Developing a model based on GIS and statistical analysis for family support of substance abuser in Terengganu

Siti Nor Fazillah  
Universiti Sultan Zainal Abidin, Malaysia

Hafizan Juahir  
Universiti Sultan Zainal Abidin, Malaysia

Mohd Toriman Toriman  
National University of Malaysia, Malaysia

Nasir Mohamad  
Universiti Sultan Zainal Abidin, Malaysia

Azli Fairuz  
National University of Malaysia, Malaysia

Syed Mohd Hafiz Syed Omar  
Universiti Sultan Zainal Abidin, Malaysia

Introduction

Globally, substance abuse is a substantial threat in public health. This problem has beena worldwide issue, because it is not only affected 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 be more serious with emerge of new drugs, a major threat to the world. The country also have to spend a lot of money for any interventions program, campaign and allocation for rehabilitation centres.
Similar to other countries, Malaysia was not spared from this problem (Chie et al., 2015). The severity of this problem prompting the government to declare drug as nation’s enemy number one in 1983 (Devi at al., 2012; Fauziah et al., 2012). Out of 28.3 million total population, an estimate of 205,000 Malaysian injected illicit drugs (Wickersham et al., 2013). Statistic reported by the National Anti-Drugs Agency of Malaysia (2013) indicated that the number of substance abuser in Malaysia was 20887. Pulau Pinang became the state with the highest number of substance abuser while, Wilayah Persekutuan Labuan was the lowest one.

Seeing of substance abuse broadened, many researchers aim to identify the root cause of this problem and to examine the best solution. Researches on substance abuse not only covers the public health field, but all sectors including social science and others. There is a lot of studies carried out to find 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 (ShMarzety et al., 2013). Science field researches on producing medicine to treat substance abuser meanwhile 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 pharmacology and psychosocial approaches. Several findings report that the most effective treatment for substance abuser is behavioural therapy and a few models were developed for this purposes (Carrol et al., 2005; Williams and Chang, 2000). One of the most important aspects that should be focused on is family aspect. In previous study, family support played an important role in rehabilitation process (Klostermann and Timothy, 2013), in which active involvement of family support in any type of problems resulted better outcome compared to whom without family support (Foster, 2012). Study by Chie et al. (2015) also supports this statement and said that loss of family support cause trouble in treatment of substance abuser.

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

However, there are several obstacles should be adjusted by family in giving total support towards substance abuser. In order to find a solution to this problem. There is a need for family support model data to be simplified, via appropriate analysis transformation and
Developing a model based on GIS ... 

interpretation of useful information. In order to handle a huge data and interpreting 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 combining GIS and statistical methods.

Methodology

Study Area

The study area was in Terengganu as shown in Figure 1, one of the states located in the East Coast of Peninsular Malaysia. It was situated within latitude 04°00'N-05°50’N and longitude 102°25’E-103°50’E, covering an area of approximately 1,295,638.3 hectares and consisted of seven districts which are Besut, Dungun, Hulu Terengganu, Kuala Terengganu, Kemaman, Setiu and Marang where Hulu Terengganu is the largest district (Official Portal Terengganu State government).

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 study sample was determined by National Anti-drug Agency (NADA) Officer based on their record. The method used to select the sample study was using purposive sampling where the criteria of respondents were based on their ability to respond to questions and relay information effectively to the researcher (Kya et al., 2015). Through purposive sampling, the focus was to gain more understanding about the study (Mok, 2009). In this study, the data collection method used was direct questionnaire where this method acquired us to greet them and briefly explain our intention hence giving them a set of questionnaire to be completed (Kya et al., 2015). The questionnaires were read to the family members exactly in the same wording sequence and marked by researcher due to several problems like the family members do not know how to read, write and understand.

Figure 1. Seven district of Terengganu selected in this study
the questions. This is to ensure that respondents respond to exactly the same question so that response bias can be controlled.

**Measure**

The family support instrument was adapted from Farah Syazrah (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). The total items has been measured including socio-demographic part were 62 items.

**Factor Analysis (FA)**

Factor analysis is a method used to handle abundance of a complex data set and interpret into powerful means whereas it will analyses the data to generate a lower dimensional linear structure (Singh et al., 2005). Factor analysis was applied in this study to develop family support indices.

The varifactors (VFs) can be expressed as:

\[
z_{ji} = a_{f1}f_{i1} + a_{f2}f_{i2} + a_{f3}f_{i3} + \ldots + a_{fm}f_{mi} + e_{fi} \tag{1}
\]

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 district in Terengganu. Each form of support has different number of variable, where emotional support, instrumental support, information support and spiritual support have 14, 11, 13 and 12 variables respectively. Hence, each from 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:

\[
FS_i = \sum_{i}^{n} F_i W_i \tag{2}
\]

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**

Finally, the distribution of family support by district using the indices developedwas mapped. This study involved image processing in GIS laboratory using ArcGIS 10.3.
Result and Discussion

Family support indices

Developing index for family support in this study was based on the method proposed by Li and Weng (2007) in their study on quality of life (QoL). There was no significant method to integrate this social indicator as one single index because of no criteria to measure the weighted for this indicator. Nevertheless, we decide to apply pragmatic solution for this case and assign factor score as indicator, while associated variance as weights (Schyns and Boelhouwer, 2004). 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 frequency in table 1. This score also can be used as family support index.

Table 1. Frequency table of family support score

<table>
<thead>
<tr>
<th>Family Support Score</th>
<th>Freq.</th>
<th>Cum. Freq.</th>
<th>%</th>
<th>Cum. %</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1.28912</td>
<td>3</td>
<td>3</td>
<td>1.22%</td>
<td>1.22%</td>
<td>Very poor</td>
</tr>
<tr>
<td>-0.92736</td>
<td>9</td>
<td>12</td>
<td>3.67%</td>
<td>4.90%</td>
<td>Poor</td>
</tr>
<tr>
<td>-0.56561</td>
<td>24</td>
<td>36</td>
<td>9.80%</td>
<td>14.69%</td>
<td>Fair</td>
</tr>
<tr>
<td>-0.20385</td>
<td>145</td>
<td>181</td>
<td>59.18%</td>
<td>73.88%</td>
<td>Good</td>
</tr>
<tr>
<td>0.157909</td>
<td>64</td>
<td>245</td>
<td>26.12%</td>
<td>100.00%</td>
<td>Very good</td>
</tr>
<tr>
<td>Instrumental Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.96731</td>
<td>6</td>
<td>6</td>
<td>2.45%</td>
<td>2.45%</td>
<td>Very Poor</td>
</tr>
<tr>
<td>-0.64484</td>
<td>39</td>
<td>45</td>
<td>15.92%</td>
<td>18.37%</td>
<td>Poor</td>
</tr>
<tr>
<td>-0.32236</td>
<td>72</td>
<td>117</td>
<td>29.39%</td>
<td>47.76%</td>
<td>Fair</td>
</tr>
<tr>
<td>0.000113</td>
<td>94</td>
<td>211</td>
<td>38.37%</td>
<td>86.12%</td>
<td>Good</td>
</tr>
<tr>
<td>0.322589</td>
<td>34</td>
<td>245</td>
<td>13.88%</td>
<td>100.00%</td>
<td>Very good</td>
</tr>
<tr>
<td>Information Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1.32408</td>
<td>2</td>
<td>2</td>
<td>0.82%</td>
<td>0.82%</td>
<td>Very Poor</td>
</tr>
<tr>
<td>-0.92318</td>
<td>25</td>
<td>27</td>
<td>10.20%</td>
<td>11.02%</td>
<td>Poor</td>
</tr>
<tr>
<td>-0.52227</td>
<td>47</td>
<td>74</td>
<td>19.18%</td>
<td>30.20%</td>
<td>Fair</td>
</tr>
<tr>
<td>-0.12137</td>
<td>128</td>
<td>202</td>
<td>52.24%</td>
<td>82.45%</td>
<td>Good</td>
</tr>
</tbody>
</table>
According to the indices developed, instrumental support has the highest index with the least scale of index compared to the other form of support, indicating 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 hindrance 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 were based on the answer given by respondents, because they have different perspectives on each form of support. Then, we determined the mean score for every district to obtain the whole picture of family support in the study area. Therefore we will further discuss the form of family support by district and examine the view of respondent in that particular district. Hence, we applied GIS to visualise a clear picture of family support indices distribution in Terengganu. Based on the spatial analysis as shown in map in figure 2, trend of family support given to substance abuser in each district presented the hierarchy of each form of support. Referring to the map, the light colour indicated the highest family support, meanwhile, the darkest colour represented the reducing family support.
We identified the mean score of emotional support and we found out that Besut has the highest emotional support with the mean score 0.2303, followed by Dungun, Kuala Terengganu, Setiu Hulu Terengganu, Kemaman and Marang with mean score 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 substance abuser in rehabilitation process.

Emotional support indicated that Besut was identified with the highest emotional support and Marang with the lowest one. The position of Besut in the north of Terengganu and far away from the state with their main occupation as self-dependence and most of them were not working can be considered as low socio economic class, suggesting why emotional support given by family members as the highest one. This was proved by the study by Pollack and Knesebeck (2004) 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). Low socio economic class families had spent more time with their family and close tie because most of them did not bond to office hour. This is contradict with the study by Salonna et al. (2012) in their literature where there was positive correlation between high socio economic classes with social support. 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 mean score 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. Our study found that the family 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 here was not based on financial aspect due to their low socio-economic status, but in the

---

**Figure 2 Hierarchy of each form of family support**

![Hierarchy of each form of family support](image-url)
form of employable help, community involvement and training aid which were related to 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 the map, 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 making them easy to handle the cases and deliver information to the family on managing substance abuser.

The map above showed the distribution of spiritual support indices was highest in Besut followed by Dungun, Marang, Kuala Terengganu, Hulu Terengganu, Setiu and Kemaman accordingly. Kemaman was 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 slightly 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 indices 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 current situation to take the best way to address possible problem that caused less family support given among substance abusers.

**Acknowledgment**

We would like to acknowledge that this special research was funded by the Niche Research Grant Scheme (NRGS-KPM) UniSZA/NRGS/2013/RR057. Special thanks goes to the Ministry of Higher Education Malaysia, Prison Department of Malaysia (Marang) and UniSZA for providing general assistance to this project. Finally and most importantly, we are greatly thankful to the East Coast Environmental Research Institute (ESERI) for their kind assistance in data analysis techniques and peer support in completing this paper.
Developing a model based on GIS...

References and notes:


Developing a model based on GIS and statistical analysis for family support of substance abuser in Terengganu

Siti Nor Fazillah  
Universiti Sultan Zainal Abidin, Malaysia

Hafizan Juahir  
Universiti Sultan Zainal Abidin, Malaysia

Mohd Toriman Toriman  
National University of Malaysia, Malaysia

Nasir Mohamad  
Universiti Sultan Zainal Abidin, Malaysia

Azli Fairuz  
National University of Malaysia, Malaysia

Syed Mohd Hafiz Syed Omar  
Universiti Sultan Zainal Abidin, Malaysia

Family support has a strong impact on individuals. There is no exception in substance abuse recovery process, family support manage to play a positive role in substance abuse problems. The presents study deals with the developing model of family support substance abuser with the combination method of GIS and statistical models. The data used for this study collected from seven districts in Terengganu with a constant number of respondents. 35 respondents for each districts involved in this study was then processed using factor analysis (FA) to develop indices of family support. Using the indices developed, Geographic information system (GIS) tool was used to map the distribution of family support indices according to each form of family support. The result indicated the highest indices for all form of family support abuser located in Besut. High levels of family supportgiven can bevery helpful as an effort for rehabilitation process of substance abusers.

**Key words:** Factor analysis, Family support, GIS, Indices, Substance abuser, Statistical models
Instructions for Authors

Thank you for choosing to submit your paper to us. These instructions will ensure we have everything required so your paper can move through peer review, production and publication smoothly. Please take the time to read and follow them as closely as possible, as doing so will ensure your paper matches the journal’s requirements.

About the journal

International Journal of Humanities and Social Development is an international, peer reviewed journal, publishing high-quality, original research. Please note that this journal only publishes manuscripts in English. Journal focuses on the results of original research projects in various fields of humanities and social development.

Articles and other material published in the International Journal of Humanities and Social Development represent the opinions of the author(s) and should not be considered to reflect the opinions of the Editorial Board. All published research articles in this journal have undergone rigorous peer review, based on initial editor screening, anonymous refereeing by independent expert referees, and consequent revision by article authors when required.

IJHSDR accepts the following article types: Articles; Book Reviews; Critical Notices.

International Journal of Philosophical Studies considers all manuscripts on the strict condition that

• the manuscript is your own original work, and does not duplicate any other previously published work, including your own previously published work.

• the manuscript has been submitted only to International Journal of Philosophical Studies; it is not under consideration or peer review or accepted for publication or in press or published elsewhere.

Preparing your paper

Manuscripts should be compiled in the following order: title page, abstract; keywords; main text; acknowledgements; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figure caption(s) (as a list). Please include a word count for your paper.

A typical article for this journal should be no more than 8000 words; this limit includes references, endnotes.
A typical book review for this journal should be more than 1000 and no more than 2000 words. A typical critical notice for this journal should be more than 3000 and no more than 5000 words. The first page should include the title of the article, the names and primary affiliations of the author(s), an abstract (no more than 200 words) and 5-6 keywords. All figures, photographs, tables, or drawings should be numbered.

Please include all authors’ full names, affiliations, postal addresses, telephone numbers and email addresses on the title page. Please note that no changes to affiliation can be made after your paper is accepted.

References must be in MLA format. Entries in the reference list should be put in alphabetical order or in order of citation. Footnotes in the text should be avoided if possible.

Articles may be submitted by e-mail. Please submit your manuscript to the following address: ijhsdr@gmail.com.

Should you have any queries, please contact us at ijhsdr@gmail.com