

46. Spatial analysis of hypertension risk

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Spatial Analysis of Hypertension Risk Factors Incidence in South Kalimantan Province

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ABSTRACT

Background: This study aims to identify spatial effects on risk variables that influence the incidence of hypertension in South Kalimantan Province because the region has specific geographical variations.

Method: The research method used is cross-sectional with a population of all households in the province, city districts in Indonesia. The data to be analyzed in this study is the incidence of hypertension data in 13 regencies of South Kalimantan Province.

Results: It is identified 5 groups of districts/cities in South Kalimantan Province that have similarities regarding risk factors affecting the incidence of hypertension.

Conclusion: The results obtained can be used by the relevant leaders as a consideration in determining policies to suppress and control the incidence of hypertension in the province of South Kalimantan by considering factors related to specific hypertension disease in the regency/city area of each group.

Keywords: *Spatial, Hypertension, South Kalimantan, Indonesia*

INTRODUCTION

Hypertension is one of the non-communicable diseases that become public health problem⁽¹⁾. Uncontrolled hypertension can lead to degenerative diseases, such as congestive heart failure, kidney failure and vascular disease⁽²⁾. Hypertension is called the silent killer because it is asymptomatic and can cause fatal strokes. Although it cannot be treated, prevention and management can reduce the incidence of hypertension and accompanying diseases. Hypertension is the number one cause of death after stroke and tuberculosis, reaching 6.7% of the death population in all ages in Indonesia⁽³⁾.

According to the guidelines of the World Health Organization (WHO) in 2011, one billion people in the world suffer from hypertension, two-thirds of whom are

developing countries that are low-middle income⁽⁴⁾. The prevalence of hypertension will continue to increase sharply, predicted in 2025 later, around 29% of adults worldwide suffer from hypertension. Hypertension has resulted in the deaths of approximately 8 million people each year, 1.5 million deaths occur in Southeast Asia, of which a third of the population suffers from hypertension⁽⁵⁾.

Based on basic health research in 2013, the prevalence of hypertension in Indonesia obtained through measurements at ≥ 18 years of age was 25.8% revealed the highest in Bangka Belitung 30.9%, followed by South Kalimantan 30.8%, East Kalimantan 29.6% and West Java 29.4%⁽⁶⁾. The prevalence of hypertension in Indonesia obtained through a questionnaire diagnosed by health personnel was 9.4%, diagnosed by health personnel or taking medication at 9.5%. So there are 0.1% who make their own medicine — respondents who have normal blood pressure are taking hypertension medication at 0.7%. Thus the prevalence of hypertension in Indonesia is 26.5%.

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The aim to be achieved in this study is to identify spatial effects on risk variables that influence the incidence of hypertension in the province of South Kalimantan.

METHOD

This research is a secondary data-based documentation study. To complete the information contained in the research objectives required primary data collection through observational research with a survey approach. The data used were data from the 2013

Basic Health Research (RisqueDas) and BPS. The data is the result of a descriptive cross-sectional survey with a population of all households in the province, city districts in Indonesia. Primary data was also taken through a questionnaire on the respondents include knowledge, attitudes, self-concept, and family support — the location of this research in Banjarmasin Kalimantan Selatan. The research period was 2015 to 2016.

The data to be analyzed in this study is the incidence of hypertension in 13 regencies of South Kalimantan Province.

Table 1: Description of Research Variables

Variables	Description of Variables	Types of Variables
Y	Percentage of residents who have been diagnosed with hypertension / high blood pressure by health personnel	Response
Variables	Description of Variables	
X ₁	Percentage of male population	Predictor
X ₂	Percentage of population with primary education	Predictor
X ₃	Percentage of population with smoking habits every day	Predictor
X ₄	Percentage of people who have moderate physical activity habits.	Predictor
X ₅	Percentage of population who have fruit consumption habits seven times a week	Predictor
X ₆	Percentage of people who have a habit of consuming vegetables seven times a week	Predictor
X ₇	Percentage of people who have a habit of consuming salty food more than one time per day	predictor
X ₈	Percentage of people who have the habit of eating food fat/cholesterol / fried more than one time per day	predictors
X ₉	Percentage of population with medical assurance / veteran / retired	predictors

RESULTS

The full Geographical **Weighted Regression (GWR) model** for each location is presented in the Appendix. Districts in South Kalimantan Province have different models of the prevalence of hypertension. Based on the variables that are significant for each area, a grouping of

districts/cities is formed that has similar variables which significantly influence the prevalence of hypertension. The cluster of districts/cities that have related variables that have a significant effect on the incidence of hypertension is presented in Table 4

Table 2: District / City Grouping Based on Significance

Spatial Groups	Variables significance	Variables Description of Variables
Tanah Laut	X3, X4, X6	Percentage of hypertensive patients diagnosed (Y) Percentage of the population of male sex (X ₁) Percentage of population with basic education (X ₂) Percentage of population with daily smoking habits (X ₃) Percentage of people with physical activity (X ₄) Percentage of the population consuming fruit - ingredients seven times in 1 week (X ₅) Percentage of people who consume vegetables seven times in 1 week (X ₆) Percentage of people who drink salty food more than 1 time per day (X ₇) Percentage of the population consuming fatty food consumption/cholesterol / fried food more than one time per day (X ₈) Percentage of population with health insurance ownership (X ₉)
Tanah Bumbu	X3, X4, X6	
Kota Baru	X4, X8	
Banjar Kota Banjarmasin Banjar Baru	X4, X5, X6, X7	
	X4, X5, X6, X7	
	X4, X5, X6, X7	
Barito Kuala	X3, X4, X9	
Tapin Hulu Sungai Selatan Hulu Sungai Tengah Hulu Utara River Tabalong Balangan	X1, X5	
	X1, X5	
	X1, X5	
	X1, X5	
	X1, X5	
	X1, X5	

Grouping based on significant variables is divided into five groups. There are districts/cities that have similar variables that have a significant effect on the surrounding areas, but there are districts/cities that have their uniqueness because the variables that are having a significant impact are not the same.

Based on the results of spatial regression, there are five groups. Districts/cities that have similar variables that have a significant effect on the surrounding districts/cities. The results of the above study indicate that group 1 consists of Tanah Laut and Tanah Bumbu Districts with characteristics Percentage of population with daily smoking habits (X₃), Percentage of people with physical activity (X₄), Percentage of the population consuming vegetables seven times in 1 week (X₆). Group 2, Kota Baru Regency with the characteristics of the percentage of the population having physical activity (X₄), Percentage of the population consuming consumption of fatty/cholesterol / fried foods more than once per day (X₈). Group 3 consists of Banjar Regency, Banjarbaru City, Banjarmasin City, with characteristics Percentage of population who have physical activity (X₄), Percentage of people who consume fruits 7 times

in 1 week (X₅), Percentage of population consuming vegetables 7 times in 1 week (X₆), the percentage of people who drink salty food more than 1 time per day (X₇). Group 4 in Barito Kuala Regency with characteristics Percentage of population with smoking habits every day (X₃), Percentage of people with physical activity (X₄), Percentage of population with Askes / JPK PNS / ¹⁹eran / Pension ownership (X₉). Group 5 consists of Tapin Regency, Hulu Sungai Selatan, Hulu Sungai Tengah, Hulu Sungai Utara, Tabalong, Balangan with characteristics Percentage of the population of male sex (X₁), Percentage of the population consuming fruits seven times in 1 week (X₅).

DISCUSSION

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Spatial analysis is a set of methods for finding and describing the level/pattern of a spatial phenomenon so that it can be better understood. By conducting spatial ²²lysis, new information is expected to emerge which can be used as a basis for decision making in the area under study. The methods used are very varied, from visual observation to the use of mathematics / applied statistics ⁽⁷⁾.

As a method, spatial analysis seeks to assist planners in analyzing the condition of the problem based on data from the target area. And the concepts that underlie a spatial analysis are distance, direction, and relationships. The combination of the three regarding a region will vary to form a significant difference that distinguishes one location from another. Thus distance, direction, and the relationship between the position of an object in an area with objects in another region will have a clear difference. And these three things are things that are always present in spatial analysis with certain stages depending on the planner's perspective in looking at a problem of spatial analysis⁽⁸⁾.

The analysis using the Geographic Weighted Regression (GWR) method aims to determine the variables that influence the prevalence of hypertension at each observation location, namely the sub-district in the province of South Kalimantan. The result described is the prevalence of hypertension modeling using the Geographic Weighted Regression (GWR) method.

CONCLUSION

The results obtained can be used by the relevant leaders as a material consideration in determining policies to suppress and control the incidence of hypertension in the province of South Kalimantan. By considering factors related to specific hypertension disease in the regency/city area of each group.

Ethical Clearance: Ethical clearance was obtained from The Ministry of Health Polytechnic Banjarmasin, Indonesia. We also wish to thank all the participants who contributed to this study.

Conflict of Interest: Nil.

Source of Funding: Nil.

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