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SPATIAL PATTERNS AND LOW EDUCATION ASSOCIATED WITH EARLY MARRIAGE

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ABSTRACT
The incidence of early marriage in Muaro Jambi Regency has increased. No studies have been done on the distribution pattern and the relationship between education level and early marriage in Muaro Jambi Regency. This study aimed to identify the hotspots and low spots of early marriage, and the relationship between low education level with early marriage in Muaro Jambi regency in 2021. Global and Local Analysis Moran Index is used in this study to map hotspots and low spots for early marriage. Spatial regression is used to determine the relationship between education level and cases of early marriage. This study used an ecological study approach with the unit of analysis of 155 villages in Muaro Jambi Regency. Data on early marriage was obtained from the Mauro Jambi Regency Health and Family Planning Agency (BKKBN) report. The percentage of early marriage in Muaro Jambi Regency is 22.49%. This study found a positive autocorrelation of early marriage in 14 villages that fall into the hotspots area and 11 villages that fall into the low spots area. Using the SAR model, this study also found a relationship between education level and early marriage in Muaro Jambi Regency.

Keywords: early marriage; education; hotspots; low spots; spatial autocorrelation

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INTRODUCTION

Early marriage is still a social problem at the global and Indonesian levels. The Law of the Republic of Indonesia Number 16 of 2019 defines early marriage as marriage carried out by men and women before the age of 19 (Kementrian Hukum dan HAM RI, 2019). According to the World Health Organization (WHO), early marriage is a couple or one of the partners who are still categorized as children or adolescents aged before the age of 18 years get married (WHO, 2013). Globally, there are ten countries with the highest child marriage rates: Niger, 75%; Chad and Central African Republic, 68%; Bangladesh, 66%; Guinea, 63%; Mozambique, 56%; Mali, 55%; Burkina Faso and South Sudan 52%; and Malawi 50% (WHO, 2013). In South Asia, at least 9.7 million girls, 48% of whom are married under 18 while in Africa 42%, and in Latin America 29% (Yuan et al., 2020).

Early marriage in Indonesia is still very high. Indonesia occupies the second-highest position in Southeast Asia and the eighth at the world level (Pranita, 2021). The National Commission on Violence against Women noted that throughout 2021, there were 59,709 cases of early marriage in Indonesia (Harruma, 2022). The Ministry of Empowerment and Child Protection has set the goals that by 2024, the number of early marriages will decrease to 8.74%

(Bappenas, 2019; Monoarfa, 2020). Throughout 2019 to 2020, there has been a decline of 0.6%, but this figure is still far from the target of a decline 8.74% in 2024 (Salsavira et al., 2021). The number of early marriages is increasing due to the Covid-19 pandemic (Cousins, 2020). Marriage at a young age can increase maternal and infant mortality, the risk of complications of pregnancy, childbirth, and puerperium increase the risk of depression, sexual infections, cervical cancer, and malaria (Elnakib et al., 2022).

The number of early marriages in Jambi Province is still relatively high. The Jambi Ministry of Religion Office noted that 859 children married from January to October 2021(Saputra, 2022). In Jambi Province, 75/1000 women gave birth at the age of 15-19 years, and this figure is relatively high compared to the national data, which is 48/1000 women (Yuan et al., 2020). Among regencies/cities in Jambi Province, cases of early marriage in Muaro Jambi Regency have increased. Data that entered the Sengeti Religious Court, as quoted by the online news page TribunMuaroJambi.com, 75 pairs of teenagers had early marriages until August 2022 (Muzakkir, 2022). Several factors are related to early marriage, one of which is the level of education. A study conducted by Aychiluhm (2021) found a relationship between education level and early marriage in Ethiopia (Aychiluhm et al., 2021). Clusters of early marriage events can occur both according to place and time. Several studies have been conducted to detect early marriage hotspots (Alem et al., 2020a; Bolarinwa et al., 2022; Johnson et al., 2019; Salsavira et al., 2021; Tessema, 2020). Knowing the hotspots can help make policies and programs to prevent and reduce the incidence of early marriage. Several studies on early marriage have been carried out in Jambi Province (A'izah, 2021; Arikhman et al., 2019; Herlinda, 2021; Rahmatan et al., 2022; Viya, 2014). However, no geospatial research on early marriage has been conducted in Muaro Jambi Regency. This study aims to identify the spatial distribution and relationship of education level with the incidence of early marriage in the Muaro Jambi Regency in 2021.

METHOD

Geographically, Muaro Jambi Regency is located between 1°15'-2°20' Latitude and between 103°10'-104°20' Longitude. Muaro Jambi Regency is one of 11 regencies/cities in Jambi Province with an area of 532,600 Ha (5,326 km2) and is located at an altitude of 0-38 meters above sea level. Muaro Jambi Regency is divided into 11 sub-districts and 155 villages/kelurahan, with a population 2020 of 412,052 people. The area of Muaro Jambi Regency in detail can be seen in the map below (BPS, 2021):

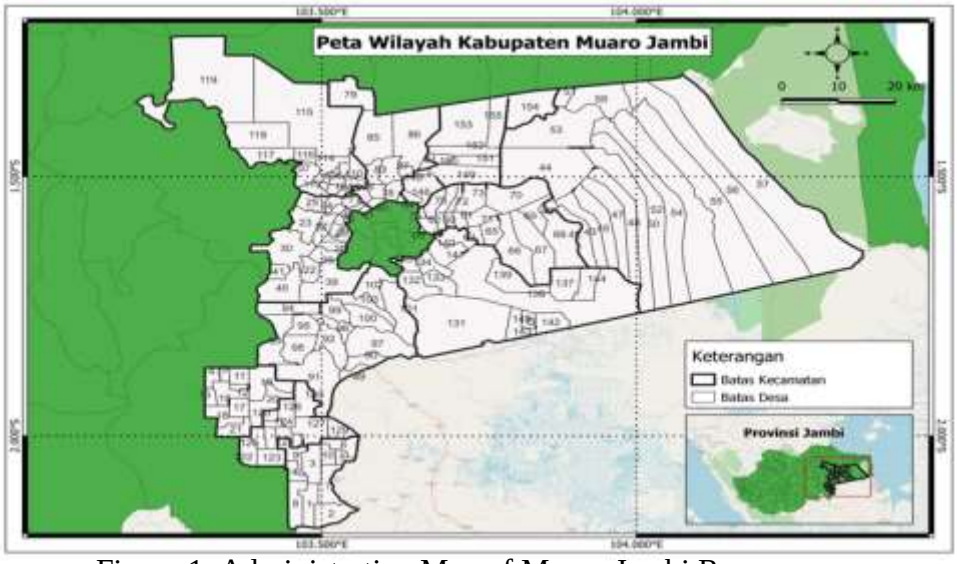


Figure 1. Administrative Map of Muaro Jambi Regency

This research used an ecological study approach with an analysis unit of 155 villages in Muaro Jambi Regency. All data on early marriage was processed into the Microsoft Excel application and then analyzed using the open-source application Geoda 1.20 using the Global and Local Moran Index analysis methods. The thematic map aims to show the distribution of the proportion of cases of early marriage by village. The Global and Local Analysis of the Moran Index or Local Indicator for Spatial Autocorrelation (LISA) aims to find hotspots and low spots. A common and important concept found in the spatial analysis literature is that closer observations in space tend to be more related and similar than those far apart (Waters, 2017). Spatial clustering or autocorrelation can be defined as the spatial aggregation of disease events or risk factors that are unlikely to occur by chance, especially after the known risk factors affecting the spatial distribution have been considered (Lessler et al., 2017). The spatial model of the relationship between educational factors and early marriage was analyzed using the Spatial Error Model (SEM). Statistical assumptions must be met before conducting the analysis. Early marriage data in this study were reports of marriages aged <19 years obtained from the Health and Family Planning Agency (BKKBN) of Muaro Jambi Regency.

RESULTS

The number of all cases of early marriage (<19 years) in Muaro Jambi Regency in 2021 was 16,095 cases or 22.49% of 71,565 couples of childbearing age (PUS). The description of the distribution of early marriage by village or kelurahan is presented in the thematic map below. The proportion of early marriages is the total number of early marriages divided by couples of childbearing age which are then multiplied by 100 (expressed in percent). A map of the distribution of early marriage is made at the village/kelurahan level.

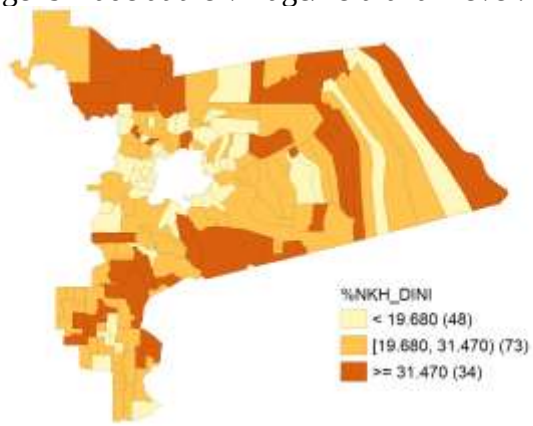


Figure 2. Map of the Distribution of Early Marriage in Muaro Jambi Regency in 2021

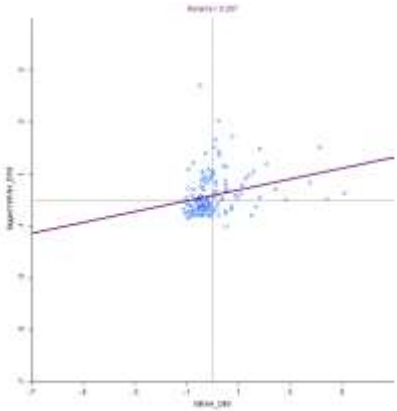
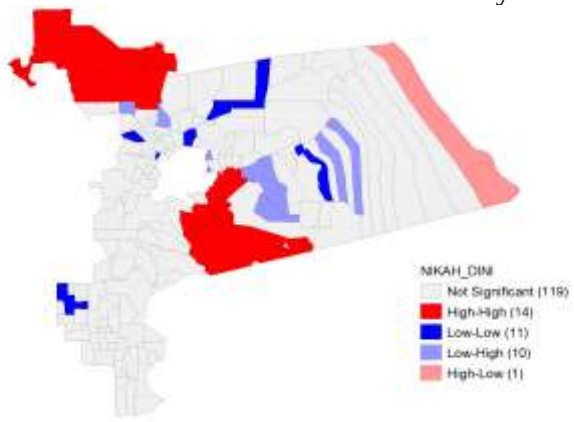


Figure 3. Moran's I Scatterplot Early Marriage in 2021

In Figure 2 above, it can be seen that the number of cases of early marriage <19.680 percent occurred in 48 villages (30.9%), and the number of cases of early marriage 31.47 percent occurred in 34 villages (21.9%). Figure 3 above shows the results of the global autocorrelation test with a Moran Index value of 0.267. It can be concluded that early marriage in Kab. Muaro Jambi in 2021 has a clustered distribution pattern. Theoretically, the Moran index value ranges from -1 to 1. A value below negative indicates a negative autocorrelation or a dispersed pattern, and a positive value indicates a positive autocorrelation or a clustered distribution pattern.

Hotspots and Low Spots of Early Marriage

Hotspots and low spots of early marriage were obtained from the Local Indicator for Spatial Autocorrelation (LISA) test results. LISA aims to find patterns in the distribution of early marriage cases based on local areas. The results of the LISA analysis can be seen in picture 3.



Picture 3. Hotspots and Low spots for Early Marriage in Muaro Jambi in 2021

The results of the analysis using the Local Indicator for Spatial Autocorrelation (LISA) found early marriage hotspots in 14 villages/kelurahan. The villages or sub-districts are Bukit Baling, Tanjung Continue, Suka Awin Jaya, Lubuk Raman, Suka Maju, Kebon IX, Talang Bellido, Talang Kerinci, Ladang Panjang, Tangkit, Tangkit Baru, Petaling Jaya, Mingkung Jaya, Trimulya Jaya. The villages/kelurahan included in the Low Spots category are Sembubuk, Tan Tan, Puding, Maju Jaya, Muaro Jambi, Bakung, Mulya Jaya, Bahar Mulya, Dusun Mudo, Kemingking Luar, Rukam.

Spatial Error Model

At this stage, prior to the regression analysis, the autocorrelation test was conducted first. After doing the autocorrelation test, then followed by the classical regression test, and then followed by the spatial regression test if it meets the requirements. The following are the results of the analysis:

1) Spatial Dependency Test

This test is conducted to see if there is a spatial autocorrelation. Lagrange Multiplier is used to determine dependencies on lag or errors. The following is the hypothesis of the spatial dependency test.

Table 1.
Spatial Dependency Test with LM test

Pengujian	P-value	Decision
Lagrange Multiplier (lag)	0.1255	Not significant
Lagrange Multiplier (error)	0.00773	Significant

*) significance at = 5%

Based on the table above, it is concluded that further analysis needs to be continued to create a model using the Spatial Error Model (SEM).

Table 2.
Parameter Testing of SEM Model

Variable	Coefficient	td.Error	P-value
Constanta	-112,622	41,231	0,0063
Percentage of People Not in school (X_1)	1,51146	0,5355	0,0047
Percentage of People who Completed Elementary School(X_2)	1,665	0,4508	0,0013
Percentage of People who Completed Junior High School (X3)	1,3519	0,3727	0,0002
Percentage of people who Completed Senior High School (X4)	0,897	0,4754	0,058
Percentage of People who Completed University (X5)	0,932	1,8197	0,0687

*) significance at = 5%

According to the table above, an equation of the spatial error model (Spatial Error Model) can be formed with the conclusion that the variables that affect early marriage are the percentage of education level not graduating, graduating from elementary school, and the percentage graduating from junior high school.

2) Best Model Selection

Table 3 below shows the selection of the best model using the AIC. Value criteria. A model can be concluded that the model is good if the AIC value is getting smaller and the R square value is more significant. Based on table 3 above, it is found that the SEM model is the best regression model.

Table 3.
Comparison of AIC Values from 2 Models

Model	R^2	^{2}	AIC value
Classical Regression (OLS)	31,50%		1110.1
Spatial Error Model (SAR)	35,00%		1104.21

DISCUSSION

This study analyzed the distribution pattern of early marriage and the influence of education level on early marriage in Muaro Jambi Regency using data on marriage reports aged <19 years obtained from the Health and Family Planning Agency (BKKBN) in Muaro Jambi Regency. The unit of analysis in this study focused on all villages/kelurahan in Muaro Jambi Regency which amounted to 155 villages/kelurahan. This study found that the distribution pattern of early marriage in Muaro Jambi Regency has a clustered distribution pattern, as evidenced by the Moran Index value of 0.267.

Further analysis using the Local Indicator for Spatial Autocorrelation (LISA) test found that there were 14 villages/kelurahan in the hotspot category and 11 villages/kelurahan in the low spot category. Areas that fall into the hotspots category spread to the northwest in Sekernan District, and southeast and south in Mestong District and Sungai Gelam District. This study's results align with a study conducted by Alem et al. (2020), who found an early marriage in Ethiopia to have a clustered distribution pattern. Further LISA analysis found hotspots in the Amhara, Afar, Southeast Gambela, and southern Tigray regions (Alem et al., 2020b). The

same result was also found by Bolarinwa et al., who found a grouping of cases of early marriage in Nigeria. Areas that fall into the hotspot category are Sokoto, Kebbi, Katsina, Kano, Jigawa, Yobe, Bauchi, Niger, Borno, Gombe, and Adamawa (Bolarinwa et al., 2022).

Based on the results of the parameter test using the spatial error model (Spatial Error Model), it was found that the variable level of education that affected early marriage was the variable Percentage Not in School, Graduated from Elementary School, and Percentage Graduated from Junior High School. These findings are in line with previous research where the education level influences the incidence of early marriage (Bengesai et al., 2021; Sabbe et al., 2013). Similarly, the results of previous research in India stated that almost two-thirds of women with low levels of education engaged in early marriage (Santhya et al., 2010).

The results of the research study by Adedokun et al. explain a significant relationship between education and pregnancy complications. Those who are highly educated know the signs of pregnancy complications and can quickly access healthcare facilities (Adedokun et al., 2016). After all, education influences early marriage. Education has a role in delaying the time of marriage. In addition, education helps women in advancing their careers. Women with secondary or higher education have a lower prevalence of early marriage than women with low education. This shows the importance of education for women in reducing early marriage (Hamed & Yousef, 2017).

CONCLUSION

This study found a cluster of early marriages in Muaro Jambi Regency. Areas categorized as hotspots are the area to the northwest in the Sekernan sub-district and the southeast and south directions in the Mestong and Sungai Gelam sub-districts. Meanwhile, the low spots are located in Taman Rajo, North Bahar, and Jambi Outer City Districts.

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