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ORIGINAL ARTICLE

DEVELOPING AN INDEX BASED ON GIS AND STATISTICAL ANALYSIS FOR FAMILY SUPPORT OF SUBSTANCE ABUSER IN TERENGGANU

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Abstract

Family support has a strong impact on individuals and there is no exception in substance abuse recovery process. Family support manages to play a positive role in substance abuse problems. The present study deals with the developing model of family support substance abuser with the combination method of Geographic Information System (GIS) and statistical models. The data used for this study was collected from seven districts in Terengganu with a constant number of respondents. 35 respondents for each district were involved in this study. It was then processed using factor analysis (FA) to develop index of family support. By using the developed indices, GIS tool was used to plot the distribution map of family support indices according to each form of family support. The result indicated that the highest index for all form of family support abuser was located in Besut district. High level of family support is essential as an effort for rehabilitation process of substance abusers.

Keywords: Index of family support; substance abuser; statistical models; factor analysis; GIS.

Introduction

Globally, substance abuse is a substantial threat to the public health. It has been a worldwide issue because it does not only affect the public health but also one of the causes of crime, disorder, family breakdown, community decay and economic failure (Nalaskowska and Cierpialkowska, 2014; Strang et al., 2012; Sudirman, 2009). In addition, this problem seems to worsen with the emergence of new drugs as major a threat to the world. The government also has to spend a lot of money for any interventions program, campaign and allocation for rehabilitation centers.

Similar to other countries, Malaysia is not spared from this problem (Chie et al., 2015). The severity of this problem has prompted the government to declare drug abuse as a nation's number one enemy in 1983 (Devi et al., 2012; Fauziah et al., 2012). Around 28.3 million out of the total populations, with an estimation of 205,000 Malaysian were injected with illicit drugs (Wickersham et al., 2013). A statistic reported by the National Anti-Drugs Agency of Malaysia (2013) indicated that the number of substance abuser in Malaysia was 20,887 persons. Pulau Pinang has turn out to be the state with the highest number of substance abuser while, Wilayah Persekutuan Labuan was recorded as the lowest.

Seeing of the extensive substance abuse, many researchers aim to identify the cause of this problem and to define the best solution for it. Researches on the substance abuse do not cover the public health field only, but also all sectors including the social science and others. There are a lot of studies carried out to define the best treatment for substance abuser. A number of rehabilitation programs and treatments were held by government as well as private institutions in Malaysia since 1975 (Al Sayed Mohamad et al., 2013). The science field researches are focusing on the producing medicine to treat substance abuser meanwhile, the social field plays a role in rehabilitation process. Most of the treatments given to the substance abusers are quite similar despite of different substances abused.

In general, the treatment for rehabilitation process of substance abuser involves the pharmacology and psychosocial approaches. Several findings have reported that the most effective treatment for the substance abuser is behavioral therapy and a few models which were developed for this purpose (Carrol et al., 2005; Williams and Chang, 2000). One of the most important aspects that need be focused is the family aspect. In the previous study, the family support played an important role in the rehabilitation process (Klostermann and Timothy, 2013). The active involvement of family support in any type of problems has showed a better outcome compared to whom without the family support (Foster, 2012). Study by Chie et al. (2015) also in agreement with this finding and has stated that the loss of family support have cause trouble in the treatment of substance abuser.

The family support is the most effective way of preventing and treating substance abusers because of it may be a great help in the recovery process (Lemos et al., 2012). A lot of studies on the family support towards the substance abuse were carried out after comprehending the importance of family support in the rehabilitation process of substance abuser. Rowe (2011) and Ozchowski and Liddle (2000) have used the Multidimensional Family Therapy (MDFT) as a family-based approach in their comprehensive treatment for the substance abuser. The result suggested has that the most effective treatment for substance abuse was family intervention which including the family supports. A studied carried out by Jalilian et al. (2014) has proved that there was a significant correlation with social support in the rehabilitation process particularly in family support.

However, there are several obstacles should be regulated by family to give a total support towards the substance abuser. In order to find a solution to this problem, there is a need for the family support model data to be simplified via an appropriate analysis transformation and interpretation of useful information. To handle a huge and interpreting the data into the best information, multivariate analysis is deemed to be the most efficient approach to analyse the family support data (Molla et al., 2015). A guideline for the family must be provided and followed to ensure the support given by the family is efficient. The objective of this study is to develop a model of family support for substance abuse using the GIS and statistical methods.

Methodology

Study Area

Data was collected in Terengganu (Figure 1) which is located in the East Coast of Peninsular Malaysia. It was situated within the latitude 04°00'N-05°50'N and longitude 102°25'E-103°50'E. The sampling region was covered with approximately 1,295,638.3 hectares area.

Terengganu is consisted of seven districts which are Besut, Dungun, Hulu Terengganu, Kuala Terengganu, Kemaman, Setiu and Marang. Hulu Terengganu district is acknowledged as the largest district in Terengganu according to the Official Portal Terengganu State government.

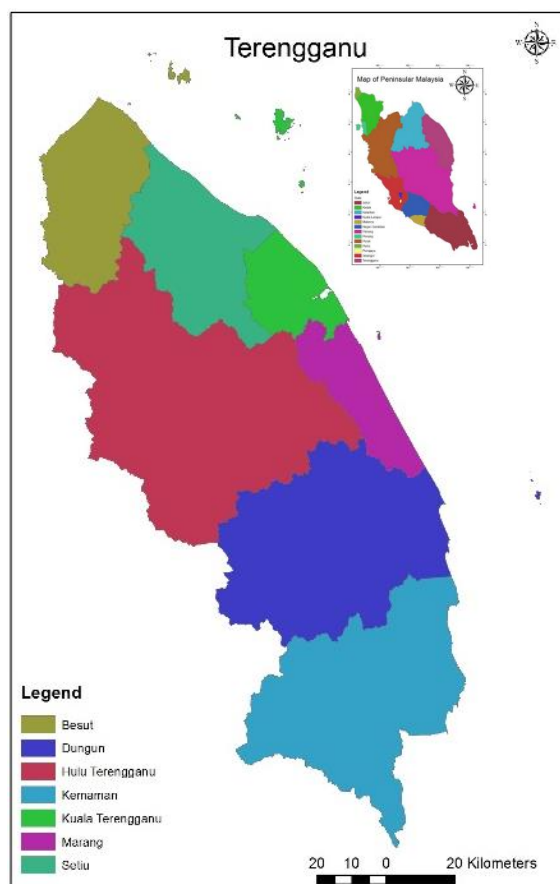


Figure 1. Seven districts of Terengganu.

Sample

The participants in this study were 245 of family members of substance abusers, with 52 (21.22%) males and 193 (78.78%) females. For this study, the selection of sample was determined by the National Anti-drug Agency (NADA) Officer based on their record database. Samples were selected by using the purposive sampling, where the criteria of respondents were based on their ability to respond to the questions and relay information effectively to the researcher (Kya et al., 2015). Through the purposive sampling, the focus was to gain more understanding on the study (Sang, 2009). In this study, the method used to collect the data was direct questionnaire. This method required a direct communication, explanation and distribution of a set of questionnaire that need to be completed (Kya et al., 2015). The questionnaires were read out aloud to the family members exactly in the same wording sequence and marked by researcher. This is due to the several problems such as the family members do not know how to read, write and understand the questions. Additionally, it is to ensure that respondents give the exact respond to the same question in order to control the response bias.

Measurement

The family support instrument was adapted from Farah (2016). The instrument contained items assessing general socio-demographic characteristics, as well as four forms of family

support which are emotional, instrumental, information and spiritual supports. All items were rated a 10-point Likert scale ranging from 1 (strongly disagree) to 10 (strongly agree). A total of 62 items have been measured which including the socio-demographic component.

Factor Analysis (FA)

Factor analysis is a method used to handle a large complex data set and interpret into powerful means. It will analyse the data to generate a lower dimensional linear structure (Singh et al., 2005). The main purpose of factor analysis applied in this study was to develop the family support index. The varifactors (VFs) can be expressed as:

$$z_{ji} = a_{f1}f_{1i} + a_{f2}f_{2i} + a_{f3}f_{3i} + \dots + a_{fm}f_{mi} + e_{fi} \quad (1)$$

Where z is the measured value of a variable, a is the factor loading, f is the factor score, e is the residual term accounting for errors or other sources of variation, i is the sample number, j is the variable number and m is the total number of factors.

In this study, factor analysis was applied to the data (four form of support) separately for seven districts in Terengganu. Each form of support has different number of variable namely the emotional support, instrumental support, information support and spiritual support with 14, 11, 13 and 12 variables respectively. Hence, each form of support index was developed by combining the factor scores generated by FA. The overall score for each respondent was obtained by weighting each factor score with the respective variance using the equation below:

$$FS_i = \sum_i^n F_i W_i \quad (2)$$

Where FS_i is form of family support, n is the number of factors selected, F_i is factor i score and W_i is the percentage of variance factor i explains.

GIS Analysis

The location of NADA, the location of the family members of substance abusers comes with a point that is stored in a shape (.shp) file and registered to the right datum. The family support data obtained during field work and the result of the analyses were changed into the 'dbase' format in order to be used in the ArcGIS software and then linked to the location of family member's houses. In this process, the data was arranged according to the districts. Finally, the distribution of family support by district using the indices developed was mapped. This study involved an image processing using ArcGIS 10.3 software.

Results and Discussion

Family Support Index

The developing index for family support in this study was based on the quality of life (QoL) method proposed by Li and Weng (2007). There was no significant method to integrate this social indicator as one single index because of no criteria could measure the weighted for this indicator. Nevertheless, pragmatic solution was chosen for this case and assign factor score as the indicator, while associated variance as the weights (Schyns and Boelhouwer, 2004). By using the factor scores generated through factor analysis followed by weighting the respective variance of factor score, the overall score for each respondent will be achieved. The score will be transformed to the scale from 1 to 5 via minimum-maximum standardization technique to have similar range of the family support index value. The score of each form of support was arranged according to the hierarchy and determined from very good (1) to very

poor (5) based on the frequency in Table 1. This score also can be used as family support index.

Table 1. Frequency table of family support score.

Family Support Score	Freq.	Cum. Freq.	%	Cum. %	Scale
Emotional Support					
-1.28912	3	3	1.22%	1.22%	Very poor
-0.92736	9	12	3.67%	4.90%	poor
-0.56561	24	36	9.80%	14.69%	Fair
-0.20385	145	181	59.18%	73.88%	Good
0.157909	64	245	26.12%	100.00%	Very good
Instrumental Support					
-0.96731	6	6	2.45%	2.45%	Very Poor
-0.64484	39	45	15.92%	18.37%	Poor
-0.32236	72	117	29.39%	47.76%	Fair
0.000113	94	211	38.37%	86.12%	Good
0.322589	34	245	13.88%	100.00%	Very good
Information Support					
-1.32408	2	2	0.82%	0.82%	Very Poor
-0.92318	25	27	10.20%	11.02%	Poor
-0.52227	47	74	19.18%	30.20%	Fair
-0.12137	128	202	52.24%	82.45%	Good
0.27954	43	245	17.55%	100.00%	Very good
Spiritual Support					
-1.51419	1	1	0.41%	0.41%	Very Poor
-1.10291	11	12	4.49%	4.90%	Poor
-0.69163	11	23	4.49%	9.39%	Fair
-0.28035	162	185	66.12%	75.51%	Good
0.130937	60	245	24.49%	100.00%	Very good
Hindrance of Support					
-1.99423	2	2	0.01	0.82	Very Poor
-1.49517	0	2	0.00	0.82	Poor
-0.9961	10	12	4.08	0.05	Fair
-0.49704	75	87	30.61	35.51	Good
0.002025	158	245	64.49	100.00	Very good

* Freq.: Frequency, Cum.: Cumulative, %: Percentage.

According to the indices developed, instrumental support has the highest index with the least scale of index as compared to the other form of support. It indicates that most of the form of support was given through this support. Previous study showed that the instrumental support involving practical assistance and material goods were more desired from family members compared to the other people (Helgeson and Cohen, 1996). The least index with the highest index range was the limitation of support associated with our finding where all form of family support had high index compared to the hindrance of support. There was a possibility that the existing of hindrance of support might occur among family members whether from themselves or people surrounding. However, the hindrance might be overcome by enhancing the positive family support (Shahrbabaki et al., 2016).

Spatial Distribution of Form of Family Support

The family support measure in each district was based on the answer given by the respondents. Next, we determined the mean score for every district to obtain the whole picture of family support in the study area. Then, we further discussed the form of family support by district and examined the view of respondent in that particular district. Hence, the GIS was applied to visualize a clear picture of family support index distribution in Terengganu. Based on the spatial analysis in Fig. 2, the trend of family support given to substance abuser in each district has presented the hierarchy of each form of support. The light color indicated the lowest level of family support meanwhile, the darkest color represented the highest level of family support.

The mean score of emotional support was identified. Besut has the highest emotional support with the mean score of 0.2303, followed by Dungun, Kuala Terengganu, Setiu, Hulu Terengganu, Kemaman and Marang with the mean score of 0.0967, 0.0524, -0.0546, -0.0588, -0.1310 and -0.1349 respectively. Most of the respondents have good indices which meant their positive emotional support towards the substance abuser in rehabilitation process.

Emotional support indicated that Besut was identified with the highest emotional support and Marang with the lowest one. Besut is located in the northern part of Terengganu with major occupation as self-dependence. Those who are not working were considered as low socio economic class, suggesting that why is the emotional support given by family members as the highest one. This was proved by a study by Silva et al. (2014) where more family contact including family support between the family members in low socio economic class. The higher bonding between family members also contributed to a successful emotional support delivery (Weyers et al., 2008). The low socio economic class families spent more time with their family in a close tie because most of them did not bond to office hour. This result was also in line with the finding by Weyers et al. (2008) which low social support are more frequent among low socio economy people.

The mean score for each district was calculated and the result showed that Besut has the highest instrumental support (0.0930), followed by Dungun, Marang, Setiu, Hulu Terengganu, Kemaman and Kuala Terengganu with the mean score of 0.0804, 0.0281, -0.121, -0.0397, -0.0568 and -0.0930 respectively. Proportional to emotional support, the highest instrumental support was from Besut. In this study, the families in this district gave more attention to their substance abuser while giving good instrumental support. Even though instrumental support involves the provision of material good, our finding showed that the major factors contributing to instrumental support in Besut was not based on financial aspect due to their low socio-economic status, but in the form of employable help, community involvement and training aid which were related to the practical assistance. This is contradict with the finding by Weyers et al. (2008) and Melchiorre et al. (2013), in which low socio economic people lack of social and instrumental support.

Based on Fig. 2, the highest information support index in Terengganu was Setiu, followed by Dungun, Besut, Marang, Kuala Terengganu, Hulu Terengganu and Kemaman. Based on our study, Setiu is the smallest district in Terengganu with low substance abuser

which bring them easy in handling the cases and delivering information to the family on managing substance abuser.

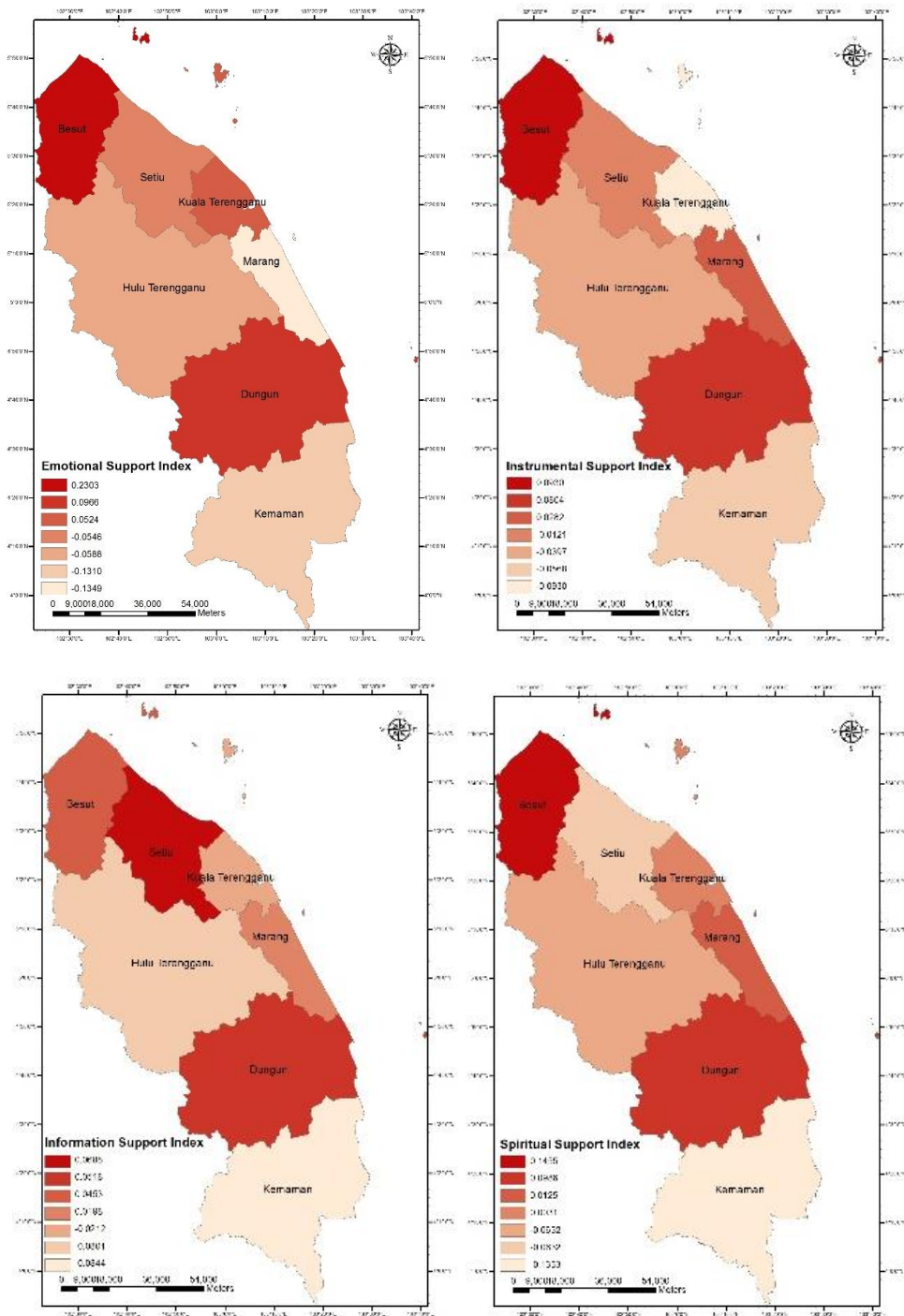


Figure 2. Hierarchy of each form of family support.

Figure 2 showed that the distribution of spiritual support index was highest in Besut followed by Dungun, Marang, Kuala Terengganu, Hulu Terengganu, Setiu and Kemaman accordingly. Kemaman is known as an industrial area where a lot of foreign workers acquired in that field. Social networking and different culture among foreign workers and local residents caused slight influence on their religious strength. Previous study documented that culture may be influenced by religion vice versa (Raday, 2003; Bonney, 2004).

Conclusion

Family support on substance abuser in Terengganu was investigated and a model was developed using a combination of statistical analysis and GIS. The distribution of family support index could be served as an indicator on how the family support plays a positive role on influencing a positive outcome for rehabilitation process of substance abusers. Indirectly, it give impression to the stakeholder involved in the current situation to take the best way to address the possible problems that caused less family support given among substance abusers.

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