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GIS OF DRUG ABUSE CASES AMONG YOUTH IN THE NORTHEAST DISTRICT OF PENANG

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ABSTRACT

Most of the previous studies generally discussed drug-related data statistically without emphasizing the spatial element and focus group. This study was focusing on high-risk groups involved in drug abuse which is youth. The main objective of this study was to identify the hotspot of drug abuse among youth in the Northeast District of Penang using Geographic Information Systems (GIS). GIS is a tool that assists in determining the location of crimes and geographical factors to analyze the relationship between the suspect and the location of crimes. The youth drug abuse data from 2013 to 2014 was used to analyze data using Optimized Hotspot Analysis with the approval of Penang's Polis Diraja Malaysia (PDRM). The result showed a 99% confidence clustered hotspot at the boundary of Police Station Jalan Patani in 2013 and 2014. Most of the sectors with hotspot zones were covered with the boundary of Police Station Jalan Patani. This study can help the authorities especially PDRM and Agensi Anti Dadah Kebangsaan (AADK) in identifying the hotspot of drug cases in spatial context representation.

Keywords: drug abuse, GIS, Optimized Hot Spot Analysis, sector, spatial pattern, youth

INTRODUCTION

From the economic aspect, urbanization is a great achievement as it facilitates the economy and promotes the growth of industries. A place with abundant natural sources will undergo tremendous changes and experience rapid urbanization. Hence, bringing up the economic to a higher level (Tarmiji *et al.*, 2019). However, the social aspect views urbanization as a crime booster because the rate of crime is higher in large cities and urbanized areas (Ajaz, 2016). According to William and Zachary (1998), urbanization is not the sole cause of the rising trend of crime. There are many other determinants; unemployment, inflation, and income inequality. Nevertheless, these related determinants are often associated with urbanization or its consequences, so the root source remains the process of urbanization (Ajaz, 2016). Other scholars agreed that rapid growth in urbanization had a direct relationship with the increase in crimes (Knox,1994; Mcilwaine, 1999; Gold, 2002 as cited in Mazlan, 2012).

Rural area citizens are less confronted with the crime due to the higher level of social cohesion and informal social control leading to low offender rates in their surroundings. The greater the distance to the city center, the less crime occurs (Gerben, 2007). Criminals mostly live in the city due to the surrounding pressure; low economic status, unemployment rates, number of singles, bad housing, low levels of social cohesion and informal social control, and demographic composition (age, type of households) (Gerben, 2007). This is supported by Kumar and Chandrasekar (2011), who indicate that crime is actively occurring in all developing countries due to the poor political, social, and environment and changing into a luxury lifestyle.

Despite all these positive impacts of urbanization on the country's economy, urbanization brought social problems to the communities due to the increasing number of unemployment and drug addiction among the youth leading to criminality. Crimes such as theft, burglary, and robberies in the housing areas are also widely reported (Katiman *et al.*, 2011). This concern also applies to Penang, Malaysia. Penang is the fastest growing country compared to other states in Malaysia in 2016 with GDP per capita is the second-highest in the country after Kuala Lumpur (Nandri, 2018). The statistic shows that Penang also recorded the highest drug abuse cases compared to other states in Malaysia from 2010 to 2016 (Table 1). The drug abuse ratio in Penang is 30:1,000 people. There is a 15% rise in the number of drug abuse cases since 2012.

Table 1. Number of Drug Addicts by States, 2010 to 2016

Year/States	2010	2011	2012	2013	2014	2015	2016
Pulau Pinang	3,753	2,747	2,286	3,043	2,780	4,280	5,081
Selangor	3,548	2,026	1,690	2,226	2,051	2,987	3,176
Kedah	2,507	1,859	1,535	2,702	2,535	2,945	3,862
Terengganu	2,377	2,443	599	641	579	1,022	1,676
Kelantan	2,360	1,475	942	895	1,399	1,994	3,233
Perak	2,296	2,215	1,549	2,789	2,716	3,106	2,639
Johor	2,091	1,918	1,729	1,874	1,992	2,541	2,565
WP Kuala Lumpur	1,344	1,013	1,098	1,841	1,698	1,328	1,695
Pahang	1,198	1,363	1,423	1,621	1,903	2,066	2,419
Negeri Sembilan	921	840	816	1,008	951	1,050	1,172
Sabah	517	440	262	513	940	898	1,044
Perlis	354	293	337	374	499	781	692
Melaka	176	538	496	675	845	944	930
Sarawak	145	333	312	650	854	658	534
WP Putrajaya	45	25	26	20	16	32	47
WP Labuan	10	3	1	15	19	36	79
TOTAL	**23,642**	**19,531**	**15,101**	**20,887**	**21,777**	**26,668**	**30,844**

Source: AADK, 2017

Generally, there is an increase in the overall age category from 2013 to 2015 with 22% growth. Youth is the largest contributor to the total number of drug addicts for the three consecutive years with a percentage of 72.29%, followed by adults (25.19%) and adolescents (2.51%). This shows that the involvement of adolescents and youth as the determinants of national development is quite worrisome and more tangible (AADK, 2015).

LITERATURE REVIEW

Drug abuse is harmful to the body and physically changes someone's behavior to be aggressive. This kind of drug abuse will leave long term damage to the person itself and affecting the family's reputation. Lacking financial resources to meet the needs of addiction can trigger someone to function normally leading to the easiest way to earn money by committing crimes. For example, stealing, extorting, robbing, or killing (Abdul Halim, 1988). A report shows that 40% of the prisoners are involved with drugs (Jamaludin, 2010). As a result, society becomes insecure with their surrounding environment and security due to frequent occurring crimes.

Geographic Information Systems (GIS) is a tool that assists in determining the location of crimes and geographical factors such as infrastructure, environmental factors, and the relationship between the address of the suspect and the location of crimes (Ang, 2015). One of the initiatives formed by the Ministry of Housing and Local Government of Malaysia in collaboration with the Town and Country Planning Department of Peninsular Malaysia (JPBDSM), Polis Diraja Malaysia (PDRM), local authorities and the Malaysian Crime Prevention Foundation (MCPF) use GIS application to create a safer city via crime mapping. Through this method, areas with high crime records can be identified and local authorities can take more effective preventive measures (Zaini and Nor Shah, 2010). With this, the prevention and enforcement of criminal cases can be enhanced as well as reducing the time to control areas of high crime risk (Mohd Norarshad and Tarmiji, 2016).

GIS shows that drug abuse was proven to have a clear spatial pattern. This study serves as an example of how neighborhood geographical markers can be used to identify high-risk areas that may cause providers to target and address more problems in drug abuse in the community. Police departments in North Carolina, USA use GIS to identify the relationship between street drug trafficking with street violence. Getis-Ord and "High-Low Clustering" methods were used to identify areas with a high hotspot density of drug trafficking and street crime reported in 2003 and 2004. The number of hotspots has been reduced in neighborhoods since the risky areas being emphasized and strictly controlled by the authorities. Changes in the type of data used to build density maps have enabled it to be used for the same ventures as domestic violence and prostitution (Eleazer *et al.*, 2008).

The use of GIS in identifying hotspots can be used in the enforcement campaigns implementation. The use of hotspots may be beneficial in enhancing

the campaign to reduce alcohol-related accidents. The researcher also develops a new method of patching for drunk drivers. The hot spot map was detailed to the local directions of spatial boundaries, showing statistically significant locations where drunk drivers may be present. The route optimization model was then used to guide officers to these locations. By utilizing location-based hot spots, new methodologies of patrolling may be developed to reduce the amount of alcohol-related crashes. This new method of patrolling will guide officers to statistically significant locations, allowing them to be more accurate while patrolling for intoxicated drivers (William *et al.*, 2017).

Also, GIS was used in localizing the spatial distribution and pattern of Universiti Malaysia Sarawak (UNIMAS) students and COVID-19 cases. The monograph prepared by the authors is useful in managing a mass number of students and staff, especially in planning and handling the process of returning of students to the campus. Generally, the methods has brought the output by assimilating geography and epidemiology. The methods, however is not restricted as it can be used for any situation (Tarmiji *et al.*, 2020). Hence, reflecting that GIS is a spatial-based tool that can be integrated with any fields and disciplines.

METHODOLOGY

The study involves drug abuse data among youth obtained from PDRM records from 2013-2014. The data consists of youth cases from the age of 19 – 39 years old as stated by age group classification from AADK. The data were stored in Microsoft Excel 97-2003. The study area was the Northeast District of Penang, an area with high population density and acts as a development center for Penang as shown in Figure 1. The Northeast District of Penang had a population of 508,181 people with a density of 4,200 people per square kilometer in 2010. According to a study conducted by Tarmiji *et al.* (2018), the Northeast District of Penang is the most developed and populated area in Penang. The local authority for this district is City Council of Penang Island. This district was divided into fifteen *mukim*; Mukim 13, Mukim 14, Mukim 15, Mukim 16, Mukim 17, Mukim 18, Bandar Ayer Itam, Bandar Batu Feringghi, Bandar Bukit Bendera, Bandar Gelugor, Bandar George Town, Bandar Jelutong, Bandar Tanjong Bungah, Bandar Tanjong Tokong and Bandar Tanjong Pinang. The district also has 13 police station boundaries and 83 police sector areas. The police stations included in this study area were Lebuh Pantai, Dato Keramat, Central, Jalan Patani, Kampung Baru, Batu Feringghi, Tanjung Tokong, Ayer Itam, Bandar Baru, Komuniti Taman Desa Permai, Jelutong, Sungai Nibong, and Pulau Tikus.

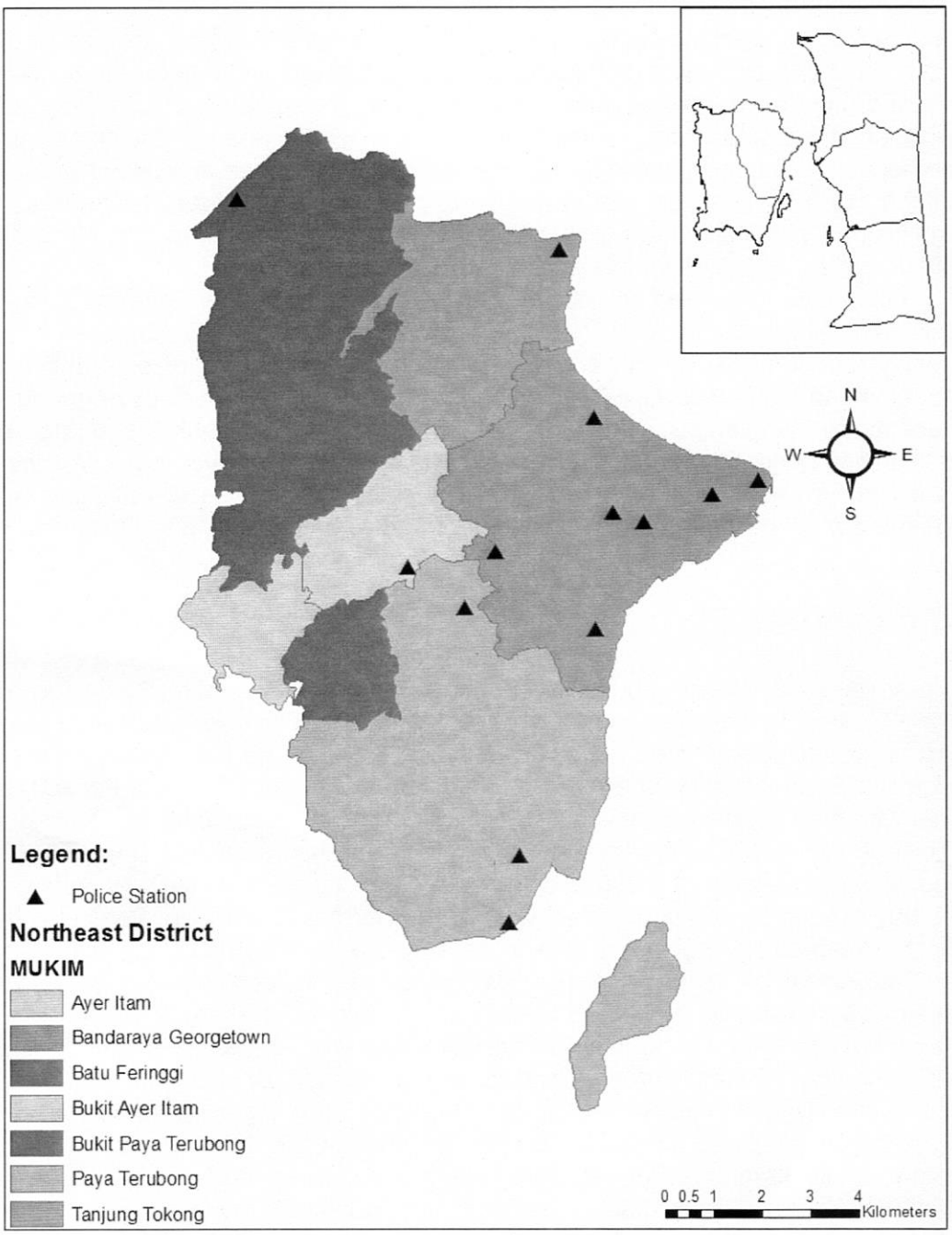

Figure 1. Study Area

Optimized Hotspot

Optimized Hotspot Analysis in ArcMap 10.3 was used to identify hotspot areas of drug abuse cases among youth. The total cases of drug abuse among youth were converted into GIS shapefile format and each case was given their geographical coordinates based on where the case was reported. The Gi Bin field identifies statistically significant hot and cold spots. The Gi_Bin in the +/-3 features statistically significant at a 99% confidence level, whereas value = 0 indicates not statistically significant result.

RESULTS AND DISCUSSION

There is an increase of 16% drug abuse cases among youth from the previous year. Age group within 35- 39 years records the highest number of cases in both 2013 and 2014. The lowest cases of drug abuse recorded below 19 years old age group (Mohd Norarshad & Tarmiji, 2016). However, there is an increase of 23% of below 19 years old group from the previous year. The Agensi Anti Dadah Kebangsaan (AADK) Kerian Enforcement Head believed that an increasing number of cases is due to widespread drug trafficking in a short matter of time (Shahrul, 2017). Youth, as well as drug traffickers, now have started to change the strategy by distributing it in small quantities (Khairil Anwar, 2017).

Table 2 shows the number of cases based on the age categories of drug abuse among youth. And Figure 2a and 2b shows the spatial distribution of drug abuse cases among youth for 2013 and 2014. The age within 20-39 years old shows increasing involvement with 16% from the previous year. On other judgment, it indicated 44 people are detected to be involved in drug abuse in a month. According to Raphael and David (2003), age also acts as a factor or crime fear. It was postulated that the higher the age of a person, the higher the level of fear towards crimes. Based on 16 studies about fear and concern among the elderly, it is found that only two studies that have no difference between the elderly and the young. Only 7 studies find that the elderly are less afraid than the young.

Table 2. Number of Drug Abuse Cases by Age Categories, 2013 to 2014

AGE	2013	2014
<17	27	27
18	15	39
19	36	59
20-24	237	363
25-29	309	442
30-34	425	553
35- 39	463	606
TOTAL	1512	2089

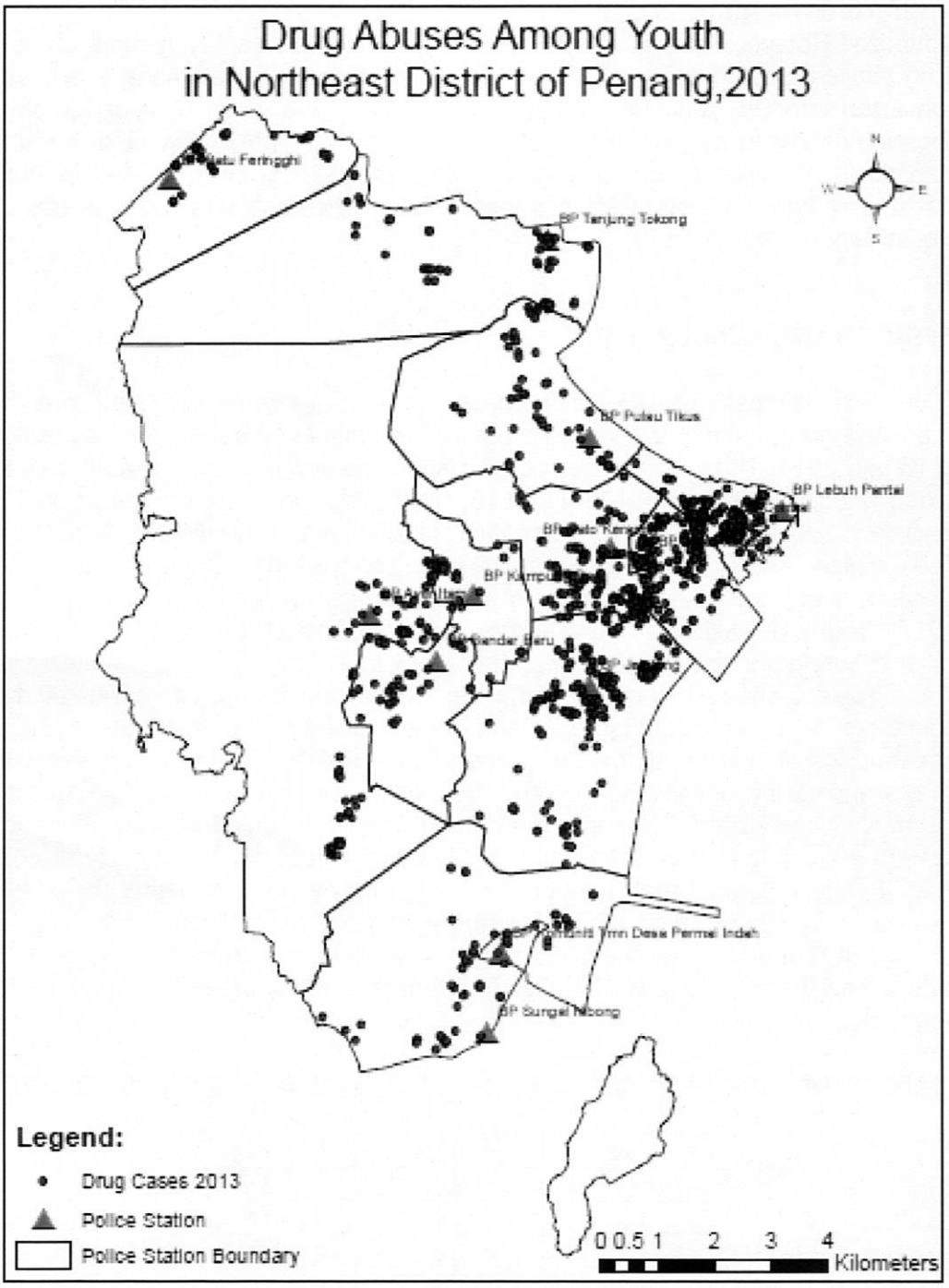

Figure 2a: Drug Abuse Cases among Youth in 2013

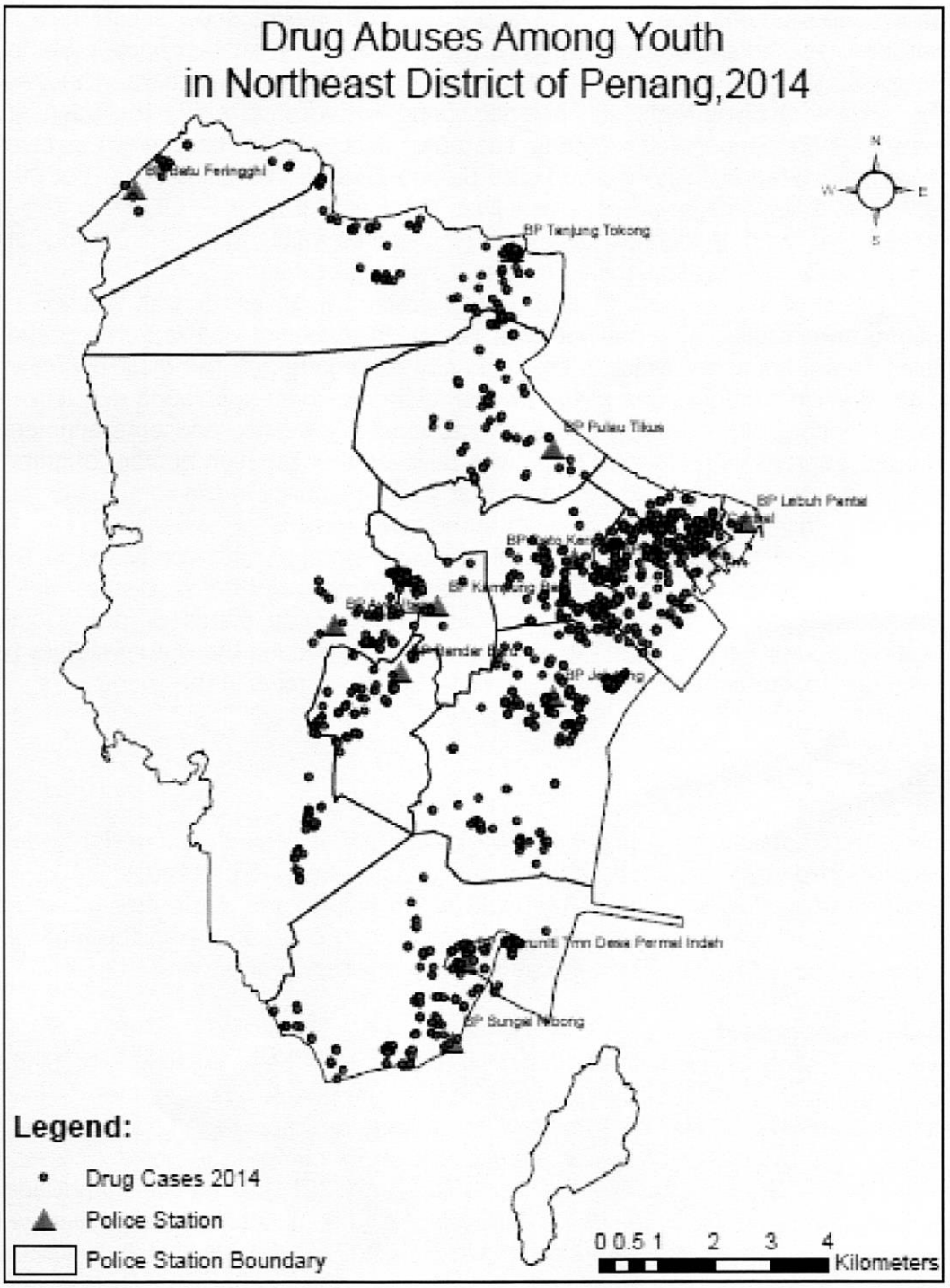

Figure 2b: Drug Abuse Cases among Youth in 2014

Figure 3a and 3b shows the Optimized Hotspot Analysis result for the drug abuse cases among youth in 2013 and 2014. Both results show similar hotspot patterns. The hotspots area covered a few police station sectors namely Station Sector 9, 10A, 11, 12B, 13A, and 13B, with 99% confidence. Generally, most of the sectors involved with high hotspot confidence located within the boundary area of Police Station Jalan Patani. The other police station boundaries involved were Police Station Jelutong and Police Station Central. The z-scores for both the 2013 and 2014 hotspot areas have values between 4.029108 - 4.550921. The z-scores also used to define hotspots. The z-scores value more than 1 indicate hotspot area whereas less than 1 indicates a cold spot area.

The clustered pattern of drug abuse cases among youth was focused on Georgetown radius. The hotspot area has been identified at the Police Station Jalan Patani boundary which is the main city of Penang and the most populated area. The city center is one of the driving factors for high population density due to the opportunities offered such as jobs, comfort, wealth, and entertainment. Hence, it agrees with Mazlan (2012) who believed that the high number of crimes occurs in urban areas. It also believes that social instability in the community may lead to an increasing number of cases in the town area.

Optimized hot spot analysis of drug abuse among youth conducted in this study was based on the data collected from the Northeast District Police Headquarters. Hence, it was not indicating the overall status of drug abuse occurrences for Penang state. Therefore, it is recommended that future studies be extended to another district of Penang and also other states in the country.

CONCLUSION

The hotspot areas were found within the radius city of Penang, where the highest population density recorded. Most of the abuse cases were detected in border areas of Police Station Jalan Patani. GIS aid in helping the authorities to reduce the crime rate in recent years. Besides, monitoring and controlling the high-risk areas can be easily identified through information sharing and the use of GIS.

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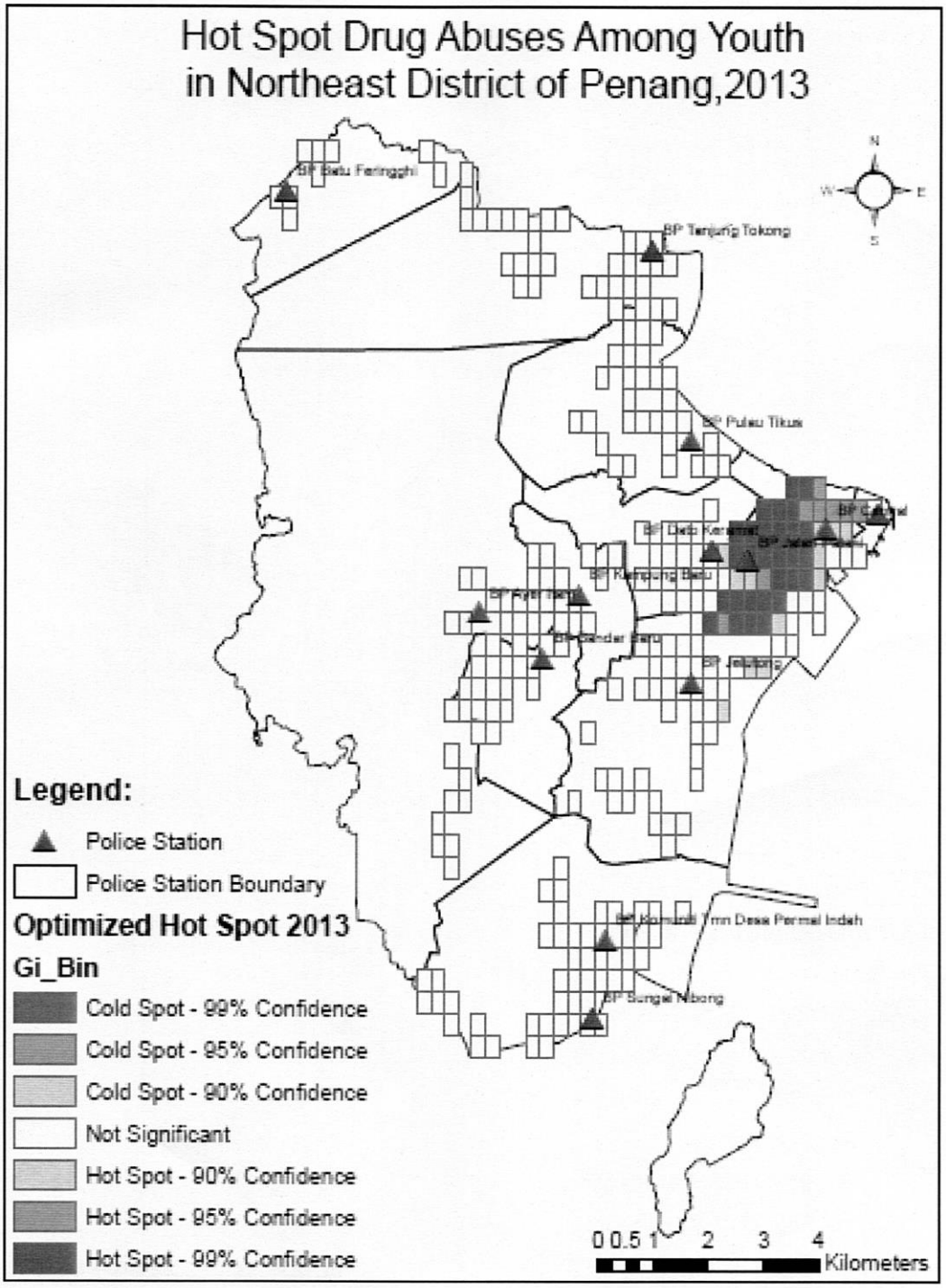

Figure 3a: Result of Optimized Hot Spot Analysis for the Drug Abuse Cases in 2013

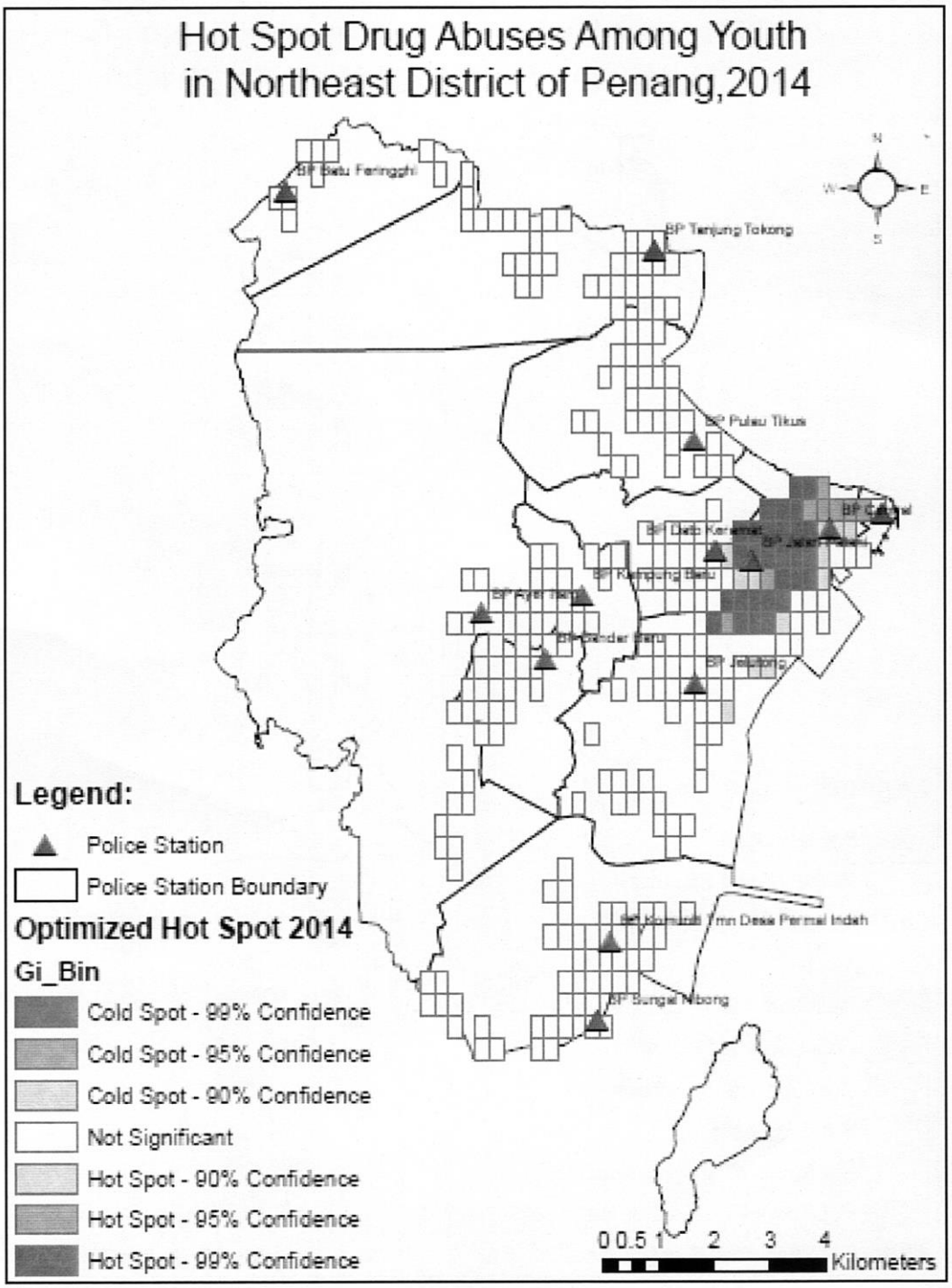

Figure 3b: Result of Optimized Hot Spot Analysis for the Drug Abuse Cases in 2014

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