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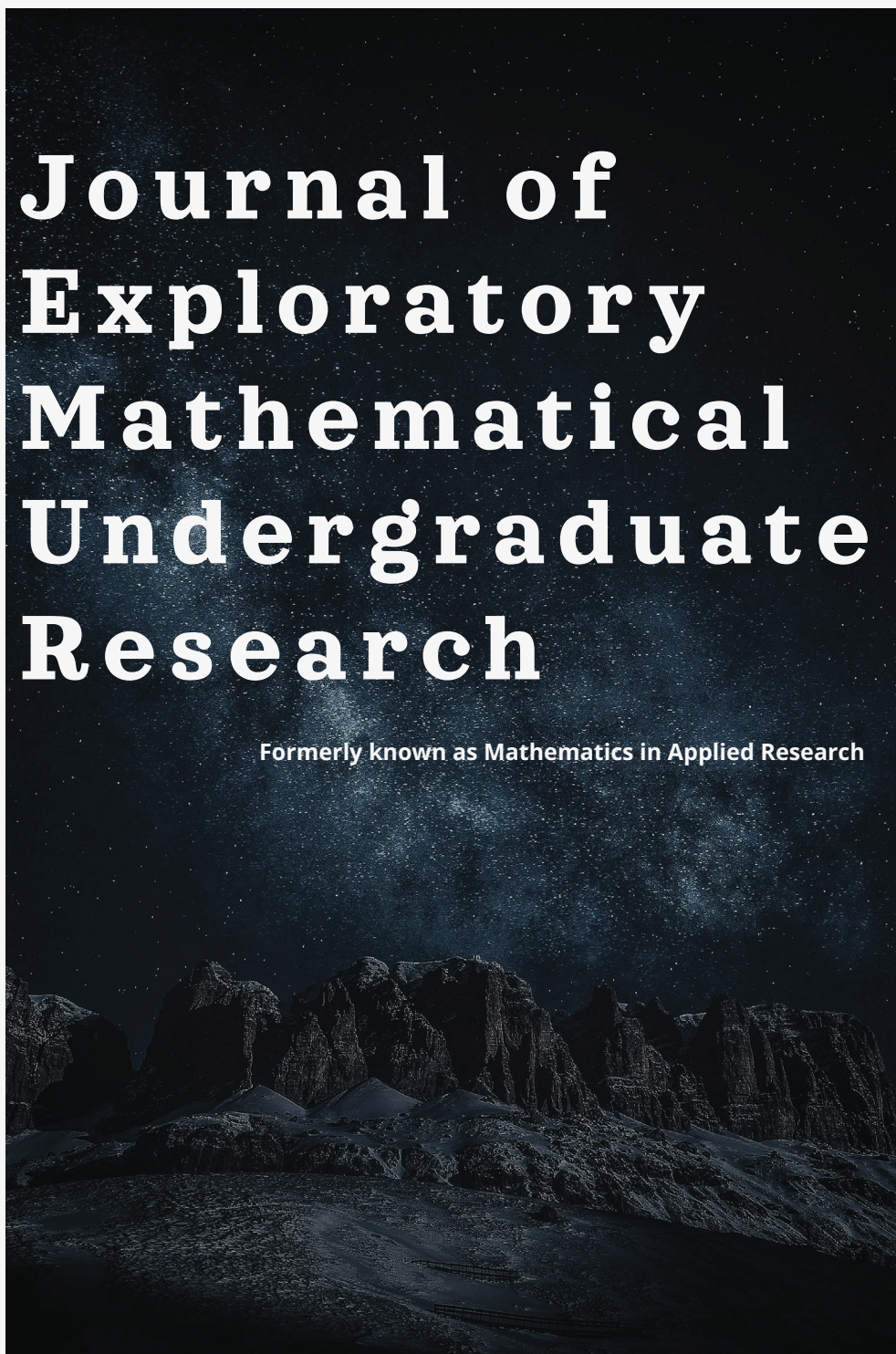
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PENAFIAN:

Sebarang maklumat yang terkandung dalam majalah ini merupakan pengetahuan dan pendapat peribadi penulis artikel. Pembaca dinasihatkan untuk mendapatkan pandangan profesional sebelum mengikuti mana-mana maklumat dalam majalah ini. Pihak universiti, penerbit, dan sidang redaksi tidak akan bertanggungjawab dan menanggung sebarang risiko atas kerugian secara langsung atau tidak langsung atas maklumat yang dipaparkan.



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## THE STUDY OF TOTAL FERTILITY RATE IN SOUTHERN REGION STATES MALAYSIA

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### Abstract

Fertility refers to the total number of children that each female human would have if she lived to the end of her reproductive years. However, total fertility rate affects the total population. The more the total fertility rate decreases, then the total population will also decrease. Since the government’s vision was to achieve 70 million population by 2100, this study was conducted to explore the fertility rate in Malaysia. This research focused on the trend of total fertility rate decline in Southern Region Malaysia that includes Johor, Malacca and Negeri Sembilan. In this research, the data obtained were from the Department of Statistics Malaysia. The line graph was used to observe the trend pattern for total fertility rate in Southern Region Malaysia and it shows that total fertility rate is declining. It showed a decrease of around 1.4 of total fertility rate. Comparing the three southern region states, Negeri Sembilan recorded the highest total fertility rate.

**Keywords:** total fertility rate, Southern region of Malaysia

### 1. Introduction

Fertility was one of the most important factors in determining the rate of population increase. The reproductive patterns of most countries have changed over the previous few decades. The average number of births a woman has during her lifetime was known as the fertility rate (Shariff & Jonedi, 2020).

$$\text{Fertility rate} = \frac{\text{Number of live births during the year}}{\text{midyear female population aged 15-49 years in the same area and year}} \quad (1)$$

$$\text{Total Fertility Rate} = \frac{\text{Sum of ages specific fertility rates X age interval of women}}{1000} \quad (2)$$

As refer to Figure 1, the total fertility rate in Malaysia has been decreasing since 2014. The total fertility rate from 2.1 in year 2014 decreasing to 2 in 2015. Furthermore, it is more worrying when the evidence records no increased, in fact there was a decreasing until year 2021 which only 1.7 total fertility rate. In addition, Saharani et al. (2018) stated that the fertility rate in each country might be different due to several factors as it involved subjectivity and may not apply across culture. Also, fertility transition from high to low was a recent thru phenomenon in Malaysia. The total fertility rate had declined from 4.9 children per woman in 1970 to 4.0 in 1980. It has continued to fall and has reached the replacement level of 2.1 in 2010.

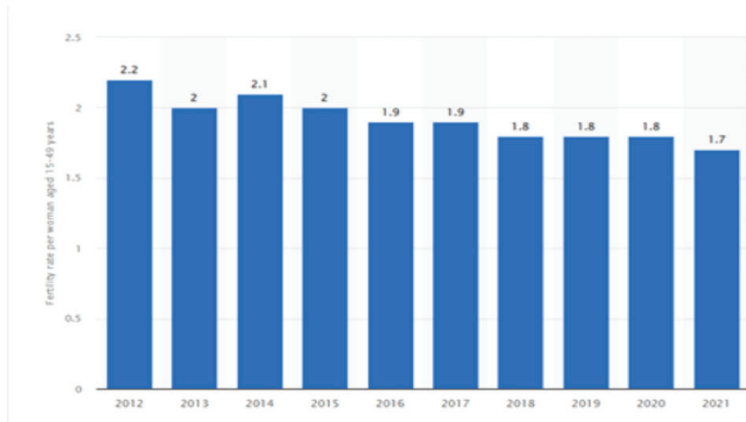


Figure 1: Malaysia’s Total Fertility Rate in Malaysia from 2012 to 2021  
 Source: Statista (Department, 2022)

The focal point of the study was to describe the differences of the total fertility rate between southern region states in Malaysia. The southern region that involved were Johor, Malacca and Negeri Sembilan. Studied done by Peng (2002) stated that the total fertility rate differs generally across states and areas. The articulated state level differentials in total fertility rate can be ascribed generally to contrasts in financial structures. Researchers in this paper would like to focus only on southern region states due to the geographical area and available data.

In this study, the researchers would like to describe the differences in total fertility rate among southern region states (Johor, Malacca, Negeri Sembilan) in Malaysia. This research will give exposure to the public about the total fertility rate in southern region states in Malaysia.

## 2. Literature Review

There were a lot of studies that have been done to determine the impact of fertility rate. The previous study depends on the country’s structure and the processes involved in the demographic transition. Therefore, the studies yield different results. Over the past three decades, Malaysia’s fertility rate has been steadily declining (Jegasothy, Sengupta, Dutta, & Jeganathan, 2021). Acknowledging the fertility rate properly was important for society, especially to government as they need to take early action to prevent population reduction.

According to Chan (1978), the purpose of the study was to determine the determinants of fertility rate. The extensive socioeconomic and fertility data from the 1970 Population and Housing Census, both published (Malaysia, Department of Statistics, 1975) and unpublished, served as the foundation for the researcher’s analysis. Vital statistics from 1970 provided mortality data.

In Malaysia, Md Nor (2019) studied on demographic issues. It stated that starting around 2016, the crude birth rate in Malaysia were diminished to 16.6 per 1000 populace contrasted with 18.5 per 1000 populace in 2009. Beginning in 2019, women’s fertility had decreased to below the replacement level of 2.1 children per woman (15-49 years old reproductive women). This study’s methodology used secondary data from the Malaysian census, data from the



Department of Statistics, and other related documents. The purpose of this paper was to evaluate and interpret the extent to which the decline in fertility was.

### 3. Methodology

#### 3.1. Research Design

This study employed a descriptive method which involve in observing and describing in detail the difference in term of total fertility rate in southern region states in Malaysia and to look at the patterns, trends and connections between infant mortality rate, crude birth rate and maternal mortality rate. This study falls under the category of longitudinal descriptive research since it involved time series data from 2000 - 2021. This study also was cluster sampling since it involved only on southern region states in Malaysia.

Moreover, a quantitative research design was used as the data was in the form of numbers and statistics. It was a structured way to collect and analyze data obtained from different sources. Quantitative research involves the use of computer, statistical and mathematical tools to obtain results (What is Quantitative Research?, 2022). Thus, on the basis of the above, the research designs were appropriated for the present study as considering that it was compatible with the objective to be achieved.

#### 3.2. Line Graph

A line graph was used to show the trend for total fertility rates for southern countries in Malaysia. It aimed to show more clearly the increase or decrease that occurred and the difference between these three states: Johor, Malacca and Negeri Sembilan.

### 4. Results and Analysis

#### 4.1 Line Graph

A line graph was used to monitor the trend of total fertility rate. Further analysis will be examined after the overall view of the problem is visualized.

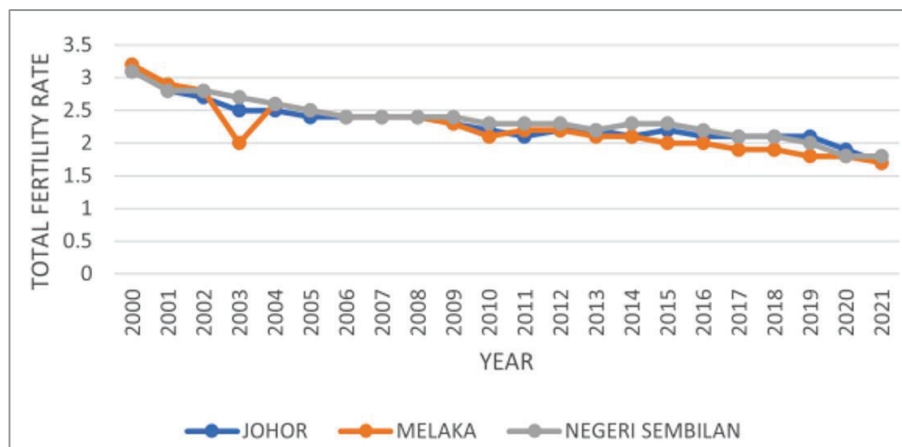


Figure 2: Differences of Total Fertility Rate from Southern Region

There are differences in total fertility rate among southern region states in Malaysia as refer to Figure 2. From Figure 2, among the three southern regions, the state of Malacca recorded the highest total fertility rate in 2000 which was 3.2 while the second highest was the state of Johor with 3.1. The trend line shows a significant decrease in 2003 by the state of Malacca where it recorded a decrease in the total fertility rate from 2.9 in 2002 to 2.0 in 2003. Malacca remained with the lowest total fertility rate compared to the state of Johor and Negeri Sembilan starting from 2009 to 2021.

However, Negeri Sembilan recorded the highest total fertility rate among the states in the southern region of Malaysia from 2002 to 2006 although it decreased slightly from 2.8 to 2.4 and it did not change until 2009. In 2015 it recorded the highest number of 2.3 and decreased until 2021 where it recorded 1.8.

As a whole, the three states showed a downward trend in the total fertility rate. The decrease of total fertility rate from 3.2 to 1.8 was recorded. It showed a decrease of around 1.4 of total fertility rate from 2000 till 2021. The three states show a difference in total fertility rates from each other in each year.

**4.2 Descriptive Statistics**

Apart from the graph, the descriptive analysis was used to examine the studied variables.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total Fertility Rate (TFR)	66	1.70	3.20	2.2970	0.33511
Crude Birth Rate (CBR)	66	5.20	24.30	13.5636	5.86753
Infant Mortality Rate (IMR)	66	5.50	9.30	7.2061	0.89182
Maternal Mortality Ratio (MMR)	66	0.00	83.40	28.2833	16.31076

Table 1 shows the total number of observations was 66. For variable TFR, the rates were per woman aged 15-49 ages. Then, for variable CBR, the rates were per 1000 population. Moreover, for IMR, the rates were per 1000 live births. Lastly for MMR, the ratio was per 100,000 live births.

Table 2: Comparison Total Fertility Rate between States

States	Total Fertility Rate		
	Mean	N	Standard Deviation
Johore	2.2955	22	0.30625
Malacca	2.2409	22	0.38379
Negeri Sembilan	2.3545	22	0.32033

Therefore, for Table 2, the average total fertility rate in Johor was 2.2955 lower than the average total fertility rate in Negeri Sembilan. Also, the average total fertility rate in Malacca was 2.2409 lower than the average total fertility rate in Negeri Sembilan.

It was proven that Negeri Sembilan had the highest fertility rate among the states as mentioned before using line graph. There were differences between the three southern region states.

Table 3: ANOVA Table

Source of Variation	Sum of Squares	Degree of Freedom	Mean Square	F	P-Value
States	0.142	2	0.071	0.625	0.538
Error	7.157	63	0.114		
Total	7.299	65			

Table 3 shows that the p-value of states is 0.538 greater than  $\alpha = 0.05$ , therefore it indicates that there is no significant difference between the three states (Johor, Malacca, Negeri Sembilan).

### 5. Discussion

In this study, it shows that the total fertility rate for Southern Malaysia is decreasing. It is supported by Department of Statistics Malaysia (DOSM) that shown population growth rate is 0.2% where total fertility rate in Malaysia has been decreasing since 2014.

For region state, it is supported by Hirschman and Young (1999) as stated that in Peninsular Malaysia, the examination of the stoppage of the Malaysian fertility decreases during the 1980s. The findings shown that in the 1980s, younger women saw a total drop of about 0.4 births, which may have been caused by an ongoing rise in marital postponement. As the analysis done in this study, it also shows that the three southern region states (Johor, Malacca and Negeri Sembilan) show a decreasing pattern throughout the year starting from 2000 till 2021.

Moreover, for the crude birth rate, the findings in this study is also supported by Md Nor (2019) as it stated that starting around year 2016, the crude birth rate in Malaysia were diminished to 16.6 per 1000 populace contrasted with 18.5 per 1000 populace in 2009.

### 6. Conclusion

The total fertility rate decline in Malaysia has become the one of the causes towards the decline of population in Malaysia. The purpose of this research was to describe the difference in total fertility rate among southern region states in Malaysia. The line graph was used and showed that the three southern regions (Johor, Malacca and Negeri Sembilan) decreasing throughout the years starting from 2000 till 2021. The decrease of total fertility rate from 3.2 to 1.8 was recorded. It showed a decrease of around 1.4 of total fertility rate from those years. Comparing between the three southern region states, Negeri Sembilan recorded the highest total fertility rate in 2015 which was 2.3. However, it decreased until 2021 where it recorded 1.8.

## References

- Chan, F. (1978). Socio-economic determinants of fertility in Peninsular Malaysia. SEAPRAP research report; no. 19.
- Department, S. R. (2022). Total fertility rate in malaysia from 2012 to 2021. Retrieved 2022-08-17, from <https://www.statista.com/statistics/641936/malaysia-total-fertility-rates/>
- Hirschman, C., & Young, Y.-J. (1999). The decline of fertility in thailand, malaysia, indonesia, and the philippines: 1968-70 to 1988-90. Seattle Population Research Center.
- Jegasothy, R., Sengupta, P., Dutta, S., & Jeganathan, R. (2021). Climate change and declining fertility rate in malaysia: The possible connexions. *Journal of basic and clinical physiology and pharmacology*, 32(5), 911–924.
- Md Nor, N. N. F. (2019). Demographic Issues in Malaysia. *Asian Social Science*. 15 (11).
- Peng, T. N. (2002). Social, economic and ethnic fertility differentials in peninsular malaysia. In *Iussp conference on southeast asia's population in a changing asian context, held at the siam city hotel, bangkok, thailand* (pp. 10–13).
- Saharani, A. R., Puzziawati, A. G., Adzmel, M., Najihah, I. & Azlan, A. A. (2018). Chapter 12: Fertility preferences in malaysia. Retrieved 2022-09-28, from <https://www.elgaronline.com/view/edcoll/9781785363542/9781785363542.00017.xml>
- Shariff, N. S. M., & Jonedi, N. H. M. (2020). Statistical analyses on the impact of demographic factors on fertility rate in malaysia. *IOSR Journal of Mathematics (IOSR-JM)*.
- What is quantitative research? (2022). Retrieved 2022-09-28, from <https://www.sisinternational.com/what-is-quantitative-research/>