Association for Percentage of DPT Immunization Against Incidence of Diphtheria in West Java province 2017 with spatial analysis

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Abstract - Diphtheria is one of the infectious diseases that can be prevented by immunization which was still suffered 954 people with a mortality rate of 4.61%. West Java Province is one of the provinces with the second largest number of sufferers in Indonesia. Many statistical tests but do not include spatial elements in the analysis. The purpose of this study was to find out the spatial relationship between diphtheria incidence and the relationship factors in DPT immunization coverage. This study was cross-sectional with spatial regression data analysis approach were used 2017 of West Java Province health profile's data and reports from the Central Statistics Agency of Indonesia. The results of analysis in the form of spatial patterns were interpreted. This study was Moran's Index of diphtheria in West Java Province was 0.255. Diphtheria in West Java Province was collecting pattern in west of the region and autocorrelation between district / cities. The low percentage of immunizations in Cianjur, Purwakarta, Karawang, and Bekasi were effect of increasing the incidence of diphtheria. Subang, West Bandung, Bekasi, Bogor City, Depok City, Sukabumi City have greatest risk of contracting diphtheria from neighboring districts / cities. It is recommendation to increase coverage and further research on risk factors for diphtheria in the West Java province spatially

Index term - Diphtheria; DPT; Spatial.

I. INTRODUCTION

Diphtheria was an infectious disease in Indonesia with 954 cases in 2017 with a CFR of 4.61%. People with diphtheria were suffering most from 5 until 9 years old. West Java Province was 167 cases of diphtheria and it was province with second largest number of cases in Indonesia after East Java Province was dominated age range 5 until 9 years old[1].

Diphtheria is a disease that can be prevented by immunization but it is transmitting in West Java Province and dominated 5 - 9 year old of 29.71% in 2017[2].

Efforts that can be made to prevent transmission of diphtheria can be done in various ways, one of which is the assessment of risk factors to make prevention easy and effective. Assessment of risk factors can be through statistical analysis to find relationships statistically which contribute to increase cases of diphtheria. Statistical analysis that can be used spatial analysis because the statistical method is more accurate in making models to describe cases than other statistics (classical regression) because there have geographical factors that are also analyzed[3].

The lack researches on spatial autocorrelation in diphtheria in the West Java province made researcher want to find out whether the incidence of diphtheria in West Java Province and linking of percentage of DPT immunization as a risk factor for the spread of diphtheria.

II. METHOD

This study's design was cross-sectional and used data from West Java Province's Health Profile in 2018 which contains data number of diphtheria cases in 2017. Data was free and public domain, which can be downloaded in West Java Province's Health Office at http://www.diskes.jabarprov .go.id.
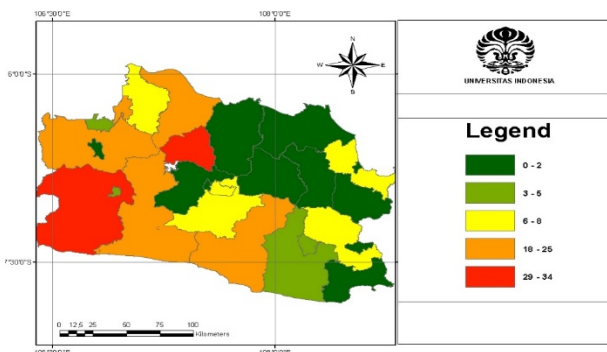
Analyzed Variable was Number of Diphtheria Events as dependent variable and Percentage of Toddlers who had Received DPT Immunization as independent variables.

Data analysis used Opengeoda software version 1.12 which can be downloaded for free. analysis used Moran's Index method with results in the form for distribution patterns of diphtheria in each district / city in West Java Province. Neighboring models used Queen Method with a sample was 27 districts / cities with study units was districts / city level. The purpose of this study was to identifying spatial relationship of diphtheria events in each districts / city in West Java Province in 2017.

III. RESULT

Value of Moran's Index for Number of Incidence Diphtheria on West Java Province in 2017 was 0.255. Initial moran value was -0.039 so Moran value for diphtheria was greater than initial Moran value so that conclusion of diphtheria in West Java Province in 2017 was autocorrelation and it was a group pattern according to the number of diphtheria events in which district / city. Pattern of diphtheria groups can be seen in figure 1

Figure 1. distribution of diphtheria in West Java Province

Districts that have high number of diphtheria were in Districts: Bogor, Sukabumi, Cianjur, Garut and Karawang. They were patterns that was close together so they have an attachment based on geographical location. This was according with the Moran's Index value. Results of the moran analysis were shown in table 1

Table 1 Results of Diphtheria Moran's Test on West Java Province in 2017

Moran's Quadrant	District / City Name
Quadrant 1 (High – High)	Bogor, Garut, Purwakarta, Sukabumi, Karawang, Cianjur, Kota Bekasi
Quadrant 2 (Low – High)	Subang, Bandung Barat, Bekasi, Kota Bogor, Kota Depok, Kota Sukabumi
Quadrant 3 (Low – Low)	Bandung, Tasikmalaya, Ciamis, Kuningan, Cirebon, Majalengka, Sumedang, Indramayu, Subang, Pangandaran, Kota Bandung, Kota Cirebon, Kota Cimahi, Kota Tasikmalaya, Kota Banjar.
Quadrant 4 (High – Low)	-

Table 1 was shown there are 7 districts / cities were in quadrant 1 (high - high), which means that districts / cities were high number of diphtheria and they located around districts / cities that have high incidence of diphtheria. Quadrant 2 was 6 districts / cities so that districts have low diphtheria cases and they located in surrounding districts / cities that have high diphtheria incidences. 15 districts were in quadrant 3 (low-low), which means the districts have low cases of diphtheria and they located around districts / cities that have low cases of diphtheria.

Percentage of Children Under Five who have Received DPT Immunization's variable, were LISA bivariate test performed with dependent variable number of diphtheria events obtained in table 2.

Table 2 Cluster of Bivariate LISA analysis

Cluster	Districts / Cities
High – High	Bogor, Kota Depok
Low – Low	Cirebon
Low – High	Cianjur, Purwakarta, Karawang, Bekasi
High - Low	Majalengka, Ciamis

Bogor District and Depok City have high number of cases and they percentage of children under five years who were immunized DPT against high. Cirebon District was low diphtheria cases and percentage of under-immunized children low. Cianjur, Purwakarta, Karawang, and Bekasi have high number of diphtheria cases and have percentage of low immunized children. Majalengka and Ciamis have low diphtheria cases and have high percentage of immunized toddlers.

IV. DISCUSSION

Moran's Test results showed the incidence of diphtheria in West Java Province in 2017 has spatial significance. It is caused by diphtheria which can spread between surrounding areas and increase number of cases in quadrant region 2. There were 6 districts / cities in quadrant 2 so it is very risky contracting diphtheria originating from surrounding districts / cities, especially districts / cities that have higher incidence of diphtheria. In addition, results of the Moran Test can be used to find out areas that have high risk factors for contracted[4][5].

LISA Bivariate Test results Bogor District and Depok City numbers of diphtheria events remained high even though the percentage of DPT immunization was high. Previous research in Bogor District, were results of interviews 3 from 4 informants showed that there were still many children who weren't re-immunize when their toddlers were immunized against DPT because parents were worried about the effects after immunization[6]. Re-immunization were needed to maintaining antibody levels as you age higher[7].

Cianjur, Purwakarta, Karawang, and Bekasi Districts have high number of diphtheria cases but percentage of DPT immunization were low. Solutions were do mass vaccinations which include adult vaccinations, door to door vaccinations, building vaccination posts, or vaccinations in schools. Vaccination was needed to prevent transmission of disease to other areas around it as not to expand other area[8].

Cirebon District was small case of diphtheria and it was small percentage of immunization. This can be caused by other factors that affect small number of diphtheria events.

V. CONCLUSION

a. Conclusion

Incidence of diphtheria in West Java Province in 2017 has a geographical attachment. The proportion of diphtheria in the west is more than in other regions and close together. DPT immunization is not only factor reducing incidence of diphtheria but there are other factors that affect mainly portion of events in the west.

b. Recommendation

Further research is needed on additional factors in Bogor Regency and Depok City. Further research in Cirebon Regency about the small amount of diphtheria. Special attention is needed to increase immunization coverage in cianjur, Purwakarta, Karawang, and Bekasi.

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