EDUCATION LEVEL AND FERTILITY RATE OF RURAL COMMUNITIES IN PASIR MAS DISTRICT, KELANTAN, MALAYSIA

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ABSTRACT

Fertility is one of the principal components of population that can affect a country's planning and development process. Since the 1960s, Malaysia has experienced a declining trend in the population fertility rate. In 2017, Malaysia's population fertility rate registered a value below the natural rate of replacement level. Nevertheless, there is a significant spatial distribution in total fertility especially in the urban and rural areas. This study investigates the impact of education level on population fertility and analyses the spatial distribution of a particular measure of population fertility in 50 townships of the Pasir Mas district, Kelantan. A cross sectional random survey was conducted to determine the education level and fertility rate of the Pasir Mas communities. The Geographical Information System is used to manage the spatial distribution in population fertility. Analysis of the data using Chi Square Test at 0.05 significant level revealed that education level significantly affecting age at first marriage, age at first birth, and number of children. Further analysis on spatial distribution in population fertility rates using LISA found that community fertility in each township was relatively similar. The studied area, which is categorized as rural, showed high fertility rate. The results emphasize the importance of community level education in developing and implementing the Malaysia population policy.

Keywords: population. fertility, education level, chi-square, LISA

INTRODUCTION

Fertility rate is a measure of the total number of children that would be born to a woman during her child-bearing years, generally between 15 to 49 years of age. Globally, there are differences in fertility rates among countries, especially between the developed and developing countries. Various factors may affect the fertility rate of a country. However, most of these factors are difficult to measure and explain as they are very subjective in nature and unique to particular countries. Consequently, it is difficult to determine the explanatory variables for fertility, making fertility rate forecasting in the future, almost impossible.

Developed countries in Europe, North America and Japan have been experiencing low fertility rate. The decline in fertility rate in Europe and North America has started since the Industrial Revolution. In 2010, the fertility rate in North America was registered at 1.9. Furthermore, most developed countries in Europe have fertility rates of 1.7, below the natural rate of replacement level. Meanwhile, in Africa and few Arab countries, the fertility rates are relatively high, followed by Central America and South American countries. In 2010, the fertility rate in African countries was 5.2, while in Central and South America, it was 2.2. In addition, the fertility rate in Asian countries was around 2.7 (World Bank, 2018).

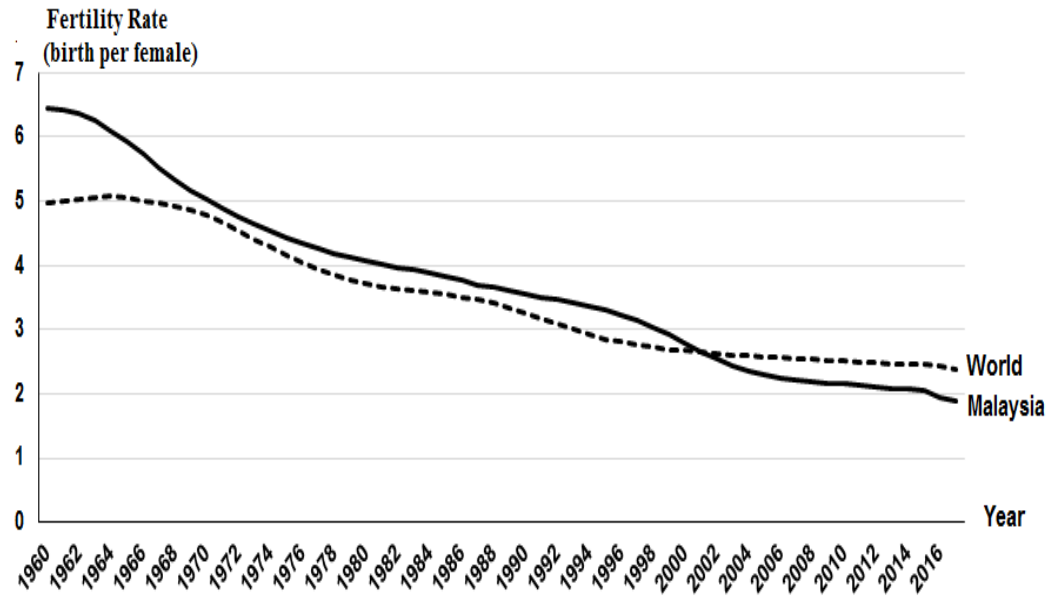
One of the most important factors affecting the rate of fertility is urbanization. People in the rural areas, in general, have a much higher level of fertility rate as compared to the urban dwellers who have a much lower rate (Usman, 1989; Kulu and Washbrook, 2014; Matthias and Markus, 2017). A detailed analysis of the fertility rate in Malaysia also has seen variations in spatial distribution in total fertility. Generally, urbanized states such as Selangor, Kuala Lumpur and Johore experience a lower fertility rate as compared to other states such as Kelantan, Terengganu, Sabah and Sarawak. In the light of this, the present study focuses on analysing the pattern of spatial distribution in total fertility in the rural areas, specifically in the Pasir Mas district of Kelantan. Essentially, the rural community level of education and its impact on fertility rate will be examined in detail.

LITERATURE REVIEW

In many ways, fertility is directly and indirectly related to the public healthcare and human welfare systems. As a consequence, the direction of the world's population fertility rate has been reviewed since 1950s. In developed countries, the fertility rate of a woman continues to fall from three children to two children. This declining trend in birth rate has caused concerns in the effort towards sustaining a stable population size. In the same period of time, the fertility rate in developing countries has experienced a decline. The fertility situation is, however, different from the one experienced in the African countries, whereby fertility rate is relatively high, hindering growth of socio-economic development in the region (Qingfeng and Xu, 2016).

In general, fertility rate around the world shows a substantial decline after the Second World War. Low fertility rate (less than 2.00 birth per woman) can be found in European countries, North America, Japan, Korea, China, Thailand, Australia, New Zealand, Brazil, Colombia, and Chile. In countries such as those in the Southeast Asia, South Asia, North Asia, North Africa, Central America and South America, an intermediate fertility rate (2.01 – 3.00 birth per woman) is present. High fertility rate (over 3.01 birth per woman) is experienced in underdeveloped and developing countries in the centre of the African continent; and Pakistan, Afghanistan, Yamen, Iraq, and Papua New Guinea of the Asian continent. There seems to be no country in the European continent, North America or Latin America registering high fertility rate (Alkema, et al. 2011)

In 1960, there was a noticeable difference between the Malaysian fertility rate and the global fertility rate, where the former registered 6.45 birth per woman at the time, before gradually declining to 5.01 in 1970 (see Figure 1). The global fertility rate, however, was around 4.98 in 1960 and decreased to 4.77 in 1970. There is no substantial difference in the fertility rates between Malaysia and the rest of the world from 1971 to 2002. For the year 2002, Malaysia's fertility rate was 2.66, whereas the global fertility rate was only 2.64. After that and until today, the fertility rate in Malaysia is below that of the world. In 2017, the fertility rate in Malaysia was 1.9 birth per woman in comparison to the global fertility rate of 2.38. The fertility rate in 2017 was the lowest rate ever recorded, and this value is expected to decline gradually in the coming years (Malaysia, 2015 & 2017).



Source: The World Bank (2018) and Vital Statistics of Malaysia (2015 & 2017)

Figure 1: Fertility Rate in Malaysia from 1960 – 2016.

Fertility rate in Malaysia also differs across the different states. Economically developed and urbanized states usually have low fertility rate. In 2017, for example, the Crude Birth Rate (CBR) was 14.4 in Kuala Lumpur, 16.6 in Selangor, 16.4 in Johor, and only 12.7 in Penang. Significantly, the four states are among the most economically developed and urbanized states in Malaysia. Terengganu and Kelantan, by contrast, have the highest CBR in Malaysia. To illustrate, in 2017, the CBR in Terengganu and Kelantan were 23.3 and 21.4, respectively (Malaysia 2017). Consistent with the earlier premise in which more developed states have lower fertility rate, both states are the least developed with lower level of urbanization.

METHODS

Study Area

This study was conducted in all townships in the district (also known as a territory) of Pasir Mas. The Pasir Mas district is located in the northwest of the state of Kelantan, bordering the Tumpat district in the north, Kota Baharu district in the west, Tanah Merah district in the South, and Thailand in the west. The Pasir Mas district is divided into 50 townships (see Figure 2). The district covers an area of 577 square kilometres with a population of 180,878 people. Half of its population are females with a value of 90,028 people (49.8%). The gender ratio of the Pasir Mas population is almost equal, with only 0.27% difference.

Data

Data on fertility rate for each Pasir Mas townships were obtained through a cross sectional random survey. Average number of childbirths for each respondent was calculated for every township (see Table 1). In this study, information pertaining to the average number of childbirths served as a measure of the community fertility rate. The spatial scientific method – the Geography Information System (GIS) software - was used to assess the patterns of spatial dependence, and fertility rate for all townships in the Pasir Mas district.

The First Law of Geography developed by Waldo Tobler is the foundation of the fundamental concepts of spatial dependence. The law states that a specific phenomenon that exists at a specific location is related to some other surrounding phenomena; however, they are only related, the closer they are to one another (Tobler, 1970).

This level of spatial dependence is measured using the Moran's Index (Lee and Wong, 2001). The local Moran's Index is known as *Moran's I* while the global Moran's Index is known as LISA *(Local Indicators of Spatial Association).* The LISA method is used as it is able to identify the hot spots of a spatial phenomenon under studied. (Anselin, 1996; Kang, Kim and Nicholls, 2014). The analysis on the impact of level of education on fertility rate was conducted using the Chi-square Test, in which, the levels of measurement for all independent and dependent variables in the Chi-square test are in nominal and ordinal scales (Rao and Richard, 2001; Chua, 2009).

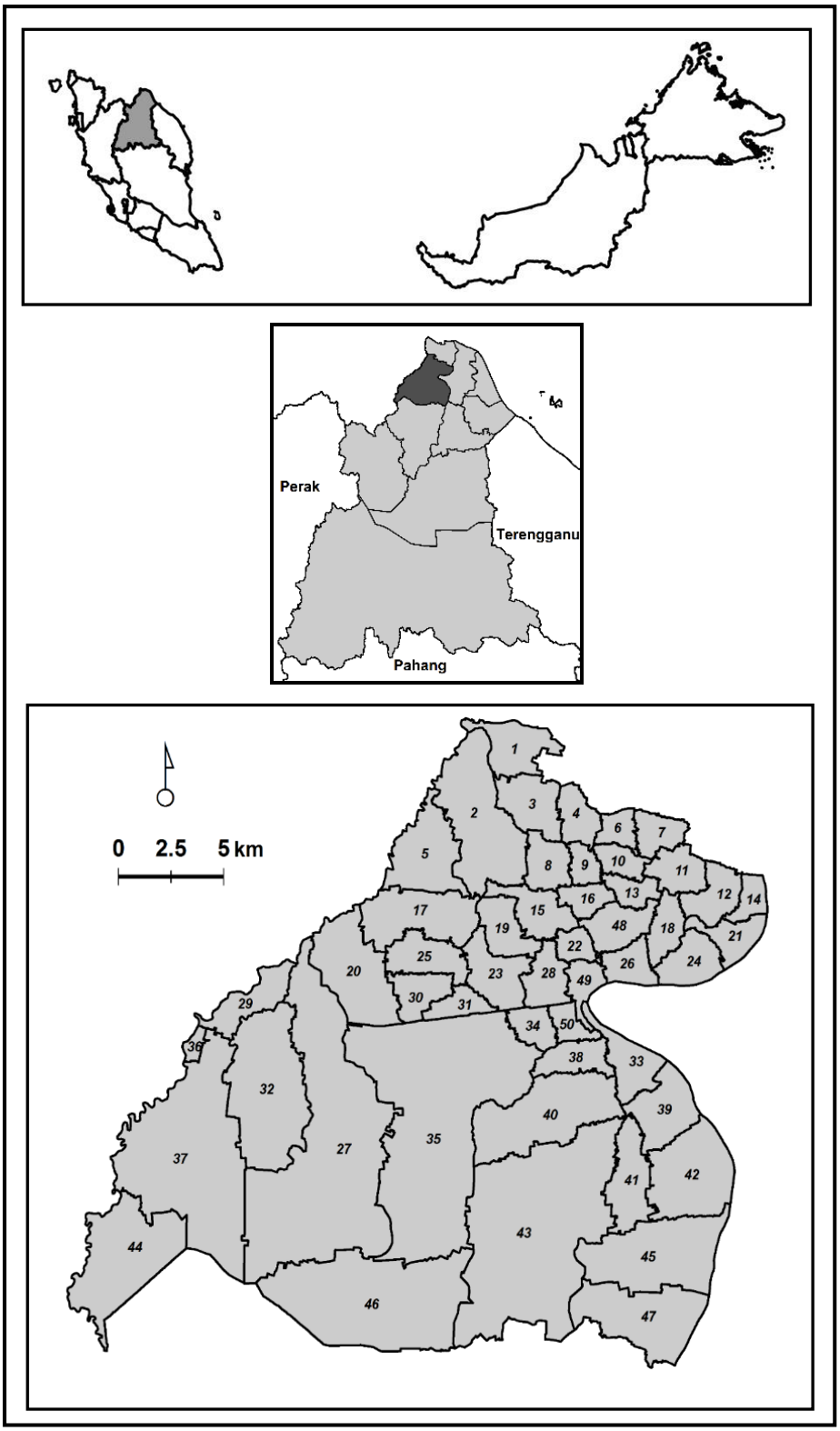


Figure 2: Location of Study Area

Table 1: The Number of Respondents in Each Studied Township

Township Code	Name of Township	Number of Respondents	Number of Respondent's Child	Average Childbirth
1	Kala	24	70	2.917
2	Meranti	58	159	2.741
3	Apa Apa	42	115	2.738
4	Kenak	37	134	3.622
5	Bakong	38	110	2.895
6	Bechah Semak	43	135	3.140
7	Teliar	38	99	2.605
8	Kedondong	37	95	2.568
9	Kerasak	34	100	2.941
10	Bechah Palas	43	100	2.326
11	Kiat	53	151	2.849
12	Padang Embon	57	181	3.175
13	Bechah Menerong	36	127	3.528
14	Paloh	23	63	2.739
15	Alor Buloh	50	138	2.760
16	Kubang Batang	27	112	4.148
17	Alor Pasir	44	121	2.750
18	Kubang Sepat	34	100	2.941
19	Lalang	26	98	3.769
20	Jejawi	41	128	3.122
21	Tendong	36	115	3.194
22	Kubang Bemban	50	124	2.480
23	Lubok Anching	34	118	3.471
24	Sakar	48	145	3.021
25	Lubok Kawah	39	133	3.410
26	Kasa	71	230	3.239
27	Gual Periok	54	182	3.370
28	Kubang Terap	47	164	3.489
29	Lubok Gong	29	97	3.345
30	Tok Sangkot	40	131	3.275
31	Tasik Berangan	28	93	3.321
32	Gual Nering	104	333	3.202
33	Kuala Kelar	31	122	3.935
34	Gua	44	99	2.250
35	Apam	168	395	2.351
36	Pekan Rantau Panjang	43	137	3.186
37	Rantau Panjang	109	347	3.183
38	LubokTapah	39	115	2.949
39	Kangkong	35	100	2.857
40	Kubang Ketam	36	122	3.389
41	Gelam	27	83	3.074

Table 1: (continued)

42	Chetok	58	209	3.603
43	Tok Uban	70	232	3.314
44	Lubok Setol	32	97	3.031
45	Jabo	70	189	2.700
46	Bukit Tuku	34	122	3.588
47	Kubang Gendang	37	112	3.027
48	Kubang Gatal	41	147	3.585
49	Bandar Pasir Mas	137	434	3.168
50	Kuala Lemal	47	168	3.574
	Total	**2,423**	**7,431**	**3.067**

RESULTS

In this study, a total of 2,426 female respondents were surveyed. Table 2 demonstrates the demographic profile of respondents surveyed. Majority of the respondents (92.5%) are of Malay ethnicity. Apart from that, most respondents (94.5%) were married, while the remaining 5.5% were either widowed or divorced. For the education level of respondents, about half of the sample (55.7%) graduated from secondary school, 21.7% of the respondents have an education level of STPM, certificate or diploma, 14.6% graduated from institutes of higher education, and 5.9% received primary school education. Respondents with no formal education accounted for 2.1% or a total of 50 people. Besides this, 38.0% of respondents were full-time housewives, 22.3% were working professionally, 23.0% were self-employed, and the remaining 8.2% of respondents were unskilled workers. Average household income of the respondents was RM2,216.20 per month, with a minimum income of RM100.00 per month. However, the maximum household income could reach up to RM25,000.00 per month. In addition, the average household members were 4.99 people, whilst average respondents' age was 36.12 years old, with a minimum age of 16 and a maximum age of 49.

Table 3 shows the detailed information regarding marriage and fertility of respondents in the study area. Age at first marriage is one of the main factors influencing a woman's fertility. In this study, the minimum age at first marriage was 14, while the maximum age was 39 years old. Mean age at first marriage was 22.3 years old with a standard deviation of 3.4 years old. In addition, the minimum age at first childbirth was 14, while the maximum age was 41 years old. Mean age at first childbirth was 23.0 years old, with a standard deviation of 5.5 years old. There were 79 respondents (3.3%) who had never given birth. Maximum number of childbirths for respondents was 13 children, with a mean of 3.07 children and a standard deviation of 1.85 children. This 3.07 mean value is nearly twice as large as the national mean value in year 2017, which was 1.9 children (Department of Statistics, Malaysia, 2017).

Table 2: Demographic Profile of Respondents

Profile	Frequency	Percentage
Ethnicity		
Malay	2,306	95.2
Chinese	77	3.2
Siamese	40	1.7
Marriage Status		
Married	2,289	94.5
Divorced/Widowed	134	5.5
Education		
No formal education	50	2.1
Primary School	143	5.9
Secondary School	1,350	55.7
Diploma	526	21.7
Higher Education	354	14.6
Employment		
Professional	565	23.3
Self-employed	558	23.0
Unskilled worker	199	8.2
Farmers	45	1.9
Housewife	921	38.0
Student	9	0.4
Others	126	5.2
Age Group		
25 years old and below	267	11.0
26 - 30 years old	473	19.5
31 - 35 years old	421	17.4
36 - 40 years old	412	17.0
41 - 45 years old	450	18.6
Above 45 years old	400	16.5

Table 3: Marriage and Fertility Profile of Respondents

Profile	Frequency	Percentage
Age at first marriage		
20 years old and below	807	33.3
21 – 25 years old	1,245	51.3
26 – 30 years old	346	14.3
31 – 35 years old	21	0.9
36 – 40 years old	4	0.2
Age at first childbirth		
20 years old and below	447	18.4
21 – 25 years old	1,184	48.9
26 – 30 years old	632	26.1
31 – 35 years old	67	2.8
36 – 40 years old	14	0.6
No child	79	3.3
Number of childbirth		
1 – 2 children	993	41.0
3 – 4 children	811	33.5
5 – 6 children	424	17.6
7 children and above	116	4.8
No child	79	3.3

Tables 4, 5 and 6 present the relationship between respondents' education level and their age at first marriage, age at first childbirth, and number of childbirths using the Chi-square tests. The results show that the respondents' education level significantly influenced all three measures of fertility - age at first marriage, age at first childbirth, and number of childbirths. In general, respondents with higher education level tend to get married at a later age. This was observed for the Pasir Mas respondents where 59.3% of respondents with high education experienced first marriage at the age of 21 to 25 years old and 36.4% got married at the age of 26 to 30 years old. In the meantime, 74.0% of respondents with no formal education, experienced marriage for the first time at the age of 20 and below. Similar pattern was also observed for age at first childbirth. Respondents with higher education level chose to defer their first childbirth at a much later age in comparison to respondents with lower education level. The findings of this research are consistent with previous studies conducted in other parts of the world. One study conducted in Saudi Arabia, for instance, found education level to be significantly associated with fertility (Rshood, et al. 2017). Similar findings have also been found in studies conducted by Guillermo and Sebastian (2007); Grace, Lee and Ping, (2014); Pinar, (2015); Piotrowski and Tong, (2016); Qingfeng and Xu, (2016); Matthias and Markus, (2017) and Mazharul Islam (2017).

Table 4: Relationship between Education Level and Age at First Marriage

Group of Age at First Marriage	Education Level of Respondents										*Chi-Square (Degree of freedom) p-value*
	Informal Education		Primary		Secondary		Diploma		Higher Education		
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	
20 years old and below	37	74.0	75	52.4	595	44.1	90	17.1	10	2.8	441.83 (16) ***0.000001***
21 – 25 years old	10	20.0	60	42.0	628	46.5	337	64.1	210	59.3	
26 – 30 years old	3	6.0	7	4.9	114	8.4	93	17.7	129	36.4	
31 – 35 years old	0	0.0	0	0.0	12	0.9	5	1.0	4	1.1	
36 – 40 years old	0	0.0	1	0.7	1	0.1	1	0.2	1	0.3	
Total	**50**	**100**	**143**	**100**	**1350**	**100**	**526**	**100**	**354**	**100**	

Table 5: Relationship between Education Level and Age at First Childbirth

Group of Age at First Childbirth	Education Level of Respondents										*Chi-Square (Degree of freedom) p-value*
	Informal Education		Primary		Secondary		Diploma		Higher Education		
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	
20 years old and below	27	54.0	50	35.0	331	24.5	36	6.8	3	0.8	483.17 (20) ***0.000001***
21 – 25 years old	14	28.0	76	53.1	727	53.9	265	50.4	102	28.8	
26 – 30 years old	5	10.0	13	9.1	227	16.8	175	33.3	212	59.9	
31 – 35 years old	1	2.0	1	0.7	30	2.2	19	3.6	16	4.5	
36 – 40 years old	1	2.0	1	0.7	6	0.4	2	0.4	4	1.1	
No Child	2	4.0	2	1.4	29	2.1	29	5.5	17	4.8	
Total	**50**	**100**	**143**	**100**	**1350**	**100**	**526**	**100**	**354**	**100**	

Table 6: Relationship between Education Level and Number of Childbirth

Number of children	Education Level of Respondents										*Chi-Square (Degree of freedom) p-value*
	Informal Education		Primary		Secondary		Diploma		Higher Education		
	N	***%***	***N***	***%***	***N***	***%***	***N***	***%***	***N***	***%***	
1 – 2 children	18	36.0	42	29.4	486	36.0	261	49.6	186	52.5	189.58 (16) ***0.000001***
3 – 4 children	9	18.0	40	28.0	464	34.4	177	33.7	121	34.2	
5 – 6 children	14	28.0	36	25.2	300	22.2	49	9.3	25	7.1	
7 children and more	7	14.0	23	16.1	71	5.3	10	1.9	5	1.4	
No child	2	4.0	2	1.4	29	2.1	29	5.5	17	4.8	
Total	**50**	**100**	**143**	**100**	**1350**	**100**	**526**	**100**	**354**	**100**	

Figure 3 shows the spatial distribution of the mean number of respondents' childbirth in each of the 50 townships. The findings demonstrate that the minimum number of childbirths was 2.25 children while the maximum number was 4.15 children. Spatial autocorrelation analysis using the Moran's Index revealed a negative relationship. The Moran's Index value obtained was -0.0803 with a *Z-score* value of -1.3334 and *p-value* of 0.1824. In general, a negative Moran's Index value which is close to zero indicates that the mean number of childbirths in a particular township is independent from those of adjacent townships.

Next, the LISA analysis was applied to detect the hot and cold spots in Pasir Mas using a local indicator of the respondents' mean childbirth. Generally, there has been no evidence of spatial clusters of mean childbirth among townships in the Pasir Mas district. In other words, the mean number of the respondents' childbirth in each township was almost similar (see Figure 4). Only three areas showed hot spots. High-low hot spots was observed in Kubang Batang township, whereas Low-High hot spots were observed in the townships of Kubang Bemban and Gua. There was no significant clustering observed in other townships.

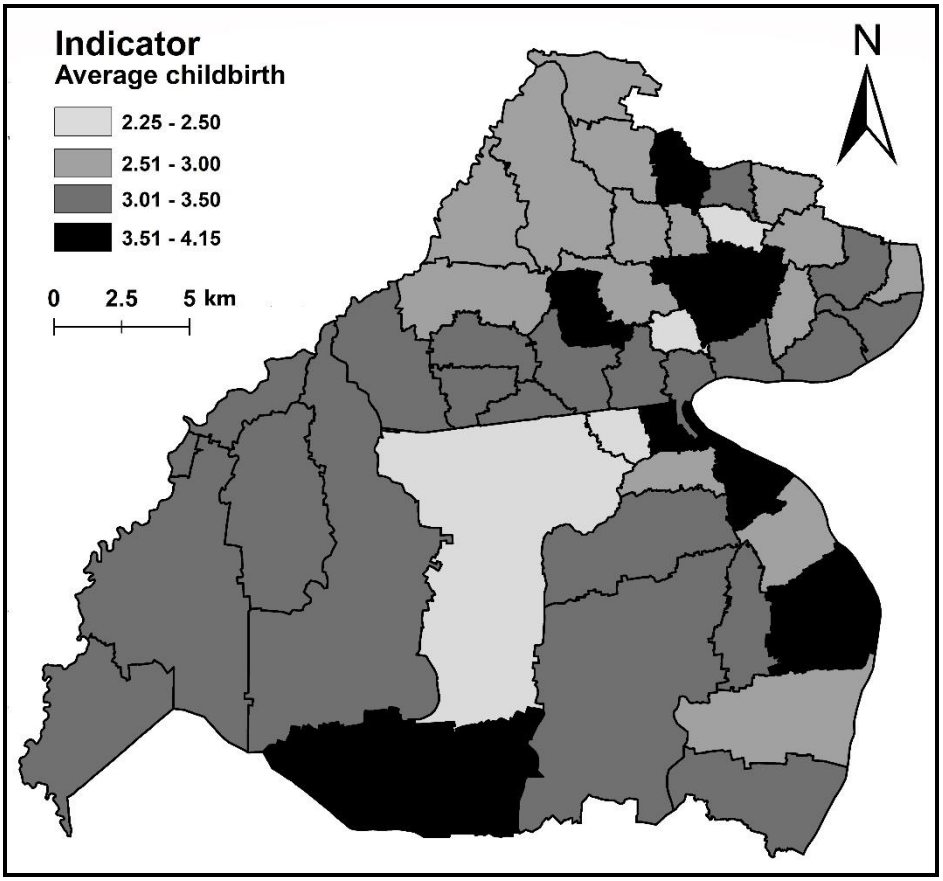


Figure 3: Distribution of Respondents' Mean Number of Childbirth

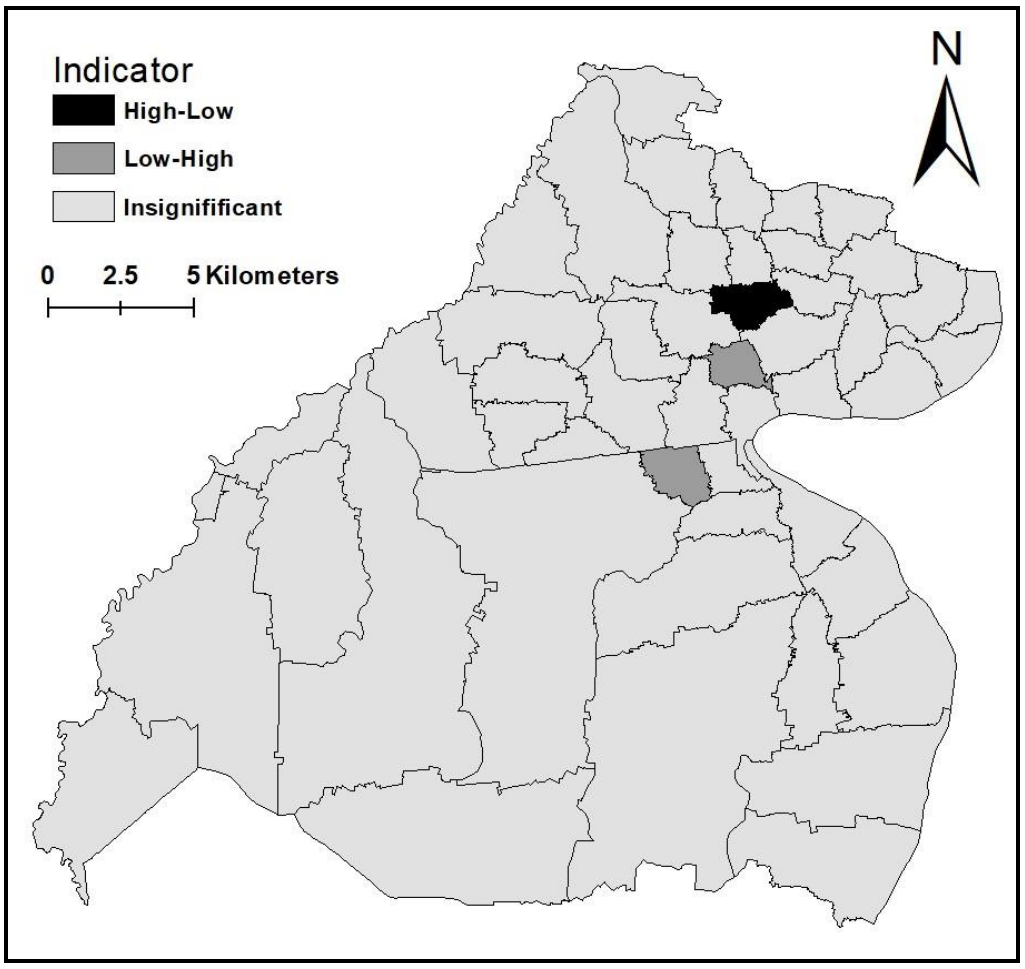


Figure 4: LISA Analysis for Hot Spots of Respondents' Mean Childbirth

DISCUSSION

This study revealed that community fertility in the study area was relatively high as compared to that of the national level. There exists contrasting spatial patterns of fertility, specifically between urban and rural areas, despite the sharp decline in the national level fertility since the 1960s. Community fertility in the study areas categorised as rural was almost twice the value of the national fertility. Using the Moran's Index (Moran I) and LISA analysis to evaluate spatial clustering (hots spots and cold spots) in the study area, there was no evidence of significant clustering detected. In essence, there is similar level of fertility in most of the study areas, and it is not spatially associated with one another.

The present study has found significant relationships between level of education and measures of fertility level such as age at first marriage, age at first childbirth and number of childbirths. Given the current population fertility level in

Malaysia, which is below the natural replacement rate, education plays a vital role to prevent population shortage. There is a need for formal teaching of population and family life education from early schooling up to higher education levels.

It is undeniable that the needs and benefits for population education and family life education are many and should be included as a content in the school curriculum. Population education helps the youth to understand about population components such as fertility, mortality, and migration and their effects on individuals, family, nation and the world; whilst family life education enables these young people to prepare themselves towards family development so that it can function optimally. Hence, education about family life and population issues can help young people to have better academic achievements, quality of life and relationships, and ultimately be able to help the nation to achieve its goals of population stabilization and sustainable development.

In Malaysia, population and family life education at tertiary level is less of a challenge; however, implementation at primary and secondary schools could be a difficult task. To date, there is no specific curriculum designed for population education and family life education throughout the formal school system. The current practice is that population and family life topics are taught both in informal as well as formal ways, where the latter are integrated in Health study, Religious study, Civics/Social studies and others. Nevertheless, policymakers in Malaysia should design a comprehensive and clear policies and guidelines to incorporate population and family life education in the school curriculum so as to prepare the young people for a successful life in the future.

Although current development plan for Malaysia puts more emphasis on the quality of population rather than the quantity of population, it is worthwhile to note that the decline of current population fertility level is alarming and requires further attention from all parties. Population education plays a crucial role in addressing fertility issue in Malaysia and ensures the fertility rate of population to reach the natural replacement rate level of 2.5 births for every female with ages between 15 to 49 years old. All in all, community level education is essential in developing and implementing a successful Malaysia population policy. The 12th Malaysia Plan (12MP) has been the starting point for the government's intention to further improve the overall and sustainable standard of living in the country. The 12MP is aimed at transforming Malaysia into a prosperous, inclusive and sustainable country in the period 2021 to 2025.

Malaysia is also expected to be an older country by 2030. In that year, it is projected that 15.3% or 5.8 million of the country's population will be aged 60 and above. The increase in the number of elderly people is expected to cause various problems such as social, economic, health, family and other problems that can have a negative impact on the level of well -being of the population. This problem is expected not only to involve the elderly themselves, but it will also involve the family, society and the country as a whole. Thus population and family life education play an important role, especially for the young. By better understanding the issue of family and population, especially the aging of the population allows the simple to accept it as a new norm in life in the future.

CONCLUSION

The imbalance in spatial distribution in total fertility which existed between urban and rural areas is another issue of concern to the Malaysia government. Such rural-urban fertility rate differences indirectly affect the spatial disparity in the overall process of social and economic development. Government policies focusing on equitable and inclusive development in the future cannot be achieved with the presence of spatial distribution in total fertility.

Awareness and concomitant commitments from all stakeholders such as families, youth, communities, and other institutions are important to support population and family life education among young people. Apart from schools and education system, religion and religious-based institutions can help to address population and family life issues. They should play an integral part in giving knowledge and understanding about family life and population matters to young people and the communities as they have a significant role in shaping the framework of the society in Malaysia. Consistent information and support from multiple channels such as the NGOs and media are vital as awareness and knowledge on population and family life education can encourage young people to adopt healthy attitudes and behaviour patterns. NGOs and the media can become a powerful influence in providing the young population with accurate information and data that support the need for population and family life education such as rates of adolescents' pregnancy and STI infection, school dropout, abuse and neglect, and employment. Effective understanding of population and family life education can help to promote the wellbeing of not only the young people, but also the community and the nation.

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