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## Stunting Cases In Muaro Jambi District 2019–2021: Spatial Autocorrelation

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### Abstract

*Stunting is a major threat to the quality of Indonesian society. Stunting or short stature is a condition in which children have less height compared to their age. The 2020 Asian Development Bank report, Indonesia is the second highest country in the Southeast Asia region with a stunting prevalence of 31.8%. Children with stunting conditions will be at risk of having a level of intelligence that is not optimal and becomes more susceptible to disease. The impact of stunting is not only experienced by children but can affect in the future to adulthood, this can result in decreased levels of productivity. This study aims to determine the spatial pattern of the distribution of stunting cases in the Muaro Jambi Regency in 2019 – 2021. The research method uses an ecological study design with a spatial approach. The sample in this study used aggregate data of 22 working areas of the Community Health Centers in Muaro Jambi Regency. There is a trend of increasing stunting cases in Muaro Jambi Regency in 2019-2021 with a distribution pattern that is in the form of clusters or clusters and globally shows that there is a positive autocorrelation with the 2 working areas of the Puskesmas, which is called hot spot area as well as being a priority in tackling stunting cases.*

**Keywords:** Stunting Cases, Spatial Autocorrelation

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## INTRODUCTION

Stunting is a national nutrition problem that must receive special attention. Therefore, Indonesia is still working hard to overcome this problem. Children who suffer from stunting experience disturbances in their growth as a result of a lack of nutritional intake for a long time. This condition can start from the time the fetus is in the womb and when the baby is born, but it is only seen after the child is two years old (Ministry of Health, 2018).

The global prevalence of stunted toddlers in 2017 was 22.2% or around 150.8 million toddlers in the world were stunted. Indonesia is the second country with the highest prevalence of stunting in the Southeast Asia/South-East Asia Regional (ADB, 2021). Meanwhile, based on data from Basic Health Research (Riskesdas), it is known that there has been a decrease in the prevalence of stunting in Indonesia by 6.4% in a period of five years, from 37.2% in 2013 to 30.8% in 2018 (Ministry of Health, 2019).

In line with the World Health Assembly (WHA) global target of reducing the prevalence of stunting in Indonesia by 40% in 2021 from 2013 conditions. In addition, the target of the Sustainable Development Goals (TPB/SDGs) is to eliminate all forms of malnutrition by 2030 Therefore, to reduce the stunting prevalence rate to 22% by 2025, a holistic approach strategy is needed including specific nutrition interventions and sensitive nutrition (National Strategy, 2019).

A study conducted by Sipahutar, et al (2021) related to area discovery *hotspot* stunting in seven main islands in Indonesia using spatial analysis shows that out of 514 districts/cities in Indonesia, there are 135 that are included in *hotspot* stunting. Research conducted (Belayneh et al., 2021) in Ethiopia shows that there are areas with a higher risk of stunting and maternal malnutrition than the underlying at-risk population. Stunted children in the identified spatial group are more likely to come from poor families, young mothers, illiterate, farmers and housewives.

The results of the 2021 Indonesian Nutrition Status Study (SSGI) show that Muaro Jambi is the district with the highest prevalence (27.2%) of toddlers experiencing stunted in Jambi Province. Many studies related to stunting cases have been carried out in Jambi Province, but some of these studies have focused more on epidemiological characteristics and risk factors for stunting events. So far not there is research with a stunting case approach at the district level in Jambi Province. Therefore, this study aims to determine the spatial pattern of the distribution of stunting cases in Muaro Jambi Regency. This is certainly useful to support recommendations for reducing stunting cases.

## RESEARCH METHODS

This study uses an ecological study design with a unit of analysis of 22 Community Health Centers in Muaro Jambi Regency. The data analyzed in this study were stunting case report data obtained by the Electronic Community-Based Nutrition Recording and Reporting (E-PPGBM) of the Muaro Jambi District Health Office from 2019 to 2021. Data analysis used in this study was Moran's and *Local Indicator of Spatial Autocorrelation* (LISA) with the help of Geoda's free application. Moran's Index analysis aims to measure global stunting data spatial autocorrelation, while LISA aims to determine hotspot and coldspot areas.

## RESULTS AND DISCUSSION

Administratively it is divided into 11 districts. The population of Muaro Jambi Regency in 2020 based on data from the results of the 2020 Population Census is 402.0 thousand people. Muaro Jambi Regency has an administrative area with 11 sub-districts consisting of 150 villages and 5 sub-districts with 22 working areas of public health centers with an area of 526,400 Ha (5,264 Km<sup>2</sup>) with an altitude of 100-150 meters above sea level (BPS, Kab. Muaro Jambi, 2021).

Figure 1. Map of the distribution of stunting cases in Muaro Jambi Regency in 2019

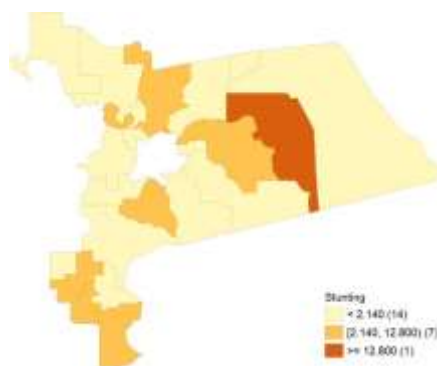


Figure 2. Map of the distribution of stunting cases in Muaro Jambi Regency in 2020

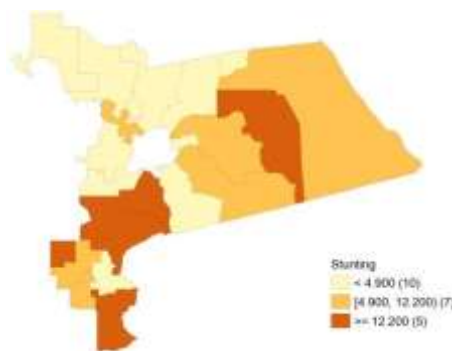
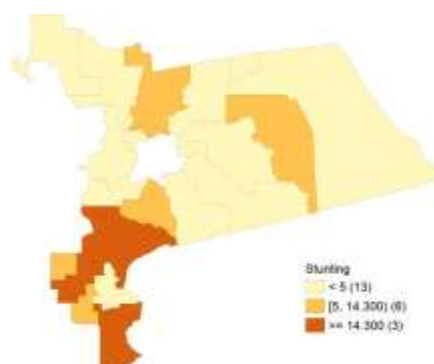


Figure 3. Map of the distribution of stunting cases in Muaro Jambi Regency in 2021



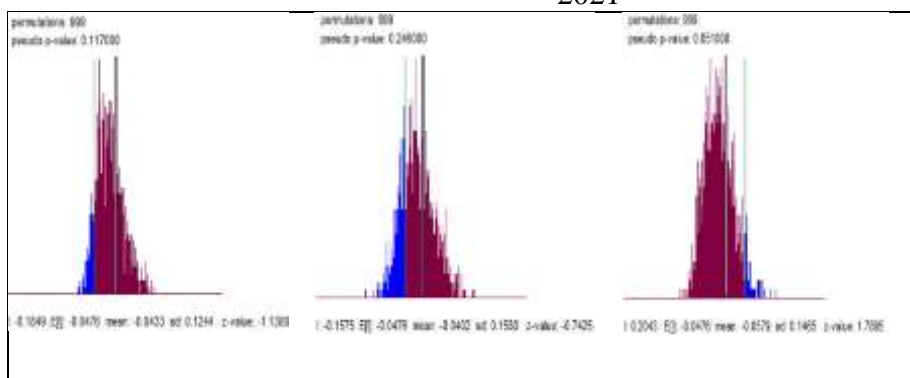
Spatial autocorrelation analysis with Moran's index test (*Moran's I test*) used to see and find out globally the pattern of the distribution of stunting according to the working area of the puskesmas in Muaro Jambi Regency. The spatial weighting matrix used in this study is the method *Queen Contiguity*, where a Puskesmas is said to be neighboring if the corners and sides of the boundaries of the puskesmas based on the map of the administrative area are that the puskesmas touch each other. In the table below are the results of the global Moran's Index analysis to see whether there is a global clustering of stunting cases.

Table 1. Pattern of the Distribution of Stunting Cases in Muaro Jambi Regency in 2019- 2021

Year	Moran Index	E[I]	P value	Spread Pattern
2019	-0.185	-0.1380	0.117	Not significant
2020	-0.158	-0.7425	0.2460	Not significant
2021	0.204	0.17895	0.051	<i>Clustered</i>

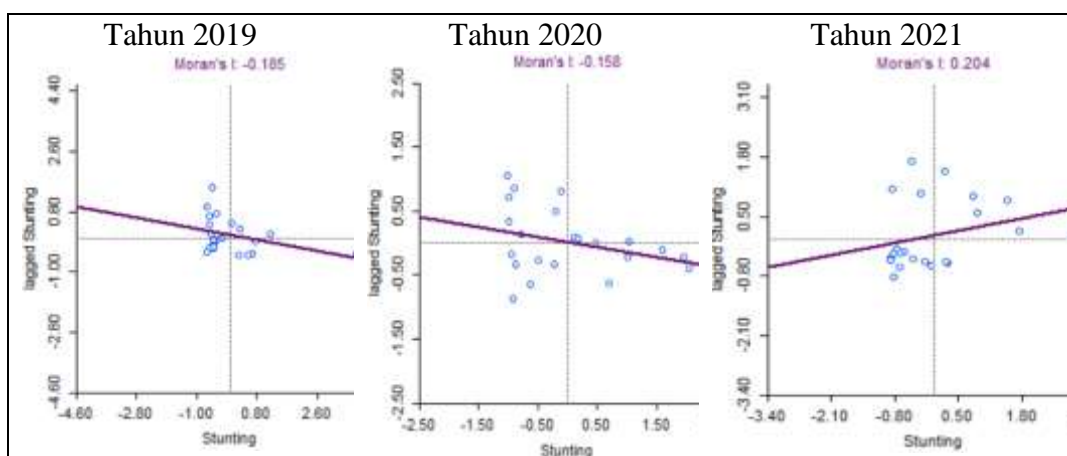
The table shows that in 2019 and 2020 there is no autocorrelation. In 2021 there is a positive autocorrelation with a p value <0.05 where the distribution pattern of stunting cases is clustered. In detail, the following are the results of the analysis which can be seen in the permutation values and scatter diagrams:

Figure 4. Diagram of the Relationship Pattern of Stunting Cases in Muaro Jambi Regency 2019-2021



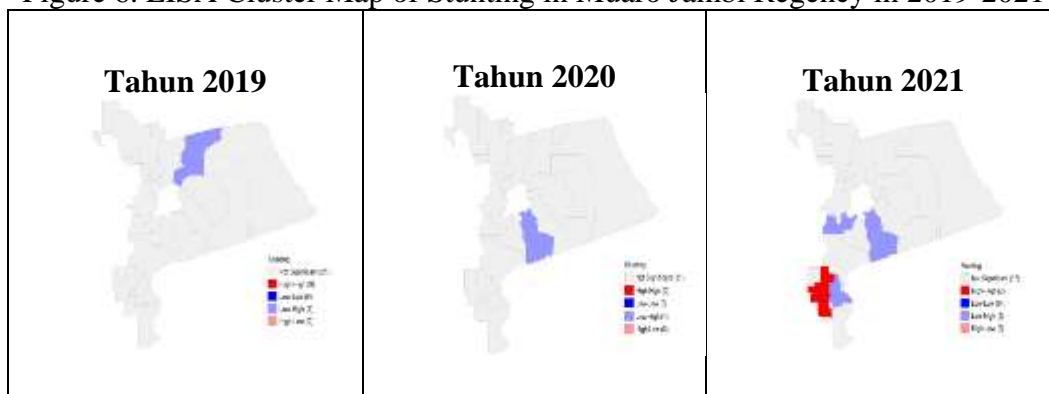
Whether there is spatial dependence or spatial autocorrelation can be seen in the value *Moran's Scatterplot*. If the value is positive with a p value <0.05, it can be concluded that there is autocorrelation and stunting cases are clustered. However, if the value is negative with a p value <0.05 then the stunting cases are spread or dispersed. The following is Moran's scatterplot for 2019-2021:

Figure 5. Scatter Diagram or Moran's Scatterplot



The results of Moran's scatterplot analysis show that in 2019 and 2020 there is no autocorrelation and in 2021 there is a positive autocorrelation.

Figure 6. LISA Cluster Map of Stunting in Muaro Jambi Regency in 2019-2021



Clustering stunting cases according to the work area of the puskesmas in Muaro Jambi Regency are divided into 4 quadrants, namely as follows:

Quadrant I: the work area of the health center with a high number of stunting is surrounded by the work area of the health center with high stunting, there are 2 work areas of the health center, namely the Sungai Bahar Health Center and the Markanding Health Center.

Quadrant II: The working area of the puskesmas with a low number of stunting cases is surrounded by the working area of the puskesmas with a high number of stunting cases, there are 3 Puskesmas, namely Kebon IX Health Center, Sungai Bahar Health Center, Bajubang Health Center.

Quadrant III: Puskesmas working areas with a low number of stunting cases are surrounded by puskesmas working areas with a low number of stunting cases also identified as LL sub-districts (*Low-Low*) or region *Cold Spot*. In this study there were no puskesmas working areas in quadrant III in 2019, 2020 and 2021.

Quadrant IV: the working area of a puskesmas with a high number of stunting cases is surrounded by a puskesmas working area with a low number of stunting cases. This quadrant is not found in 2019, 2020 and 2021.

### Discussion

The pattern of distribution of stunting cases observed from 2019 to 2021 in Muaro Jambi Regency shows a trend of increasing cases. The results of the spatial autocorrelation analysis using Moran's I Test show that the pattern of distribution of stunting cases based on the work area of the Puskesmas in Muaro Jambi Regency has a positive autocorrelation in 2021 where the Moran index value is 0.204. This proves that the p value  $<0.05$ , which means that spatially there is a relationship between the distribution of stunting cases between the working areas of the Puskesmas in Muaro Regency and they occur in groups.

Stunting or too short based on a person's age is defined as a height that is less than minus two standard deviations. This condition describes inadequate nutrition and repeated attacks of infection during the 1000 days of a child's life. Factors contributing to stunted growth include poor maternal health and nutrition, inadequate infant and young child feeding practices, and infections. In particular, including maternal nutrition and health status before, during and after pregnancy which affect the growth and development of the child since in the womb. Efforts made to achieve the global stunting target must begin with a situational analysis to determine the number of stunted children and assess the determinants of stunting specifically in a geographical and social context, so that actions are adapted to the contextual needs of the most vulnerable populations (WHO, 2014). Stunted children may never achieve full linear growth and their brains may never develop to their full cognitive capacities, impacting school readiness, learning performance and life chances. (Ganesh, 2013)

*Clustering* Stunting cases in this study used analysis *Local Indicator of Spatial Autocorrelation* (LISA) shows that the working area of the Puskesmas with a high number of stunting and surrounded by the working area of the Puskesmas with high stunting has 2 working areas of the Puskesmas which are referred to *ashot spot area* the priority areas for stunting prevention are the Sungai Bahar Health Center and the Markanding Health Center.

The study by Seboka et al, (2022) spatial clustering of hot spots (high risk) was consistently observed in northern Ethiopia across all surveys. In addition, a high risk of childhood stunting was observed in southern and eastern Ethiopia. Overall progress has been made in reducing stunting in children under 5 years of age, although the disparities varied across regions and districts between surveys, the patterns generally remained constant over time. Spatial autocorrelation analysis revealed the presence of a statistically significant cluster at 0.01, the level of significance across each of the three surveys conducted between 2011, 2016, and 2019.

Gupta and Santhya (2020) in their research which spatially analyzed stunting cases using data from the fourth round (2015-16) of the National Family Health Survey (NFHS-4) and the 2011 Indian Census found that stunting in children continues to be high in India with several hot spots in the

central and eastern regions, namely Bihar, Jharkhand, Madhya Pradesh and Uttar Pradesh. The risk factors that have been identified are short maternal stature, large household size, close pregnancy intervals, hypertension, poverty, open defecation and extreme temperatures. India

In addition, research was conducted by Kesuma et al, (2022) on children under 5 years in Indonesia shows that there is a spatial autocorrelation in the annual data used, so that the condition of stunting in Indonesia from 2015 to 2019 is interrelated between provinces. The condition of stunting in Indonesia still needs attention, even though in general the percentage of stunted sufferers is decreasing.

The increased risk of potentially irreversible loss of growth and cognitive function and increased morbidity and mortality associated with stunting demands further work on the etiology, prevention, and early treatment of stunted children. Intervention should be provided for sufficient time to assess linear growth. Treatment of stunted children should be considered a public health priority (Soliman et al, 2021).

## CONCLUSION

There is a trend of increasing stunting cases in Muaro Jambi Regency in 2019 - 2021 with a distribution pattern that is in the form of clusters or clusters and globally shows that there is a positive autocorrelation with the 2 working areas of the Puskesmas, which is called *hot spot area* as well as being a priority in tackling stunting cases.

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