. Data

Number of Inhabitants	Wages/salaries	Poverty
1091937	2025515.5	207500
2229408	0366769.5	206870
2247425	2722605.5	204000
2264145	1415892.04	186450
2279894	2852707	183790
2435252	2836921	183540

3.2 Determining Multiple Linear Regression Equations

Multiple linear regressions were made with the aim of seeing the influence between the variables of the influence of Number of Population (M 1), Wages / salaries (M2), on variables influenced by Poverty (D). In general, the results of D data observations are influenced by the influence variables M1 and M2 with the formulation [12]:

$$D = b_0 + b_1 m_1 + b_2 m_2$$

By using Python 3.10.2 software, the coefficients are obtained as below:

Table 2. Multiple Linear Regression Equations

	COEF
const	221105.5
Number of Inhabitants	-0.0147
salary	0.0021

From Table 2 of the Multiple Linear Regression Equation, b 0 = 221105.5, b 1 = -0.0147, and b 2 = 0.0021 so that the multiple linear regression equation obtained is as follows:

$$D = 221105.5 - 0.0147\,M1 + 0.0021\,M2$$

According to the equation obtained, it can be interpreted that for every perception for 1% in the variable salary / average wage, the increase in the poverty rate increases by 0.0021. And if the variable M1 (number of population) gets a perception every 1%, then the poverty rate will be reduced by -0.0147

3.3 Correlation Coefficient(r) and Regression(R)

The purpose of the correlation test is to find out how closely related the variables are. Namely the variables M1 (number of population) and D (poverty), M2 (salary) and D (poverty), M1 (number of population) and M2 (salary).

Table 3. Correlation Efficiency

type	**correlation coefficient**
M1, D	-0.577
M2, D	-0.112
M1, M2	0.346

Based on Table 3 of the Correlation Coefficient, the Correlation Coefficients M1 and D are negative which means that M1 and D (-0.577) have opposite relationships (have a negative perfect linear relationship) as well as M2 and D (-0.112), while M1 and M2 (0.346) have a low relationship

Table 4. Regression Efficiency

Type	Coefficient of Regression
D, M1M2	0.584

Based on Table 4 Regression Coefficient, Regression Coefficient M1,M2 to D is 0.584 which means that the influence variable and the affected variable have a correlation relationship with a moderate level.

3.4 Determination of the coefficient (r2)

To determine the percentage of influence of the influence variable in influencing the affected variable, a coefficient of determination is usually used, as in the table below:

Table 5 Coefficient of Determination

Type	Coefficient of Determination
R-squared	0.341

Based on Table 5 of the Coefficient of Determination, the value of the Coefficient of Determination is obtained at 0.341, which means that the influence of the influence variable in influencing the variable is influenced by 34.1%, while for 65.9% it is influenced by factors other than M 1 (population) and M2 (salary / average wage).

3.5 F Test

To find out whether the variable has a significant effect on the variable affected or not, Test F can be used. The F test is commonly used in multiple linear regression, because in multiple linear regression more than 1 influence variable is obtained. The F test in regression analysis is useful for checking whether the regression model has the power to determine the dependent variable.

Hypothesis Taking:

H0 = No effect of population and salary on poverty.

H1 = There isan effect of population and salary on poverty

Based on Table 5 Regression Results, the value of the calculated F is 0.7769.

Criterion:

a. If F counts < F table, it can be concluded that H0 is accepted.

b. If F counts ≥ F the table, so it can be concluded that H1 is accepted.

In the results of the F distribution with dk denumerator = 3, and dk numerator = 2 at the level of significance = 0.05, therefore the value of F table = 9.55 is obtained. Since F counts (0.7769) < F table (9.55), the conclusion H 0 is accepted which mean that there is no influence between the variables of population and salary on poverty with a significance level of 0.535 or 53.5%.

3.6 T-test

In parametric statistics, one technique that is often used to test the hypothesis of the average difference between two independent or paired groups (samples) is the t-test. This technique is very commonly used in data analysis because it has a fairly good ability to overcome some negative aspects in nonparametric statistical techniques.

Taking Hypothesis:

1. H0 = for the absence of influence variable (M) on variable dinfluence (D).
2. H1 = for the influence of the influence variable (M) on the variable dinfluence (D).

Criterion:

1. If T counts ≤ T the table concludes that Ho is accepted.
2. If T counts > T the table concludes that H1 is accepted.

Based on Table 2 of the Linear Regression Multiple Equation, the test results can be concluded as below:

a. Constant on Test T

The calculated T value is 7.621, in the table T for db = 3 and the significance leveli 0.05 is obtained 2.353, becauseT counts the table > T so that H 0 is rejected and H1 is accepted so that it can be concluded that the constant value is not zero, which means the constant value has an influence on the affected variable (D).

b. Number of Inhabitants on Test T

The calculated T value for the population of -1.223 is obtained, for the T table with db = 3 and a significance level of 0.05 the result is 2.353, becauseT is calculated < the table then H 0 is accepted and H1 is rejected, so it can be concluded that there is no influence variable population to variable dinfluence (D).

c. Test t on salary

The calculated T value for salary is 0.199, for the table T with db = 3 and the significance level of 0.05 is 2.353, becauseT is calculated < the table then H 0 is accepted and H1 is rejected, so that it can be concluded that there is no influence of salary variables on the affected variables (D).

4 Conclusion

The correlation of the coefficients M1 and D is negative which means that D1 and M (-0.577) have opposite relationships (have a negative perfect linear relationship) as well as M2 and D (-0.112), while M1 and M2 (0.346) have a low relationship. The value of the Coefficient of Determination is obtained at 0.341, which means that the influence of the influence variable in influencing the variable is 34.1%, while for 65.9% it is influenced by factors other than M1 (population and M2 (average salary/wage). According to the equation obtained, it can be interpreted that for every perception for 1% in the variable salary / average wage, the increase in the poverty rate increases by 0.0021. And if the variable M1 (number of population) gets a perception every 1%, then the poverty rate will be reduced by -0.0147.

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