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ANALYSIS OF FACTORS OF MATERNAL MORTALITY RATE IN MEDAN CITY USING BIVARIAT POISSON REGRESSION

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ABSTRACT

There are several factors that cause maternal death, such as bleeding, hypertension, infection, prolonged labor, abortion and others. Maternal deaths related to pregnancy, childbirth and the puerperium (42 days after delivery), and the number of deaths per 100,000 live births related to pregnancy or medical problems (except accidents or incidents). In this study the case of maternal mortality using the Bivariate Poisson Regression model which aims to determine what factors are the main factors in maternal mortality using the Bivariate Poisson regression method.

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1. INTRODUCTION

Indonesia's Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) are still relatively high, while Indonesia still has the highest Maternal Mortality Rate (MMR) among other ASEAN countries. From 1994 to 2007, Indonesia managed to reduce the maternal mortality rate from 390 per 100,000 live births in 1994 to 228 per 100,000 live births in 2007. However, an increase in 2010 census data shows that the maternal mortality rate in Indonesia has again increased to 346. 100,000 births. This figure still declined slightly in 2015, with a decrease of 305 compared to live births. As a result, the health status of Indonesian pregnant women has decreased significantly quite significant in recent periods.

The maternal mortality rate in Indonesia can still be said to be high, especially during pregnancy and the factors of maternal death have its causes such as bleeding, hypertension, infection, prolonged labor, abortion and others that cause maternal death in the city of Medan in 2010-2013. . In 2019 the maternal mortality rate was 179 mothers from 302,555 live births or 59.16 out of 100,000 live births compared to the maternal mortality rate in 2018, the maternal mortality rate in 2019 decreased. The maternal mortality rate is 186 out of 305,935 cases or 60.79 out of 100,000 live births. This figure is far from 2018.

2. RESEARCH METHODE

2.1 Data Source

The source of data in this study was obtained from the Health Profile of the Province of North Sumatra" which came from the Medan City Health Office. And the data obtained from the Medan City Health Office.

2.2 Research variable

The research variable is the maternal mortality rate in the city of Medan. The predictor (independent) used is the cause of maternal death in the city of Medan. In the table below, the variables that cause death rates are: mothers obtained from the Medan City Health Service website in 2017.

2.3 Types of research

Quantification is a type of research whose results use quantitative (measurement) methods. Method quantitative focuses on human life or is called a variable. In the quantitative method, in analyzing the relationship between variables using the theory objective. According to Kasiram (2008), quantitative research is a method find an insight that requires data in the form of digital that is needed in digging up the information you want to know.

2.4 Data analysis

Correlation analysis is an analysis of the relationship between two variables relatedto the same or parallel positions are independent. The association is not a causal relationship, or a regression analysis effect relationship.

The steps in analyzing the factors of maternal mortality in the city of Medan are:

1. The thematic map of North Sumatra is used to describe infant and maternal mortality rates in the area / city of Medan and the variables considered to have an impact.
2. Perform correlation experiments on variable responses
3. Use the VIF criteria for examine multicollinearity to determine whether there is a close relationship between the variables that are thought to have an effect.
4. Using Bivariate Poisson Regression for modelling, including:
   a. The parameters of the Poisson binary regression model are estimated by using the Expectation-Maximization algorithm to maximize the ln likelihood function.
   b. The bootstrap method was used to calculate the standard error of the Poisson bivariate regression parameter.
   c. Use the likelihood ratio test to perform a parameter interest test at the same time partially (using the Z value). and the partial parameter test does not use the Likelihood Ratio Test because the standard error parameter has been obtained, it can get the z value and there is a likelihood estimation theorem if the results are normally distributed.
5. Do testing overdispersion or underdispersion.
6. Ensure the best model.
7. Carry out the discussion of the best models.

3. RESULT AND ANALYSIS

The results of this study are the bivariate Poisson model for the variable number of maternal deaths. The data used in this study is secondary data in 2018. From the results of the analysis using the SPSS application.

3.1 Response Variable Correlation

Prior to conducting a Bivariate Poisson analysis, criteria must be met, namely between response variables that have a close relationship with predictor variables. Correlation examination of response variables is used to determine whether there is a relationship between the number of maternal deaths at a young age and the number of maternal deaths in old age. And if there is a relationship then we can use Poisson Bivariate Regression analysis.Characteristics of maternal mortality factors in urban areas include the average value, variance, maximum value and minimum value.

Table 4. Characteristics of the Number of Causes of MMR.

Variabel	Mean	Varians	Minimum	Maksimum
x_1	33,5	300	16	68
x_2	33	196,4	16	56
y_1	26,5	77,6667	16	33
y_2	18	8	16	20

Based on the table above, the average number of maternal deaths at age is higher than that of young mothers. The average number of cases of maternal death at younger ages is the lowest. In 2013 the average number of

maternal deaths in the city of Medan reached 34.95 with the largest cases amounting to 40.8 deaths in the city of Medan. And the lowest number of maternal deaths in the city of Medan was recorded at 0.

3.2 Characteristics of the Number of MMR and Factors Affecting Maternal Mortality

To see the value of Variance Inflation Factor (VIF) for each predictor variable. If the tolerance value is greater than 0.10, it means that there is no multicollinearity where the tolerance value is greater than 0.10, which is 0.292. And for the VIF (Variance Inflation Factor) value less than 0.10, where the VIF value exceeds 10.00, which is 3.427, it exceeds 10. It is concluded that there is multicollinearity in the predictor variables. Table 5. VIF Value of Predictor Variables

Variable	VIF value	Tolerance
x_1	3,712	0.269
x_2	3,357	0.298
x_3	3.255	0.307
x_4	4,896	0.204
x_5	6,944	0.144
x_6	7,802	0.128

Table 5 above shows that the value of VIF is less than 10.00 and none is more than 10.00, then this means that multicollinearity does not occur where multicholinearity is a simple multiple variable analysis.

In this Poisson regression modeling, the variable maternal mortality rate is obtained by using the estimated Poisson bivariate regression parameter as shown in the table below:

The Poisson bivariate regression model with the causes of maternal mortality is obtained: = (2,817178 + 2,0905 + 0,470921 - 0,061574 - 0,090062 + 2,851849).

Based on the table above, it is obtained that the value of the variable that has a significant effect is found in the variable causing maternal death, namely abortion (5 .).) , old parturition (4) , Infection (3), Hypertension (2), Bleeding (1) and others (6). These variables stated that the effect was significant because the t-table value was less than Alpha (0.05).

4. CONCLUSION

Bivariate Poisson regression is a method used to obtain a model from a pair of data that is correlated with several predictor variables and has a Poisson distribution. The number of maternal deaths is suspected to be correlated and is discrete data so that it can be analyzed together with the Poisson bivariate regression method.

And to see the value of Variance Inflation Factor (VIF) for each predictor variable. If the tolerance value is greater than 0.10, it means that there is no multicollinearity where the tolerance value is greater than 0.10, which is 0.292. And for the VIF value less than 0.10 where the VIF value exceeds 10.00.

Based on the research that has been done, suggestions can be given to readers and other parties, in order to better maintain health and provide better health services to the community.

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