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ORIGINAL ARTICLE

# Spatial Analysis of The Distribution of Drug Abuse Cases in East Java Province, Indonesia 2019-2023

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## ABSTRACT

**Background**: The high rate of drug abuse in East Java Province indicates a complex socioeconomic issues that are region-based. This can be seen from the uneven distribution of drug abuse cases, which is thought to be influenced by regional socioeconomic conditions. A spatial approach, specifically spatial autocorrelation analysis, is needed to identify clustering patterns and interregional connections. Objective of this study to identify the areas in East Java with the highest risk of drug abuse rates from 2019 to 2023. **Methods**: This is an observational study with a cross-sectional design using spatial autocorrelation analysis. The population and sample consist of 38 regencies/cities in East Java Province from 2019 to 2023, with a total sampling technique. **Results**: There was spatial autocorrelation in drug abuse cases with positive and significant Moran's I value over five years. There was spatial autocorrelation in the variables of minimum wage, crime rate, and open unemployment rate in relation to drug abuse cases with positive and significant Moran's I value over five years. Conclusion: There is spatial autocorrelation in the variables of minimum wage in regencies/cities, crime rates, and open unemployment rates in relation to drug abuse cases in East Java Province from 2019 to 2023. **Conclusion**: the results of this study can be used as a basis for policy formulation focusing on areas with high wages, high crime rates, and high unemployment rates regarding region-based drug abuse interventions so that integrated interventions can be carried out.

**Keywords:** Drug abuse, Spatial autocorrelation, Moran's I, Socioeconomic factors, East Java Province

## INTRODUCTION

Spatial analysis is a scientific approach that uses geographically based data to identify, visualize, and analyze patterns, distributions, and relationships between variables with a spatial dimension. In the field of public health, this analysis plays a vital role in understanding disease spread, determining environmental risk factors, designing location-based interventions, and evaluating accessibility to health facilities. This technique allows for the visualization of health data on geographic maps, thus facilitating effective intervention planning and more targeted decision-making (Mufida & Fahmi, 2024). Technologies such as Geographic Information Systems (GIS) have simplified the implementation of spatial analysis by providing tools to manage, visualize, and analyze geospatial data (Mufida, 2024). GIS is often used in epidemiological mapping to identify disease clusters, evaluate health facility accessibility, and determine the relationship between socioeconomic conditions and health indicators (Cromley & McLafferty, 2012).

Spatial analysis has become an important approach in understanding and dealing with drug abuse, which is a complex problem with social, economic, and geographic dimensions (Istiqlala & Fahmi, 2024). By utilizing technologies such as Geographic Information Systems (GIS), researchers and policymakers can identify the distribution patterns of drug abuse cases, determine risk

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factors, and design more effective interventions (Istiqlala, 2024). This approach allows for the identification of drug-prone zones based on socioeconomic, demographic, and infrastructure parameters, thereby providing deep insights that cannot be generated by ordinary descriptive analysis. In Indonesia, research conducted by Supriadi et al. (2022) in Bandar Lampung City used GIS to determine drug abuse-prone areas by considering factors such as population density, poverty levels, and crime rates. The results showed that the crime rate was the most dominant parameter in determining a region's vulnerability to drug abuse.

Drug abuse is defined as the periodic or regular use of one or more types of psychoactive substances (Narcotics, Psychotropics and Addictive Substances) outside of medical instructions or guidance (Azmiyati S.R., Cahyati W.H, 2014). Global drug abuse cases continue to increase every year; based on data from the World Drug Report 2023 published by the United Nations Office on Drugs and Crime (UNODC), the number of drug users worldwide has reached about 296 million people, equivalent to 5.8% of the global population aged 15–64 years. This number represents a significant increase of 12 million people compared to the previous year. Of this total, more than 39 million people suffer from health problems due to drug use (BNN Public Relations, 2024).

Drug abuse in Indonesia, based on the 2023 national survey on the prevalence of drug abuse, shows that about 3.3 million people, or 1.73% of the population aged 15–64 years, are involved in drug abuse, with a considerable increase among the 15–24 age group. In 2023, an estimated 3,337,816 people were involved in drug abuse. However, this number decreased by 324,830 people compared to the total in 2021, which was 3,662,646 people. Meanwhile, the number of drug users in 2021 increased by 243,458 people compared to 2019, which was 3,419,188 people (BNN Puslitdatin, 2023).

Based on drug abuse prevalence data in East Java in 2023, the total number of inmates in East Java Province, reaching 12,851 prisoners, places the province second nationally for the highest number of prisoners due to drug cases. Furthermore, East Java also ranks second nationwide for the top 10 drug-prone areas, according to the mapping data from the Community Empowerment Division of the National Narcotics Agency (BNN) in the Indonesian Drugs Report May 2024 (BNN RI, 2024). The high rate of drug abuse in East Java is supported by the following data:

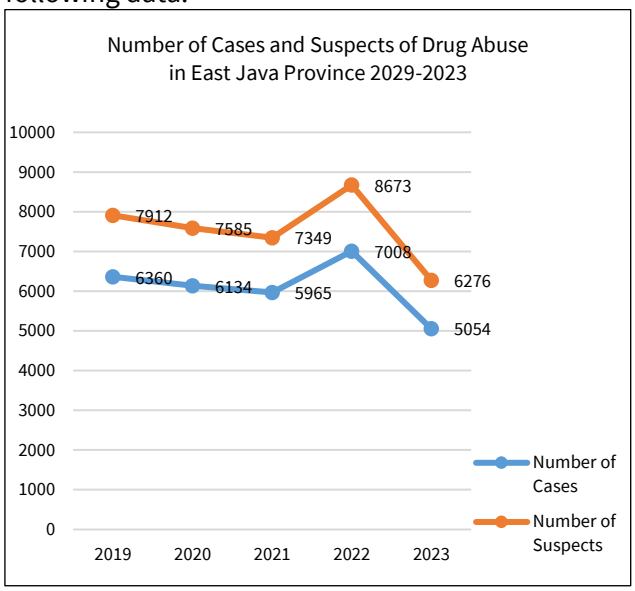


**Figure 1.** Cases and Suspects of Drug Abuse in East Java Province, 2019–2023
(Source: East Java Regional Police Data)

According to Badri M. in Lasri 2018, drug abuse is often based on several factors, usually divided into two major sections. Individual factors such as knowledge, attitude, personality, gender, age, desire for pleasure, curiosity, and for solving current problems. Environmental factors such as employment, family disharmony, socioeconomic class, and peer pressure. Based on research by Pina (2015), environmental factors, including social interactions and relationships, play a significant role in encouraging individuals to engage in drug abuse. Kominfo.jatimprov (November 2009) added that a lack of understanding and knowledge about the dangers of drugs is also a concerning dominant factor in drug abuse cases. According to Aisyah (2024), high unemployment rates and socioeconomic inequality also contribute to the increase in drug abuse cases. Regions with unstable

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social and economic conditions tend to be vulnerable to drug abuse. Furthermore, the performance of law enforcement officials in prosecuting and preventing drug circulation also affects the number of drug cases. These factors indicate that drug abuse in East Java is influenced by a complex combination of demographic, economic, social, and institutional factors.

The high number of drug abuse cases in several regions of East Java, influenced by many factors, leads to a widening area where drug abuse occurs, making it difficult to determine highly vulnerable areas. Information about drug-prone areas is needed as input for policy decisions on the prevention, eradication, misuse, and illicit trafficking of narcotics as an effort to minimize the increase in drug abuse cases. Based on this background, the researcher intends to determine the distribution pattern in East Java Province that poses the highest risk for drug abuse rates from 2019 to 2023.

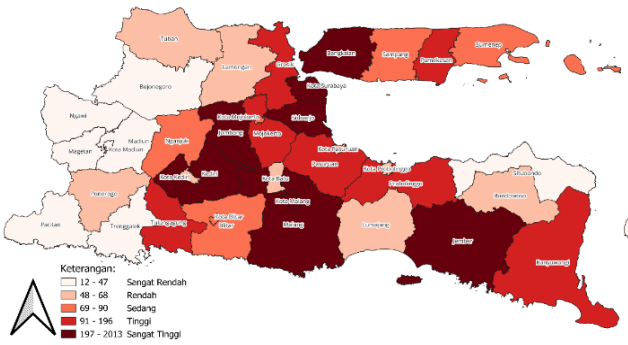
## METHODS

This research is a secondary data analysis using an observational study type with a cross-sectional design, employing a spatial analysis approach to map and analyze the distribution pattern of drug abuse cases in East Java Province during the 2019–2023 period. The population and sample are 38 Regencies/Cities in East Java Province from 2019–2023, using a total sampling technique. The instrument in this research is an observation sheet used to record and organize the research data. The data in this study use secondary data in the form of drug abuse case data in East Java from 2019–2023, obtained from the Drug Investigation Directorate of the East Java Regional Police, as well as other supporting data, including Gini ratio, human development index, crime rate, population density, open unemployment rate, and regency/city minimum wage, which were obtained from the East Java Statistics Indonesia website (BPS). The data analysis technique in this study uses two software: Quantum GIS, which is used for map data visualization, and GeoDa, which is used for further spatial analysis of univariate and bivariate spatial autocorrelation with Global Moran's Index and Local Moran's Index.

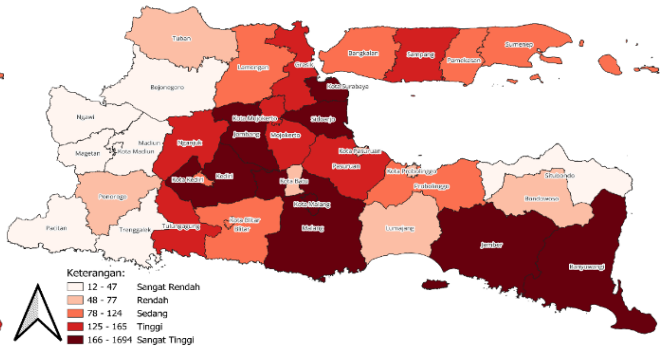
## RESULTS AND DISCUSSION

### Spatial Distribution Pattern of Drug Abuse Cases in East Java Province 2019–2023

Based on the research results, the drug abuse map in East Java shows an increasing trend of cases, with the very high category located in the central region, specifically Surabaya City, Sidoarjo Regency, Kediri Regency, Jombang Regency, Malang City, and Malang Regency; as well as the eastern region, namely Jember Regency and Banyuwangi Regency. Meanwhile, the western and northern parts of the region relatively show a lower intensity of cases. This spatial dynamic indicates that factors such as urbanization, population density, major economic activities, and transport connectivity contribute to the formation of drug abuse clusters in areas with major city functions and industrial zones.




(a)2019




(b)2020

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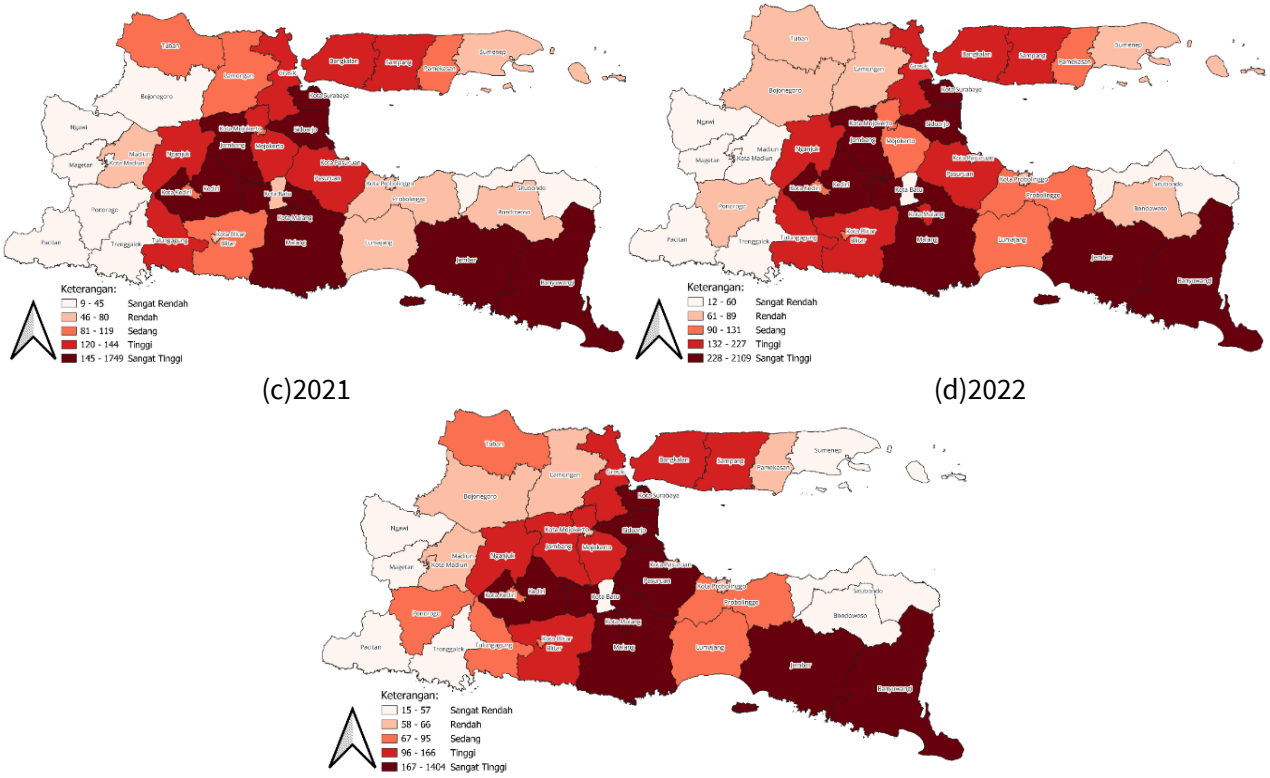


(c)2021 (d)2022

(e)2023

**Figure 2.** Map of Drug Abuse Distribution in East Java Province 2019–2023

Based on the research results, the drug abuse map in East Java shows an increasing trend of cases, with the very high category located in the central region (Surabaya City, Sidoarjo Regency, Kediri Regency, Jombang Regency, Malang City, and Malang Regency) and the eastern region (Jember Regency and Banyuwangi Regency). This pattern reflects that regions with high population density, large economic activity, and high community mobility are more vulnerable to drug circulation. The trend of increasing and decreasing drug abuse cases is also influenced by urbanization and population growth, as well as the increase in drug distribution routes in centers of economic activity (Dewabrata, W. 2023).

This result aligns with the research conducted by Dewabrata, W. (2023) based on Indonesian rehabilitation patient data from 2019–2020, which found that individuals living in urban areas, coupled with high population growth rates, tend to have a significantly higher risk of severe drug addiction compared to those living in rural areas. The contributing factors are high population density, income inequality, high mobility, and easier access to drug circulation in urban areas. Furthermore, the results of this study also show that the high number of drug abuse cases in East Java is inseparable from the role of large cities, especially Surabaya, as the main node for economic and trade activities.

Complete transportation access, population density, and high mobility intensity make this region strategic yet vulnerable to being exploited by drug trafficking networks. This is reinforced by the East Java Regional Police's finding of an international drug network with 21 kg of crystal meth, valued at 22 billion rupiah, distributed through port routes in Surabaya (Tribrata News, 2025). This condition confirms that urban economic centers not only attract migration and population growth but also function as the main transit routes for drug distribution, contributing to the increasing trend of abuse in East Java.

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**Global Moran's I and Local Moran's I (LISA) Spatial Autocorrelation of Drug Abuse Cases in East Java Province 2019–2023**

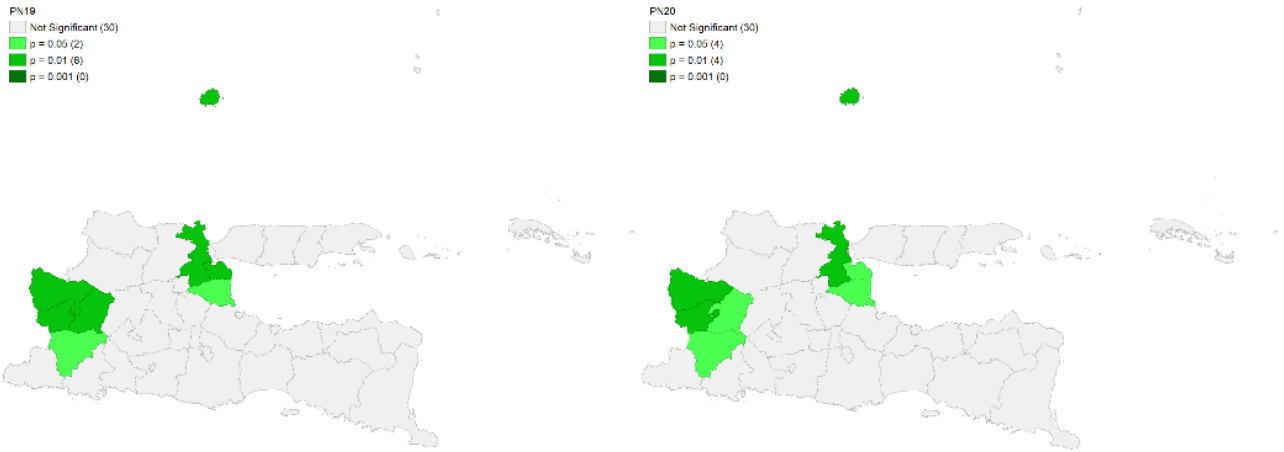
The Global Moran's I test results over five years show a positive, weak, but significant spatial pattern for drug abuse cases in East Java. This indicates that drug abuse cases tend to form regional clusters, although the strength of the relationship is relatively low, with Moran's I values in the range of 0.12–0.19. Although weak, this pattern remains significantly meaningful with a p-value < 0.05. Specifically, the Moran's I values were recorded as 0.165; 0.158; 0.193; 0.129; and 0.127, with pseudo p-values of 0.012; 0.013; 0.011; 0.010; and 0.008, respectively. Thus, it can be concluded spatially-temporally that the clustering pattern of drug abuse cases in East Java is consistent from year to year, albeit with a relatively weak relationship strength.

The LISA results in the Cluster Map show a clear, clustered (non-random) and consistent local spatial pattern from year to year. Two regions consistently fall into the High-High cluster: Surabaya City and Sidoarjo Regency, showing a consistent pattern as a high drug case cluster. Five regions fall into the Low-Low cluster: Ngawi Regency, Magetan Regency, Madiun Regency, Madiun City, and Ponorogo Regency, which tend to show a low drug case cluster. These areas become the hotspots and coldspots of the observed phenomenon and can be used as targets for policy intervention.

The Significance Map provides information on the statistical strength of the identified clusters. In the LISA Significance Map, over five years, Gresik Regency was the only consistent region in the very significant category, at a significance of 0.01. This indicates a fairly strong and stable spatial autocorrelation of drug cases in Gresik. Although other regencies/cities were not entirely consistent across various significance categories, a highly significant spatial relationship was not found in other regions.

**Table 1.** Univariate Global Moran's I Test Results for Drug Abuse Cases in East Java Province 2019–2023

| Variable | Moran's I | | | | | p-value | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **2019** | **2020** | **2021** | **2022** | **2023** | **2019** | **2020** | **2021** | **2022** | **2023** |
| Drug Abuse | 0.165 | 0.158 | 0.193 | 0.129 | 0.127 | 0.012 | 0.013 | 0.011 | 0.010 | 0.008 |




(a)2019 (b)2020

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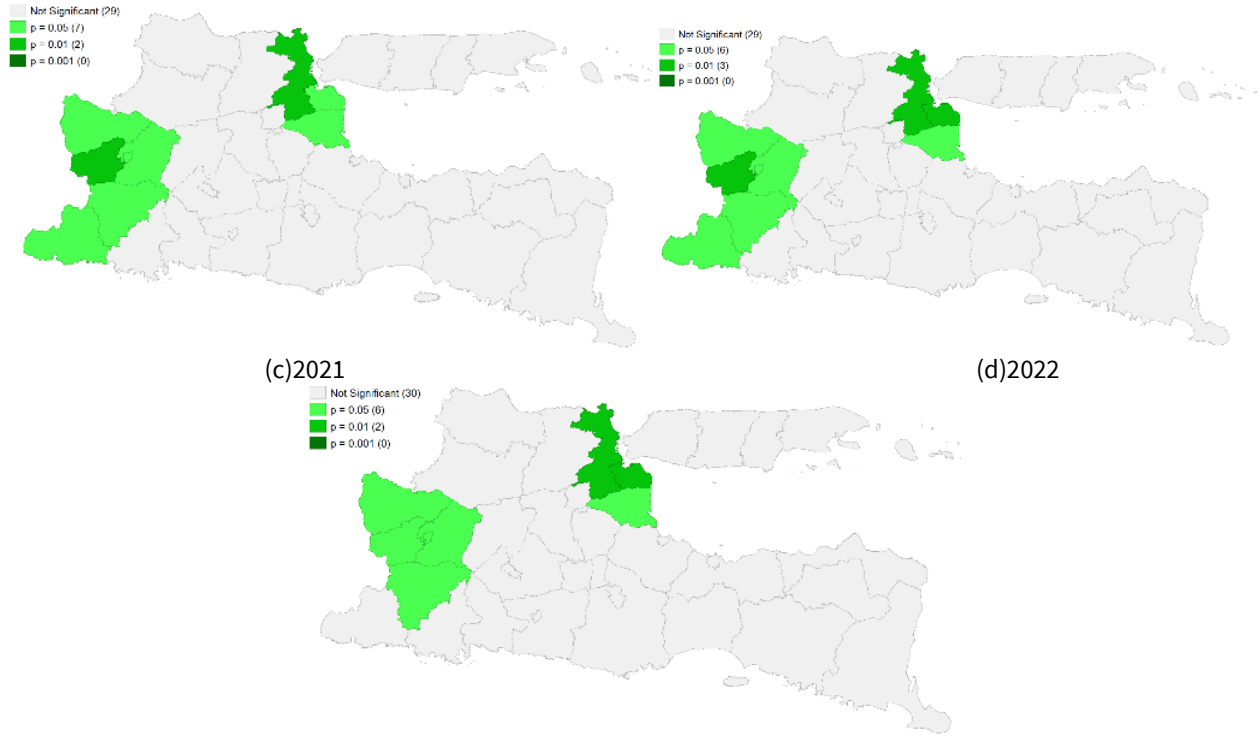


**Figure 4.** Significance Map of Drug Abuse in East Java Province 2019–2023

From the spatial autocorrelation analysis of drug abuse cases, it can be concluded that there is a significant spatial autocorrelation globally and locally over the last five years. The High-High cluster is primarily in urban and industrial areas, while the Low-Low cluster appears in the southwestern part, which is a rural area. This result indicates that the existence of spatial autocorrelation in the high rate of drug abuse aligns with the research conducted by Phlicharoenphon, W., & Pummakarnchana Robert, O. (2024), which also applied a geographic information system to study spatial data on drug cases, with analysis results showing that the distribution of drug cases had a clustering pattern with a Moran's I value range of 0.17-0.31 and an indication of positive spatial correlation. In addition, most drug cases occurred in urban and built-up areas, indicating a significant spatial relationship between the density of human activity and drug abuse cases.

The results in this study also align with research by Marotta (2019), which concluded that opioid overdose deaths in New York State showed a significant spatial pattern, with clusters of high death concentration found in the Mid-Hudson and western parts of the state, which are heterogeneous areas consisting of urban, suburban, and rural regions. Another study by Choi (2022) also found that heroin-related overdose incidents in Cincinnati were not evenly distributed but formed spatial clusters with a complex pattern. Based on Local Moran's I, there were seven hotspots scattered in the southwestern and south-central parts of the city, demographically characterized by high poverty rates, low education levels, low income, a dominant male population, and high crime rates.

## Spatial Relationship of Economic and Social Factors with Drug Abuse Cases in East Java Province 2019–2023

Gini Ratio and Drug Abuse

The Global Moran's I test results over five years show that the relationship between the Gini ratio and drug abuse cases in East Java tends to be random, with inconsistent direction, very weak strength, and is not significant. The Moran's I value is in the range of -0.077 to 0.118, with a pseudo p-

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value consistently greater than 0.05, indicating no meaningful spatial clustering pattern. For five consecutive years, the Moran's I values were recorded as -0.077; -0.018; 0.015; 0.118; and 0.065, with pseudo p-values of 0.200; 0.427; 0.412; 0.098; and 0.200, respectively. Spatially-temporally, these results indicate that the relationship between the Gini ratio and drug abuse cases fluctuated from negative to positive but remained weak and insignificant, thus not forming a repetitive clustering pattern from year to year.

From the spatial autocorrelation analysis of the Gini ratio against drug abuse cases, although there was no significant global spatial pattern between the Gini ratio and drug cases in East Java, local analysis showed indications of limited spatial clusters, especially in metropolitan areas with complex socioeconomic characteristics, which need to be addressed in region-based drug control policies. These results indicate that the Gini ratio has a spatial contribution that is local and uneven to the high rate of drug abuse, only being more prominent in certain, unequally distributed urban areas.

This is in line with the research conducted by Hendri & Muharja (2014) titled Study on Inequality and Criminality, which stated that income inequality was found to have no significant effect on some types of criminality, including drug abuse, suggesting that the correlation between the Gini Ratio and crime rates can be very limited or non-existent in certain contexts.

Regency/City Minimum Wage and Drug Abuse

The Global Moran's I test results over five years show a positive, moderate, and significant spatial pattern between the minimum wage and drug abuse cases in East Java. This means that regions with a high minimum wage tend to be close to regions with a high number of drug abuse cases, and vice versa. The strength of this relationship is in the moderate category, with Moran's I values in the range of 0.28-0.32 and is significantly meaningful with a p-value < 0.05. Specifically, the Moran's I values were recorded as 0.314; 0.306; 0.324; 0.286; and 0.285, with pseudo p-values of 0.013; 0.013; 0.011; 0.020; and 0.021, respectively. Thus, it can be concluded spatially-temporally that the link between minimum wage and drug abuse cases in East Java is consistent from year to year, with a significant clustering pattern of moderate strength.

From the spatial autocorrelation analysis of the minimum wage against drug abuse cases, there was a significant spatial autocorrelation globally and locally over the last three years. The High-High cluster occurred in urban and industrial areas, while the Low-Low cluster appeared in the southwestern part, a rural area with an economy that tends to flow slowly to moderately. These results show that the minimum wage level has a spatial contribution to the high rate of drug abuse, although its influence is uneven across the entire region.

This aligns with the research conducted by Sitinjak and Ghuzini (2023), which showed that the distribution of the minimum wage plays an important role in shaping the spatial pattern of youth unemployment in Indonesia, where regions with a high minimum wage tend to cluster with regions that have a high unemployment rate. Similar results were also shown by Isnaini et al. (2017–2018), who found that income level has a significant influence on the prevalence of drug abuse in Indonesia spatially, thus indicating that economic factors contribute directly to the social vulnerability of the community. In line with this, recent studies show a geographical shift in the production and distribution of synthetic narcotics in Indonesia that follows the logic of economic location, which also includes proximity to logistics/industrial centers, thus reinforcing the link between the density of economic activity and the intensity of narcotics crime (Sulastiana, 2024).

Human Development Index (HDI) and Drug Abuse

The Global Moran's I test results over five years show a positive and weak spatial pattern between the HDI and drug abuse cases in East Java. This indicates a tendency for regions with a high HDI to be close to regions with a high number of drug abuse cases, but the strength is relatively low, with Moran's I values in the range of 0.15-0.18. Specifically, the Moran's I values were recorded as 0.175; 0.178; 0.184; 0.152; and 0.156, with pseudo p-values of 0.042; 0.041; 0.039; 0.060; and 0.053, respectively. This finding shows that the spatial

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pattern was significant in the 2019–2021 period but weakened and became insignificant in 2022–2023. Thus, it can be concluded spatially-temporally that the link between the HDI and drug abuse cases is weak and inconsistent, with significance only appearing at the beginning of the observation period.

From the spatial autocorrelation analysis of the HDI against drug abuse cases, there was a global and local spatial autocorrelation over the last three years, although with weak relationship strength and not always significant. The High-High cluster occurred in areas with high population concentration, wider accessibility, and dynamic social and economic mobility. However, this dynamic runs parallel to the high risk of drug abuse, which can be linked to social pressure, rapid urbanization, and a metropolitan lifestyle. Meanwhile, the Low-Low cluster appeared in the southwestern part with a low HDI; the low HDI in this region can limit access to education, information, and health services, potentially suppressing the reporting rate or creating a latent condition for drug circulation. These results show that the HDI level has a spatial contribution to the high rate of drug abuse, although its influence is uneven across the entire region.

This analysis indicates that HDI inequality between regions not only reflects socioeconomic disparity but also spatially correlates with the level of vulnerability to drug abuse. Regions with high HDI values are not necessarily free from drug problems; they actually have the potential to become hotspots that require special attention in formulating region-based policies. This research result aligns with the study by Mubarok & Saepudin (2023), which showed that the HDI is a variable that has a positive and significant influence on the crime rate in large cities in Indonesia. Indirectly, this suggests that regions with a low HDI potentially have a higher rate of drug abuse due to the link between crime implementation and social vulnerability. Furthermore, although a study by Budiartha & Anggraini (2024) found that the HDI was not singly significant for criminality, together with inequality and economic growth, the HDI contributed to the trend of criminality, which, in a strong spatial context, is relevant to the dynamics of drug cases.

Crime Rate and Drug Abuse

The Global Moran's I test results over five years show a positive, weak, and significant spatial pattern between the crime rate and drug abuse cases in East Java. This means that regions with a high crime rate tend to be close to regions with a high number of drug abuse cases, and vice versa. The strength of this relationship is relatively weak, with Moran's I values in the range of 0.16-0.23, but remains significantly meaningful with a p-value < 0.05. Specifically, the Moran's I values were recorded as 0.195; 0.238; 0.160; 0.209; and 0.203, with pseudo p-values of 0.034; 0.024; 0.036; 0.016; and 0.016, respectively. Thus, it can be concluded spatially-temporally that the link between the crime rate and drug abuse cases is consistent from year to year, albeit with a relatively weak relationship strength.

From the spatial autocorrelation analysis of the crime rate against drug abuse cases, there was a global and local spatial autocorrelation over the last three years. The High-High cluster occurred in areas with urban zones, industrial centers, and migration, thus potentially causing high social and economic pressure. Meanwhile, the Low-Low cluster appeared in the southwestern part with a low crime rate, characterized as rural or semi-urban, where social ties and traditional norms are stronger and function as social protection. These results show that the crime rate has a spatial contribution to the high rate of drug abuse, although its influence is uneven across the entire region.

This aligns with the research conducted by Rahman, Bahtiar & Haris (2021), who found that narcotics criminality in Kendari City formed a clustering spatial pattern in various sub-regencies. Economic, environmental, and family factors also contributed to this clustering.

Population Density and Drug Abuse

The Global Moran's I test results over five years show a positive, but very weak and insignificant spatial pattern between population density and drug abuse cases in East Java. This indicates that although there is a tendency for

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regions with high population density to be close to regions with a high number of drug abuse cases, the pattern does not form a clear clustering because the strength is very weak, with Moran's I values in the range of 0.05-0.11. Specifically, the Moran's I values were recorded as 0.110; 0.101; 0.110; 0.053; and 0.088, with pseudo p-values of 0.095; 0.108; 0.096; 0.191; and 0.124, respectively, all of which are above the significance threshold. Thus, it can be concluded spatially-temporally that the relationship between population density and drug abuse cases tends to be weak, insignificant, and does not show a consistent clustering pattern from year to year.

From the spatial autocorrelation analysis of population density against drug abuse cases, although there was no significant global spatial pattern between population density and drug cases in East Java, local analysis showed indications of limited spatial clusters, especially in regions with high population density characterized by high urbanization, centers of economic activity, and dense population concentration, such as Surabaya City and Sidoarjo Regency. These regions tend to have a high level of population mobility and greater potential for social vulnerability, which can contribute to the high rate of drug abuse. These results indicate that population density has a spatial contribution that is local and uneven to the high rate of drug abuse, only being more prominent in certain, unequally distributed urban areas.

This is consistent with previous studies showing that rural or semi-urban areas with low population density tend to have a lower rate of drug abuse compared to urban areas or industrial zones with high population density (BNN, 2024; Arief, 2022). Furthermore, a study conducted by Yusuf Bilal (2024) showed that population density has a positive and significant influence on criminality, although the direct influence on drug abuse is insignificant. This supports the idea that regions with high density tend to experience vulnerability to drugs due to the inherent pattern of criminality.

Open Unemployment Rate and Drug Abuse

The Global Moran's I test results over five years show a positive, weak, but significant spatial pattern between the Open Unemployment Rate and drug abuse. This means that regions with a high open unemployment rate tend to be close to regions with a high number of drug abuse cases, even though the strength of the relationship is relatively weak, with Moran's I values in the range of 0.20-0.27 and a p-value < 0.05. Temporally, the Moran's I values from 2019 to 2023 are 0.202; 0.259; 0.270; 0.216; and 0.241, respectively, with pseudo p-values of 0.021; 0.015; 0.010; 0.027; and 0.019. This pattern shows that spatially-temporally, the link between open unemployment rate and drug abuse consistently forms a weak but significant cluster throughout the study period.

From the spatial autocorrelation analysis of the open unemployment rate against drug abuse cases, there was a significant spatial autocorrelation globally and locally over the last three years. The High-High cluster occurred in urban areas with high unemployment rates, especially among the productive age group, leading to tight job competition, high living costs, and a more permissive social culture with loose social control and community supervision, making access to drugs easier. Meanwhile, the Low-Low cluster occurred in rural areas with a relatively low unemployment rate, although job quality is often informal and temporary, which is accompanied by lower social pressure, stronger community ties, and more strongly binding social and religious norms, thus limiting access to drugs. These results show that the open unemployment rate level has a spatial contribution to the high rate of drug abuse, although its influence is uneven across the entire region.

This aligns with the research conducted by Wahyuni et al. (2022), which showed that large cities like Surabaya and Medan have higher drug abuse rates in the young unemployed group aged 20–35 years, along with easier access and life pressure. Another study by Isnaini (2020) emphasized that the unemployment rate is part of the socioeconomic vulnerability factors that increase the risk of drug abuse in certain regions.

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**Table 2.** Bivariate Global Moran's I Test Results for Drug Abuse Cases with Socioeconomic Factors in East Java Province 2019–2023

| Variable | Moran's I | | | | | p-value | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2021 | 2022 | 2023 | 2019 | 2020 | 2021 | 2022 | 2023 |
| Gini Ratio | -0.077 | -0.018 | 0.015 | 0.118 | 0.065 | 0.200 | 0.427 | 0.412 | 0.098 | 0.200 |
| Regency/City Minimum Wage | 0.314 | 0.306 | 0.324 | 0.286 | 0.285 | 0.013 | 0.013 | 0.011 | 0.020 | 0.021 |
| Human Development Index | 0.175 | 0.178 | 0.184 | 0.152 | 0.156 | 0.042 | 0.041 | 0.039 | 0.060 | 0.053 |
| Crime Rate | 0.195 | 0.238 | 0.209 | 0.160 | 0.203 | 0.034 | 0.024 | 0.036 | 0.016 | 0.016 |
| Population Density | 0.110 | 0.101 | 0.110 | 0.053 | 0.088 | 0.095 | 0.108 | 0.096 | 0.191 | 0.124 |
| Open Unemployment Rate | 0.202 | 0.259 | 0.270 | 0.216 | 0.241 | 0.021 | 0.015 | 0.010 | 0.027 | 0.019 |

## CONCLUSION

The distribution of drug abuse cases in East Java Province from 2019 to 2023 demonstrates a clustered pattern, with eight regions consistently classified in the very high category: Surabaya City, Sidoarjo Regency, Kediri Regency, Jombang Regency, Malang City, Malang Regency, Jember Regency, and Banyuwangi Regency. These areas are generally characterized by high population density, intense economic activity, and high community mobility, which increase their vulnerability to drug circulation. Spatial analysis reveals a positive spatial autocorrelation and significant spatial relationships between drug abuse cases and socioeconomic factors, particularly regency/city minimum wages, crime rates, and open unemployment rates, confirming that socioeconomic and demographic factors play a crucial role in shaping the spatial pattern of drug abuse in East Java.

Based on these findings, drug abuse prevention and control efforts should be implemented through a comprehensive, place-based approach. Future research is encouraged to incorporate additional determinants beyond socioeconomic factors to better capture the complexity of drug abuse dynamics. For policymakers and relevant institutions such as the National Narcotics Agency, law enforcement, and local governments, spatial analysis results can serve as a foundation for targeted interventions in high-risk clustered areas. Policy strategies should be tailored to regional characteristics, including strengthening workplace-based prevention programs in high minimum wage areas, enhancing security and supervision in high crime regions, and prioritizing job creation and vocational training in areas with high unemployment rates, supported by active community participation in prevention and anti-drug education initiatives.

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