

**Appendix I**

**Youth Non-Participation in Pattani Province of Thailand**

Prince of Songkla University  
Pattani Campus

## YOUTH NON-PARTICIPATION IN PATTANI PROVINCE OF THAILAND

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This paper examines the prevalence of youth non-participation, defined as not attending school and not employed in the workforce, by gender and religion (Muslims or others) in the sub-districts of Pattani province, an area in southern Thailand where there is currently concern about extremists' recruitment of youth in the insurgency. Data were obtained from the 2000 Population Census of Thailand. The outcome demonstrated the proportion of persons aged 15-17 years who were out of school and not employed. The particular categories used (region comprising aggregated sub-districts to overcome statistical problems due to small samples, and religion-gender combinations to allow for the possible interaction between gender and religion), as well as the statistical methods used, enabled identification of geographic areas where a relatively high level of disparity (social inequality) existed for young persons aged 15-17 years. The plotting technique used in this paper makes it easy to identify districts or provinces that need urgent action to increase social justice because of high levels of inequality.

**Keywords:** Demographic factors, School attendance, Pattani province, Logistic regression.

### Introduction

Since the terrorist insurgency in Thailand's three most southern provinces began in 2004, there has been concern about extremists recruiting

youth. Pattani is the most densely populated of these three most southern provinces and, according to the population registration and housing survey in 2000 (National Statistical Office, 2006), at the turn of the century had 595,985 residents, of whom 82% stated their religious affiliation to be Muslim.

### **Educational Background**

In 2000, only 25% of Pattani's population had completed secondary school. Moreover, 23.5% of all 15-17 year olds were both unemployed and out of school. School participations tend to decrease as children get older. There are about 95% of children in early primary years who attend government schools. It is because the schools are located near children's home and therefore there is less expenses for transportation and other costs. Only about 60% of population aged 15-19, remains in schools whereas nationally around 82% of these ages attends school. Reasons why fewer older children attend school are related to several factors. These include religious and cultural preference for Islamic training, frustration in a language not spoken at home, difficult access to secondary schools, poverty limiting the ability of households to afford the expenses, quality, security and relevance of school to future employment opportunities.

On average population aged 15 years and over have six years of education attainment whereas it is 7.8 years for the whole country. Population aged 6-24 years not attending school is about 39% (National Statistical Office, 2006).

### **Employment Background**

In 2000, employment characteristics of population aged 15 years and over were 37% employees and 36% own account workers. A survey on employment rate of people in the Muslim communities in southern border provinces (Lanui *et al.*, 1997) found that most households were in agricultural sectors. The employment rate was at low level. Some economic activities were not appropriate to the Muslims and some workers were unskilled. The unemployment rate was about 4.62% due to the fact that expansion of employment was not relevant to the Muslims' way of

life. Most of the unemployment occurred in the fishery communities. People in these communities considered working as a religious act. Therefore, they did not choose their occupations by the income but by choosing the ones permitted by their religion and convenient for their religious practice. Some occupations were not accepted although high income such as employment in entertainment places, financial institutes or work for beauty. Therefore unemployment occurred more in this region than in others. Three southernmost provinces rank among the 20 poorest in Thailand with poverty rates in 2002 of 20% in Pattani. There are nine districts of Pattani that do not meet the government goal of 70% of households with a per capita annual income in excess of 20,000 bath. These districts are Kapoh, Mayo, Nong Chick, Mai Kaen, Maelan, Yarang, Muang, Yaring, Panare (Community Development Department, 2005).

Numerous studies, including Cowell (2008), have used income for measuring inequality within a society, usually justified by findings that dependent children share the socio-economic conditions and well-being of their parents (Avramov, 2002). Disadvantage is often generational and Gesemann (2007) concluded that education is the key to integration. Philmore and Goodson (2008) used education and employment as indicators of integration within a society. A focus on participation by young people in education and/or employment can help predict likely future levels of integration, and also probable disparity and tensions, in the community. Based on a study of the Muslims in Germany, Figen (2007) emphasized that without participation in education there cannot be satisfactory participation in the society's decision making. In another recent report on the integration of the young Muslims in Germany, Gesemann (2007) stated that unsatisfactory achievement in schooling and high unemployment present a warning signal that feelings of exclusion and marginalization will be exploited among disadvantaged youths to create conflict.

Although the study by Cowell (2008) combined income and purchasing power, there are relatively many other published studies using such indicators. Avranov (2002) looked at income, education and housing as composite indicators of disadvantage. This comparison of one's relative condition might be relevant to perceptions and feelings about being 'not at school and not employed'. Also, in Pattani province in southern Thailand there are differences in religion that mark a demarcation within the

population. Perceptions of the relative position of one's self and also of one's religious or gender group could be related to subsequent behaviour and unrest. A composite school-employment index could be useful for identifying locations of social inequality in the region studied.

This study examined religion and gender, as well as place of residence in the province, as factors among 15-17 year olds in being not at work and not at school.

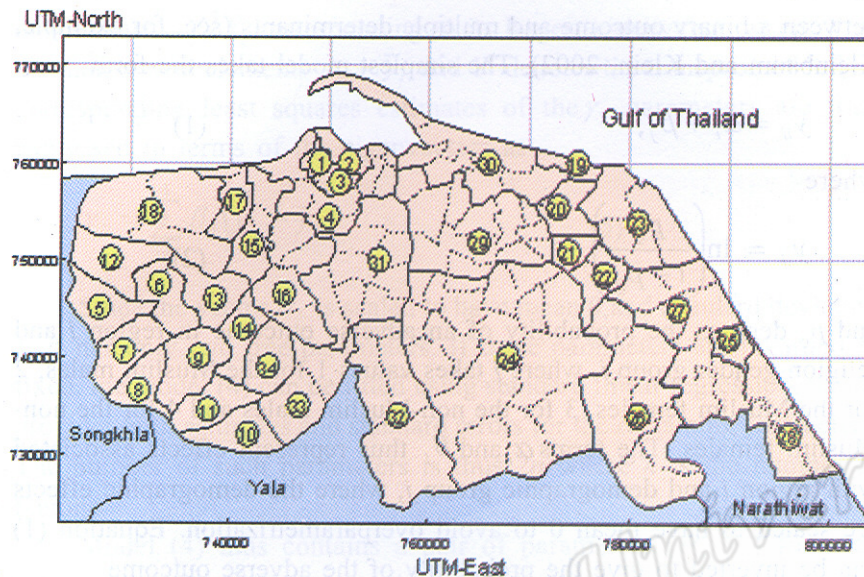
## **Methods**

### ***Study Design and Variables***

The study was cross-sectional, based on population data selected from the 2000 Population and Housing Census of Thailand. Omitted were persons who did not state their age, and persons aged less than 15 years or greater than 17 years, giving a total study sample of 35,022. The determinants were defined as gender, religion (Muslim or non-Muslim) and region (sub-district or aggregated sub-district) of residence. The adverse outcome was the binary variable defined as giving the answer "no" to both the questions "attending school" and "employed" on the form for the 2000 Population and Housing Census of Thailand.

### ***Definition of Regions***

Some sub-districts had low populations for either or both Muslim and non-Muslim residents. Two of the 115 sub-districts had fewer than 50 residents aged 15-17 in either of the two religion groups, a further 81 had fewer than 50 non-Muslims in this age group, and five more had fewer than 50 Muslims aged 15-17. To ensure that the statistical analysis was not compromised by such small sample sizes, adjoining sub-districts were combined where necessary to form larger regions, each with a minimum total population of approximately 1,600 persons for both the Muslims and non-Muslims. This reduced the number of residence locations from 115 to 34, and as a result all such regions had at least 50 respondents in each religion group. Figure 1 shows how these regions were defined, with dotted lines indicating the sub-district borders and continuous lines separating the larger regions.



- |                      |                       |                         |
|----------------------|-----------------------|-------------------------|
| 1. Sabarang+Anuru    | 13. Na Ket            | 24. Mayo+TYD            |
| 2. Bana              | 14. Khuan Nori        | 25. Taluban             |
| 3. Jabangtiko+Talubo | 15. Tuyong+Bang Tawa  | 26. West Saiburi+Karubi |
| 4. Rusamilae+        | 16. Central Nong Chik | 27. East Saiburi        |
| 5. Khok Poh          | 17. South Nong Chik   | 28. Mai Kaen            |
| 6. Makrut+Bangkro    | 18. West Nong Chik    | 29. South Yaring        |
| 7. Pabon+Changhaitok | 19. Panare City       | 30. North Yaring        |
| 8. Sai Khao          | 20. Thakumcham+BanNok | 31. North Yarang        |
| 9. Napradu           | 21. Don               | 32. South Yarang        |
| 10. Pahlo            | 22. Khuan+Thanum      | 33. Maelan+Mung Tia     |
| 11. Thung Phala      | 23. North Panare      | 34. Parai               |
| 12. Tha Rua          |                       |                         |

**Fig. 1**

Map of 115 sub-districts in Pattani,  
with combinations to create 34 statistical regions

### **Statistical Methods**

In preliminary data analysis we compared the prevalence of non-participation within the 34 statistical regions of Pattani province by plotting these proportions separately for each combination of gender and religion using an area plot.

The prevalence of the adverse outcome may be modelled using logistic regression, which provides a method for modelling the association

between a binary outcome and multiple determinants (see, for example, Kleinbaum and Klein, 2002). The simplest model takes the form

$$y_{ij} = \alpha_i + \beta_j, \quad (1)$$

where

$$y_{ij} = \ln\left(\frac{p_{ij}}{1-p_{ij}}\right), \quad (2)$$

and  $p_{ij}$  denotes the probability of an adverse outcome in region  $i$  and religion-gender group  $j$ , where  $j$  takes values 1 for the Muslim males, 2 for the Muslim females, 3 for the non-Muslim males and 4 for the non-Muslim females. The terms  $\alpha_i$  and  $\beta_j$  thus represent effects associated with region  $i$  and demographic group  $j$ , where the demographic effects are scaled to have mean 0 to avoid overparametrization. Equation (1) can be inverted to give the probability of the adverse outcome

$$p_{ij} = \frac{1}{1 + \exp(-\alpha_i - \beta_j)} \quad (3)$$

The logistic regression model was fitted to the counts in cells defined by combinations of demographic group and region, and the adequacy of the model was assessed by comparing the residual deviance with the number of degrees of freedom, and also by examining the linearity in the plot of deviance residuals against normal quantiles (Venables and Ripley 2002, Chapter 7). To allow for possible interactions between region and demographic group, model (1) may be extended to a more general multiplicative model of the form

$$y_{ij} = \alpha_i + \gamma_i \beta_j. \quad (4)$$

In this model the demographic parameters are scaled to have unit variance as well as mean 0. The additional parameters  $\gamma_i$  provide a measure of the disparity in the adverse event rate between the different demographic groups in region  $i$ . Thus if region  $i$  has  $\gamma_i = 0$ , it means that there is no difference in the school adverse event rates between demographic groups in this region, whereas if  $\gamma_i$  is large in magnitude there is a high disparity between these groups.

Model (4) is non-linear and thus cannot be fitted simply using regression. However, Theil (1983) showed that the least squares estimates of the  $\beta_j$  parameters in model (4) are the elements of the eigenvector

of the matrix  $Y_c^T Y_c$  corresponding to its largest eigenvalue, where  $Y_c$  is the matrix with elements  $y_{ij} - \bar{y}_i$  and  $Y^T$  denotes the transpose of  $Y$ . The corresponding least squares estimates of the  $\gamma_i$  parameters are then expressed in terms of the eigenvectors as

$$\gamma_i = \sum_{j=1}^4 \beta_j (y_{ij} - \bar{y}_i). \quad (5)$$

Since the vector  $\beta_j$  is scaled to have mean 0 and standard deviation 1, it has only two free parameters. If these parameters are regarded as fixed, the model (4) can be fitted using standard linear regression, which provides both estimates and standard errors for the remaining parameters. The number of such parameters is thus  $2n$  where  $n$  is the number of regions.

Model (4) thus contains a pair of parameters  $(\alpha_i, \gamma_i)$  for each region, where  $\alpha_i$  is the proportion of non-participating subjects and  $\gamma_i$  is the disparity index measuring the extent to which different demographic groups have different non-participation rates. This model has been used extensively for mortality forecasting in population science, where it is known as the Lee-Carter model (see, for example, Lee and Carter 1992, Booth et al 2002). In this research  $y_{ij}$  is the logarithm of the mortality rate in a population where the indexes  $i$  and  $j$  refer to age group and year, respectively.

To allow for values of  $p_{ij}$  equal to 0 or 1, a small constant  $d$  is added to the numerator and denominator in Equation (2) before log-transforming. Having estimated the vector  $\beta_j$  in model (4) by least squares we then used logistic regression to estimate the parameters  $(\alpha_i, \gamma_i)$  for each region. Sum contrasts (Venables and Ripley 2002, Chapter 6) were used instead of the standard treatment contrasts, so that the standard error for each  $\alpha_i$  parameter provided a confidence interval for the difference between the non-participation rates in region  $i$  and the overall mean participation rate in the study area.

The final results are displayed as a scatter plot of the estimated parameters  $(\alpha_i, \gamma_i)$  for the regions. This plot shows the pattern of both non-participation and disparity in the study area. Using the standard errors estimated from the logistic regression model, the regions may then be classified into groups according to whether the confidence intervals for the non-participation rates exceed, contain, or fall below the overall



mean, and according to whether the confidence intervals for the disparity indexes exceed zero, contain zero, or fall below zero.

**Results**

*Preliminary Analysis*

Fig. 2 shows area plots of the non-participation rates in the 34 regions, ordered by the sum of the non-participation percentages for the four demographic groups. The upper panel compares percentages by gender whereas the lower panel shows the comparison by religion.

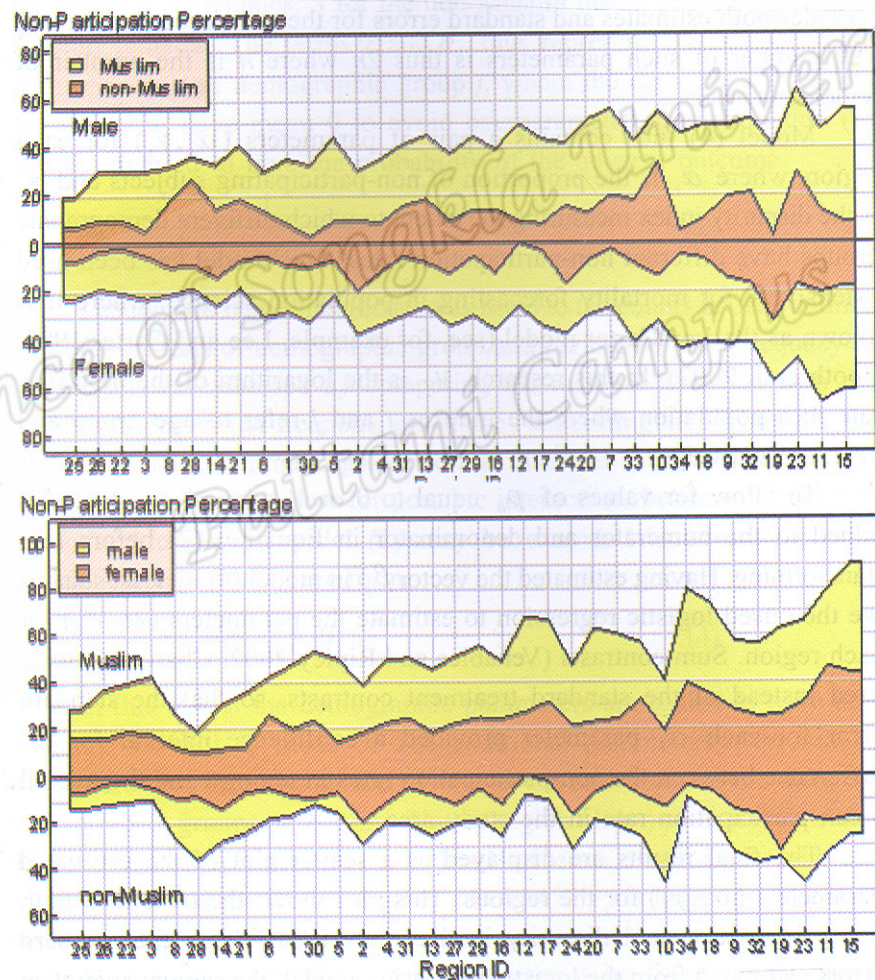


Fig. 2  
Non-participation rates of youths aged 15-17 in  
statistical regions of Pattani province

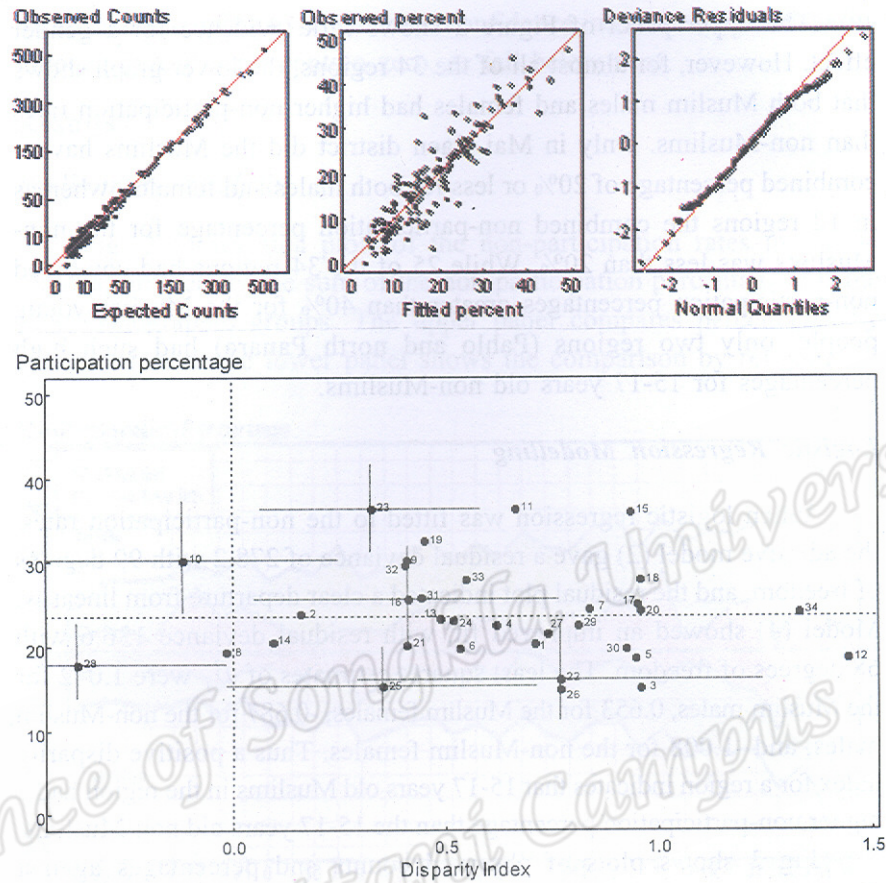
The upper panel of Figure 2 shows little evidence for a gender effect. However, for almost all of the 34 regions, the lower graph shows that both Muslim males and females had higher non-participation rates than non-Muslims. Only in Mai Kaen district did the Muslims have a combined percentage of 20% or less for both males and females, whereas in 12 regions the combined non-participation percentage for the non-Muslims was less than 20%. While 25 of the 34 regions had combined non-participation percentages greater than 40% for the Muslim young people, only two regions (Pahlo and north Panare) had such high percentages for 15-17 years old non-Muslims.

### *Logistic Regression Modelling*

When logistic regression was fitted to the non-participation rates, the additive model (2) gave a residual deviance of 278.2 with 99 degrees of freedom, and the residual plot indicated a clear departure from linearity. Model (4) showed an improved fit, with residual deviance 136.6 with 68 degrees of freedom. The least squares estimates of  $\beta_j$  were 1.042 for the Muslim males, 0.653 for the Muslim females, -0.687 for the non-Muslim males, and -1.008 for the non-Muslim females. Thus a positive disparity index for a region indicates that 15-17 years old Muslims in the region had a higher non-participation percentage than the 15-17 years old non-Muslims.

Fig. 3 shows plots of observed counts and percentages against fitted values as well as residuals against normal quantiles in its upper panels, with a scatter plot of the non-participation rates versus disparity indexes for the regions in the lower panel.

The lower panel shows a scatter plot of the non-participation rates and the disparity indexes for the 34 statistical regions in Pattani province. On the x-axis, a score of zero for the disparity index would mean that, for the particular region, all four gender-religion groups would have the same non-participation levels, a positive value indicates greater non-participation rates for the Muslim youth, and a negative value indicates greater non-participation rates for the non-Muslims. On the y-axis, a placement near the dotted line would indicate that, for that particular region, the overall level of non-participation would be at the overall average for all regions. Regions with points above and below the dotted line have levels that are higher and lower, respectively, than the average level of non-participation for 15-17 year olds in the Pattani province.



**Fig. 3**  
 Multiplicative model results for youth non-participation rates in Pattani regions

The plot also shows confidence intervals that can be used to make valid statistical conclusions, the vertical line segments denote a 95% confidence interval for the non-participation rates (when compared with the overall mean), whereas the horizontal line segments denote a 95% confidence intervals for the disparity indexes (compared to zero disparity). To reduce clutter the confidence intervals are shown only for selected regions.

Using the confidence intervals, the regions may be classified into clusters, with the following results:

1. Higher than average non participation, positive disparity (0 region).
2. Higher than average non participation, no evidence of disparity (1 region).
3. Higher than average non participation, negative disparity (7 regions).
4. Average non-participation, positive disparity (0 region).
5. Average non-participation, no evidence of disparity (4 regions).
6. Average non-participation, negative disparity (17 regions).
7. Lower than average non-participation, positive disparity (1 region).
8. Lower than average non-participation, no evidence of disparity (1 region).
9. Lower than average non-participation, negative disparity (3 regions).

Fig. 4 shows a corresponding thematic map.

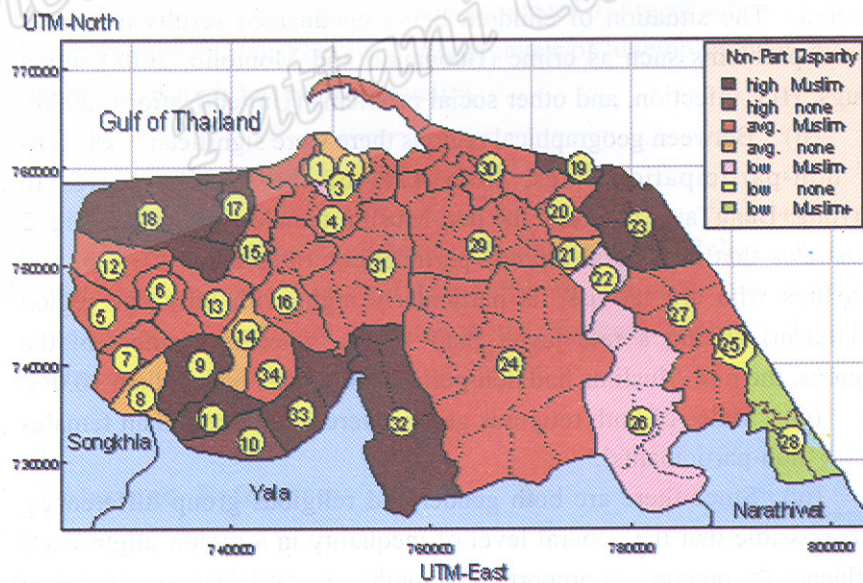


Fig. 4

Map of multiplicative model for youth non-participation rates in Pattani regions

A high disparity occurred in Napradu, Thung Phala, Tuyoung+Bang Tawa, Panare city, north Panare, south Yarang and Maelan+Mung Tia with the Muslims having a higher than average non-participation, negative disparity. In Phalo there is no evidence that the disparity index is higher than average non participation. In contrast, the Muslims in the MaiKaen region have a lower than average non-participation, positive disparity.

### Conclusion and Discussion

This study investigated the factors associated with failure to be at school or to be at work among 15-17 year olds in the Pattani province. The conclusions drawn from the analysis were:

- (i) Of the total (35,022) population of 15-17 year olds in Pattani in 2000, 23.5% were 'not at work and not at study, and therefore at risk of the consequence of limited life chances such as not achieving a good education, knowledge, employment, income and health. These 15-17 year olds are neither in employment nor in school, where schooling could increase their chances of gaining employment, is of concern. Their life chances in terms of achieving adequate income, status and health are limited. The situation of children being uneducated results in further social problems such as crime (Buonanno and Montolio, 2008), illicit drugs, HIV infection, and other social problems (United Nations, 2000).
- (ii) Between geographical regions there were significant variations of non-participation rates, from 47% of the Muslim males in Tuyoung+BangTawa to 0% of the non-Muslim females in ThaRua. Fig. 2 illustrates that in general the non-participation rates of 15-17 years old Muslims who are 'at risk' is particularly high, with only one region (Maikhan) having a rate lower than 10.0%, whereas in most of the regions, the non-Muslims had non-participation rates of less than 10.0%.
- (iii) Males of both religious groups were more likely than females to be 'non-participants'.
- (iv) Since there are both gender and religious group differences, it is possible that the general level of inequality in a region might itself influence the outcome of proportion of youth 'non-participation'. Therefore disparity indexes were calculated as a measure of inequality. The production of a Disparity Index used the average (scaled) set of

percentages for the four religion-gender groups and enabled the use of a model that placed locations (regions) on a scatter graph for ease of showing and comparing the situation of 15-17 year olds being 'non-participation', for specific locations, as well as comparisons of locations in terms of demographic inequality. A cluster around zero points would have been ideal, but it was found that in the Pattani province there were relatively high levels of non-participation and quite high levels of inequality between religious groups and genders.

(v) In summary, the use of a logistic model and the map shown in Fig. 4, with a disparity index of levels of demographic differences, have considerable potential to quickly draw attention to locations where there is a relatively high level of social inequality. Avranov (2002) suggested that perception of relative disadvantage rather than an 'absolute' deprivation, causes dissatisfaction and that depends in part on the extent to which others in the same location experience the disadvantage. Therefore, there might be a link between levels of social unrest and the locations of social disparity shown in this study, but there is a need for future research on it.

There is potential value in using this paper's plotting technique to identify locations, districts or provinces in need of urgent action to increase social justice, not just because of high levels of 'unemployment' but also because of high levels of inequality.

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