DEC 19, 2022

Analysis of the effect of wind speed in increasing the COVID-19 cases in Jakarta

DOI
dx.doi.org/10.17504/protocols.io.ewov1odzylr2/v1

Dewi Susanna[1], Yoerdy Agusmal Saputra[2], Sandeep Poddar[3]

[1]Universitas Indonesia;
[2]Indonesian Institute of Health;
[3]Lincoln University College

Yoerdy Agusmal Saputra

ABSTRACT

Background:
COVID-19 remains public health problem around the world. It is possible the climate could affect the transmission of COVID-19.Wind is one of the climate factors besides temperature, humidity, and rainfall. This study aimed to describe spatial patterns and find the correlation of wind speed (maximum and average) with the pattern of COVID-19 cases in Jakarta, Indonesia.
Methods:
The design of this study was an ecological study based on time and place to integrate geographic information systems and tested using statistical techniques. The data used were wind speed and weekly COVID-19 cases from March to September 2020. These records were obtained from the special coronavirus website of Jakarta Provincial Health Office and the Indonesian Meteorology, Climatology and Geophysics Agency.The data were analyzed by correlation, graphic/time trend, and spatial analysis.

DOI

dx.doi.org/10.17504/protocols.io.ewov1odzylr2/v1

PROTOCOL CITATION

Dewi Susanna, Yoerdy Agusmal Saputra, Sandeep Poddar 2022. Analysis of the effect of wind speed i increasing the COVID-19 cases in Jakarta. **protocols.io**
https://dx.doi.org/10.17504/protocols.io.ewov1odzylr2/v1

FUNDERS ACKNOWLEDGEMENT

Directorate Research and Development Universitas Indonesia
Grant ID: PENG-006/UN2.RST/PPM.00.00/2022

CREATED

Dec 14, 2022

LAST MODIFIED

Dec 19, 2022

PROTOCOL INTEGER ID

73969

Methods

1 Study design

A quantitative method was applied with an ecological design that provides real-time and location analysis, using geographic information systems, and the data were tested using statistical techniques.

2 Data collection

The secondary data comprised daily reports of COVID-19 infection and wind speed (maximum and mean) in Jakarta from the pandemic inception, specifically between March and September 2020. These records were obtained from the website of the Jakarta Provincial Health Office (https://corona.jakarta.go.id/id/data-pemantauan) and the website of the Indonesian Meteorology, Climatology and Geophysics Agency (https://dataonline.bmkg.go.id/akses_data). Subsequently, the general information was converted into 31-weeks documentation. Furthermore, a basic map of Jakarta with neighboring community boundaries was obtained using the GADM Map and Data site https://gadm.org/. Coordinates for the weather monitoring stations were accessed online from https://www.gps-latitude-longitude.com/. The Jakarta province comprising 261 urban villages served as the research location.

3 Statistics data analysis

Univariate analysis was conducted to determine individual variable distribution, including maximum and average wind speed (m/s), as well as the number of COVID-19 cases. This process is descriptive and quantitative, where the data exist in statistical distribution tables, line graphs, and thematic maps based on the research objectives. Subsequently, the bivariate analysis involved Pearson's product-moment correlation test to evaluate the relationship between independent (wind speed factor) and dependent variables (COVID-19). Specifically, the method stated the possible existence ($p < 0.05$), closeness (r), and direction of the relationship. In addition, the strengths of the association were qualitatively divided into four categories, where r=0.00–0.25 was absence/weak relationship, r=0.26–0.50 was moderate, r=0.51–0.75 was strong and r =0.76–1.00 was very strong/perfect.14The correlation value also determined the direction of the relationship as a positive (+) or negative (-) pattern. This value ® was evaluated by the conditions, where r = 0 was no linear relationship, r = -1 was perfect negative linear and r =1 was perfect positive linear.14Furthermore, the univariate and bivariate analysis was conducted at the Computer Laboratory using SPSS 21 software (RRID:SCR_002865).

4 Spatial data analysis

Spatial analysis was performed to observe the relationship pattern between the two variables. Based on a selected community, an interpolation process was employed to create an overlay map of COVID-19 cases and climate parameters. The Jakarta grid map interpolation was used to estimate the magnitude of climate variables outside the measurement points (weather stations) by applying the following steps. Firstly, a grid map of five weather monitoring stations was created. The interpolation was performed by entering the point values or coordinate attribute data (longitude and latitude) into the climate variable attribute table so. The coordinate points were joined in the climate variable map. Secondly, the independent variable vector data were digitized by inputting the spatial data on climate variables into a base map, then processing and selecting a color symbol (single-band pseudocolor) with color ramp blues. Consequently, a digital category of high and low climate variables was formed depending on the data magnitude. Thirdly, the dependent variable vector data were digitized by entering spatial data on COVID-19 rates into the base map, depending on the community, followed by processing and selecting a point symbol (centroid). A digital category of large and small cases was generated based on the disease data. Fourthly, the two vector maps were interpolated with the plugin interpolation menu. Therefore, an interpolated raster plot was obtained and used to analyze or predict the climate variable values in each community. The resulting color gradations and point symbols did not show any ratio but only reported ordinal values, including high-low climate variations and number of virus cases. This color gradation ranged from dark blue to white, indicating high to low wind speeds (maximum and mean). Subsequently, the colors were created digitally using a single band pseudocolorwith ramp blues colors from Quantum Geographic Information System (QGIS) software(RRID:SCR_018507) with a natural grouping of five classes, where very dark blue = very high, dark blue = high, blue = medium, light blue = and white = very low. The dot symbol (centroid) varied from large to small, representing the virus spread. Similarly, the point symbol size was digitally generated using a simple marker or a standard symbol from the QGIS software with a linear classification between 0 and 17.

The spatially analyzed data were further processed with overlayed thematic graphics and maps to show the relationship pattern based on time and location. The spatial analysis was associated with the statistical correlation results generated using the QGIS software version 3.0 at the Computer Laboratory of the Faculty of Public Health, University of Indonesia.

Citation: Dewi Susanna, Yoerdy Agusmal Saputra, Sandeep Poddar Analysis of the effect of wind speed in increasing the COVID-19 cases in Jakarta https://dx.doi.org/10.17504/protocols.io.ewov1odzylr2/v1