

30825

**SEAPRAP RESEARCH  
REPORT NO. 19**

**SOCIO-ECONOMIC DETERMINANTS OF FERTILITY IN  
PENINSULAR MALAYSIA**

Fong Chan Onn  
Faculty of Economics and Administration  
University of Malaya  
Kuala Lumpur, Malaysia  
April 1978

A report of research undertaken with the assistance of an award from  
Southeast Asia Population Research Awards Program (SEAPRAP), a joint program  
of the International Development Research Centre and The Ford Foundation

**ARCHIV  
30825**

Socio-economic Determinants of Fertility  
in Peninsular Malaysia

Fong Chan Onn  
Faculty of Economics and Administration  
University of Malaya  
Kuala Lumpur, Malaysia

April 1978



A report submitted to the Southeast Asia Population Research Awards Program (SEAPRAP), Singapore, a joint Program of the International Development Research Centre and the Ford Foundation.

This report is presented as received by IDRC from project recipient(s). It has not been subjected to peer review or other review processes.

This work is used with the permission of Institute of Southeast Asian Studies.

© 1978, Institute of Southeast Asian Studies.

IDRC - Lib.

20025

ARCHIVE

#### ACKNOWLEDGEMENTS

This study was financed by a grant from the Southeast Asia Population Research Awards Program (SEAPRAP), Singapore. The grant is gratefully acknowledged and, in particular, we must thank Dr. Pedro V. Flores, Project Coordinator of SEAPRAP for the smooth execution of the project. Special thanks are due to Miss Dorothy Fernandez and her staff in the Population Division, Department of Statistics, Malaysia, for their kind permission in allowing us access to the needed unpublished data from the 1970 Population and Housing Census. Datin (Dr.) Nor Laily Abu Bakar, Director-General of the Malaysian National Family Planning Board (NFPB), also gave us her advice and encouragement on the conduct of this study. The views expressed here, however, do not necessarily reflect those of SEAPRAP, the Malaysian Department of Statistics or the NFPB.

110

## TABLE OF CONTENTS

Section		Page
1	Introduction	1
2	Socio-economic Development in Peninsular Malaysia	2
3	Sources of Data	4
4	Theoretical Basis for the Study	5
	4.1 Measures of Fertility	5
	4.2 Socio-economic Variables Affecting Fertility	5
	4.3 General	10
5	Methodology	10
6	Findings	12
	6.1 Dependent Variables	12
	6.1 Determinants of Fertility	15
7	Conclusions and Policy Implications	34

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Selected Socio-economic Indicators for Peninsular Malaysia 1957-1975	3
2	Principle-component Factor Loadings for Pooled Sample	16
3	Summary of Effects of Factors on Fertility Measures - Pooled Sample	22
4	Principle-component Factor Loadings for Rich Sub-sample	28
5	Principal-component Factor Loadings for Poor Sub-sample	30
6	Summary of Effects of Factors on Fertility Measures - Rich Districts	31
7	Summary of Effects of Factors on Fertility Measures - Poor Districts	31

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Peninsular Malaysia - Crude Birth Rate by District	13
2	Peninsular Malaysia - General Fertility Rate by District	14

Socio-economic Determinants of Fertility  
in Peninsular Malaysia

1. Introduction

A large number of research studies have been done on the relationship between socio-economic development and fertility. Research in this field can be broadly classified into two interrelated categories: studies on the consequences of fertility and studies on the determinants. In terms of policy implications the former might be said to provide justifications for population policy and the latter the design for such a policy. In the consequence category is the seminal work of Coale and Hoover (1965) which in turn inspired many other studies (see, for example, Conroy and Folbre (1976) for a good summary of this). Studies in the determinants category include Weintraub (1962), Adelman (1963), Russett et. al. (1964), Heer (1966), Adelman and Morris (1966), Friedlander and Silver (1967), Kasarde (1971), Ekanem (1972), Janowitz (1973), Cain and Weininger (1973), Farooq and Tuncer (1973) and Bell (1976). However, except for the Cain and Weininger (1973) study which dealt with regions within the United States and the Farooq and Tuncer (1973) study which dealt with provinces within Turkey, all the other cited works are cross-country studies using aggregated data with nations as units of analysis. In terms of policy implications, these cross-country studies have been valuable. However, it would not be sufficient for a national planner to depend solely on these cross-country studies for the design and formulation of national population

policies since, in many cases, intra-national differences in fertility far exceed inter-national differences. In this study we examine the determinants of fertility in Peninsular Malaysia (or West Malaysia) based upon intra-national data available by administrative districts (for administrative purposes Peninsular Malaysia is divided into 70 districts in 1970) from the 1970 Population and Housing Census. The findings are compared with and contrasted against that of the other studies, and a number of possible policy implications are then drawn from this analysis. Since there are so few studies in the determinants category performed on an intra-national basis, the findings of this study will, it is hoped, contribute towards a better appreciation of intra-national differences in fertility attributable to socio-economic development.

## 2. Socio-economic Development in Peninsular Malaysia

Since its independence in 1957 there have been deliberate efforts made in the form of the various five-year development plans to bring about social and economic development in Peninsular Malaysia.<sup>1</sup> Table 1 shows some background information on socio-economic conditions in Malaysia between 1957 and 1975. Overall, in terms of income per capita, literacy and other indicators, there has been a steady trend of development and modernization. The percentage of labour force in

---

<sup>1</sup>Since 1957 the various development plans pursued include the First Malaya Plan (1956-1960), the Second Malaya Plan (1960-1965), the First Malaysia Plan (1966-1970), the Second Malaysia Plan (1971-1975) and the present Third Malaysia Plan (1976-1980).



Table 1

Selected Socio-economic Indicators for  
Peninsular Malaysia 1957-1975

Indicator	1957	1965	1970	1975
Literacy Level (%) <sup>+</sup>	51.0	-	60.8	-
<u>Distribution of Labour Force:</u>				
% in agriculture	60.9	52.1	50.2	46.1
% in manufacturing	9.5	10.9	12.5	13.5
% in services	29.6	37.0	37.3	40.4
% of population in towns $\geq$ 10,000 people	26.4	-	27.1	-
Real GNP per capita (M\$1970)	-	829	912	1244
% of GNP originating from agriculture	-	31.8	29.0	29.8
Crude birth rate (per 1000 people)	46.2	36.7	33.9	31.4
Crude death rate (per 1000 people)	12.4	7.9	7.3	6.4
Mid-year population ( $10^6$ )	6.28	8.04	9.18	10.39
Average annual population growth rate (%)	3.0	3.1	2.7	2.5

+ Based upon the entire population.

Sources: Malaysia, Department of Statistics (1960)  
Malaysia, Department of Statistics (1972)  
Malaysia, Department of Statistics (1975)

agriculture, for example, has declined from 60.9% in 1957 to 46.1% in 1975 indicating a steady relative expansion of the industrial and services sector over the period. On the social side crude death rate, for example, has declined from 12.4 per 1000 people in 1957 to 6.4 per 1000 people in 1975 indicating a marked general improvement in the living conditions of the people over the period. However, economic development has not been uniform throughout the country.<sup>2</sup> The capital and the various metropolitan districts are relatively well developed while many of the rural districts, especially those in the east coast states, are relatively underdeveloped. Statistically, in such a situation where detailed regional data are available one can use cross-sectional data to gauge the long-term effects of socio-economic development on fertility. It should be pointed out, however, that the relationship between socio-economic development and fertility is not uni-directional. Changing fertility can also affect individual socio-economic conditions and this can have profound consequence on the overall economic development process. But analysis of these aspects, though important, is beyond the scope of this study.

### 3. Sources of Data

While the intention was to go as far back as possible, district data from the 1947 and 1957 Censuses were not tabulated (either in published or unpublished form) and, much to our dismay, we found that

---

<sup>2</sup>This is very well documented in Malaysia (1976), pp. 199-217.

the raw data collected from these Censuses have been either misplaced or destroyed.<sup>3</sup> Hence we are constrained to base our analysis upon the extensive socio-economic and fertility data collected in the 1970 Population and Housing Census, both published (Malaysia, Department of Statistics (1975)) or unpublished. Data on mortality were extracted from 1970 vital statistics published by the Department of Statistics (Malaysia, Department of Statistics (1972)). Data from a number of other sources were also used and these are acknowledged in the Appendix containing the list of variables used in the study.

#### 4. Theoretical Basis for the Study

##### 4.1 Measures of Fertility

As measures of fertility, it would be ideal to use the "desired" number of conceptions. However, Malaysian data on fecundity are not available, neither are data on miscarriages, still births, abortions and so on. In this study, live births are substituted for desired conception. We use two bases for the live birth figures - the average size of the population, and the number of women between the ages of 15 to 44 years - leading to the use of crude birth rate ( $y_1$ ) and general fertility rate ( $y_2$ ) as the two measures of fertility.

##### 4.2 Socio-economic Variables Affecting Fertility

In this section we provide some justifications for the selection of the socio-economic variables incorporated in this study.

---

<sup>3</sup>Private communications with the Population Division of the Department of Statistics, Kuala Lumpur, 1977.

#### 4.2.1 Income

The consumption aspect of the number of children suggests that income is an important variable affecting fertility. The income data used in this study is the per capita district gross product ( $x_1$ ). Previous studies on the relationship between per capita income and birth rate have indicated conflicting results. Russett et. al. (1964)'s partial correlation between per capita income and birth rate was negative, while Weintraub (1962)'s was positive. Adelman (1963) also found a positive partial correlation between age-specific birth rate and per capita income for developed countries and for a sample including developed and developing countries. All these studies have been on a cross-country basis and our study is innovating in that it attempts to perform this kind of analysis on an intra-national basis.

#### 4.2.2 Child Mortality

It is generally believed that a high level of child mortality has the effect of increasing fertility since the higher the child mortality level, the greater is the number of births needed to achieve a given family size (see United Nations (1953), p. 76). Weintraub (1962) found a statistically significant partial correlation between birth rate and infant mortality rate. On the other hand, Leiberstein (1957) pointed out that the higher the survival rate, the greater is the economic return provided by a child and therefore the more children desired. In this study both infant mortality rate ( $x_2$ ) and toddler mortality rate ( $x_3$ ) will be included so that an assessment of the relationship between child mortality and fertility, within the Malaysian context, can be made.

#### 4.2.3 Population Density

Adelman (1963) found a negative relationship between population density and birth rates and concluded that "... over-population tends to generate its own antidote". In order to explore this issue, the population density variable ( $x_4$ ) as well as the dependency ratio variable ( $x_5$ ) are included in this study.

#### 4.2.4 Urbanization

Urbanization, as a factor affecting national fertility, has received great attention (see United Nations (1953), pp. 75, 78). It is perceived that urbanization can enhance the urban/rural differential in the "taste" for children and in the level of contraceptive knowledge. In order to explore the effects of urbanization within a country, a number of variables reflecting urbanization (percentage of population in towns between 1,000 to 9,999 people ( $x_6$ ), percentage of population in towns  $\geq 10,000$  people ( $x_7$ ), percentage of district gross product originating from agriculture ( $x_8$ ), percentage of employed male employed in agriculture ( $x_{10}$ )) are included in the study. Another variable (percentage of economically active male employed ( $x_9$ )) is also included since urbanization is often related to a higher level of open unemployment.

#### 4.2.5 Level of Education

Adelman (1963) and Russett et. al. (1964) found negative partial correlations between birth rate and the societal level of education. Education can affect birth rate through a number of channels, including changes in the level of contraceptive knowledge, taste for

children and economic productivity. These influences are difficult to separate but the level of education is important and is included in this study as variables  $x_{13}$  (percentage of males  $\geq 15$  years of age without formal schooling),  $x_{14}$  (percentage of females  $\geq 15$  years of age without formal schooling), and  $x_{15}$  (percentage population literate).

#### 4.2.6 Communications

It is generally felt that better communication facilities leading to better contact with the outside world can reduce the fertility level through "demonstration effect" or exposure to the modern small-family norm. In this study we have used the motor vehicle density variable ( $x_{16}$ ) as a proxy variable for the status of communication facilities. The other variable used as proxy variable for relative exposure to modern ideas is the number of doctors per 1,000 married women between 15 and 44 years of age ( $x_{23}$ ).

#### 4.2.7 Differences in Culture

Malaysia is a multi-racial and multi-cultural society. Wrong (1962) asserted that in multi-racial or multi-religious societies, fertility differences between such groups may be of intrinsic interest. Rivalry between groups may sometimes take the form of competitive efforts to encourage large families in order to gain ascendancy in numbers in the future. It is well known that there are significant differences in the fertility rates of the three main racial groups - Malays, Chinese and Indians - in Malaysia (for example, see Saw (1966) and Retherford and Cho (1973)). Whether these differences are due to the effect of competitive efforts or the effect of religious and cultural differences towards

economic development and fertility is not clear. Nevertheless, the differences in fertility rates indicate the importance of the extent of racial homogeneity in each district for this study, and we have incorporated the racial composition of the district population (percentage Malays in district population ( $x_{17}$ ), percentage Chinese in district population ( $x_{18}$ ), and percentage Indians in district population ( $x_{19}$ )) in this study.

#### 4.2.8 Social Status of Women

Sociologists suggests that differences in the societal attitudes towards women may cause differences in fertility. Specifically, the more prevalent the belief that the proper role of women is to "stay at home and bear children", the higher the fertility. It is then inferred that the higher the status of women in society the lower is its fertility. In this study, we use the variables percentage of females  $\geq 10$  years staying at home ( $x_{20}$ ), percentage of females between 10 to 19 years married ( $x_{21}$ ), the ratio of female literacy to male literacy ( $x_{22}$ ), percentage of economically active females employed ( $x_{11}$ ), and percentage of employed females employed in agriculture ( $x_{12}$ ) to indicate the relative social status of women in the district.

#### 4.2.9 Overcrowding

It has been hypothesised (Stycos (1964)) that overcrowded living conditions limit the use of most contraceptives except for oral contraceptives. This thus tend to increase fertility. On the other hand, overcrowded living condition undoubtedly plays a very important role in limiting fertility since it serves as a constant reminder to the

couple on the difficulty of accommodating a further child. The effect of overcrowding on fertility is, thus, not clear-cut. To examine this we have included the variable the number of persons per bedroom in the dwelling ( $x_{26}$ ) as an independent variable in this study.

#### 4.2.10 Basic Amenities in Households

It has been argued further by Stycos (1964) that lack of basic amenities like electricity and running water supply in households limit the use of contraceptive methods other than oral contraceptives. To examine the effect of this proposition on fertility we have included the variables percentage of permanent quarters with electricity service ( $x_{24}$ ) and percentage of permanent quarters with running water supply ( $x_{25}$ ) as independent variables in this study.

#### 4.3 General

In summary, then, this study uses two fertility measures - the crude birth rate and the general fertility rate - as dependent variables. As independent variables the study uses a total of 26 socio-economic variables, reflecting income level, child mortality, population density, degree of urbanization, level of education, status of communications, differences in culture, the social status of women, degree of overcrowding and the existence of basic amenities in households. The full list of these variables are contained in the Appendix.

### 5. Methodology

Given the large number of independent (or predictor) variables included in the study, an analysis using correlational or multiple regression techniques would bring with it all the attendant problems of



interpreting the relative importance of the independent variables in accounting for variation in the dependent (or criterion) variables because of multicollinearity among the independent variables (see Green and Tull (1975), chapter 12). Further a correlational or multiple regression analysis can often lead to fuzzy conclusions since, in many instances, an independent variable can be a proxy for a more important underlying factor.<sup>4</sup> Only when a variable is interpreted together with the other independent variables with which it is highly correlated can its real meaning be uncovered. For these reasons we have used principal-component factor analysis (Harman (1970), Rummel (1970)) as the technique of analysis in this study. It is generally felt that this technique is a good one for exploring the relative importance of a large number of variables acting simultaneously on a 'dependent' variable. The important dimensions underlying the large number of predictor variables can be identified when they are separated out into principal orthogonal groups. Hence their real causal effects on the criterion variables can be uncovered. It must be pointed out that one valuable consequence of using principal-component factor analysis is that, in the final results, a predictor variable may be a proxy for a factor quite different from that specified in section 4. Section 4 only provides possible a priori justifications for the incorporation of the variables. The section did not, and should not, attempt to bind a variable to be a proxy variable

---

<sup>4</sup>For example in this study, as was pointed out in section 4.2.7, the variable percentage Chinese in district population ( $x_{18}$ ) can indicate competitive efforts or inherent cultural differences towards fertility.

to any underlying factor in the final results. This can only be done when the variables have been analysed in totality, as is done in factor analysis.

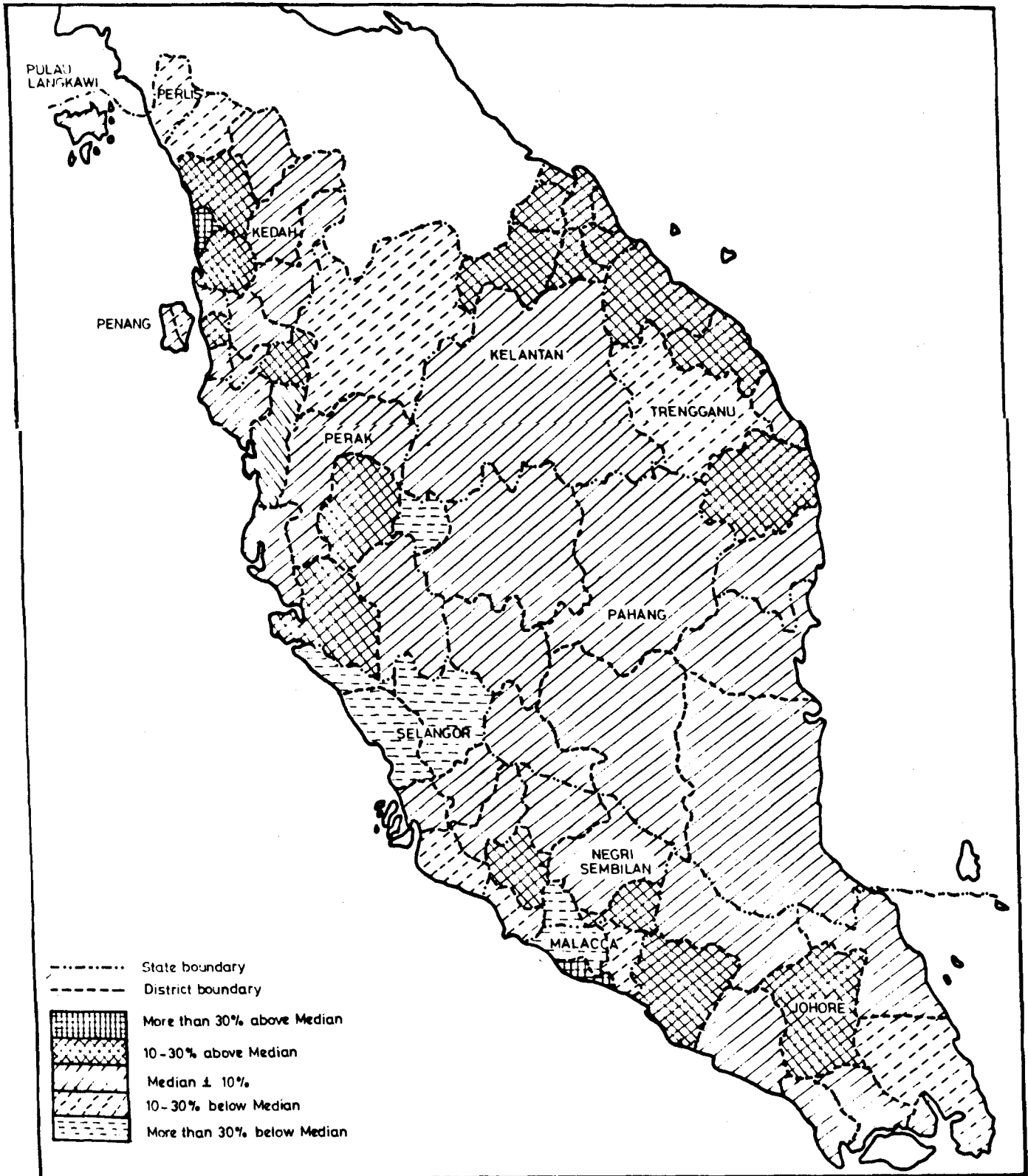
## 6. Findings

### 6.1 Dependent Variables

The data on crude birth rate and general fertility rate were first analysed. In the median district the crude birth rate and general fertility rate are 33.17 and 176.64 respectively. These are about equal to the West Malaysian average of 33.9 (crude birth rate) and 182.8 (general fertility rate). The distribution of the two fertility measures are pictorially presented in Figures 1 and 2. From Figure 1 it can be seen that in terms of crude birth rate, most of the districts in Kelantan and Trengganu are between 10% to 30% above the median value. The coastal districts of Kedah have also fairly high crude birth rates when compared to the district with the median value. On the other hand, the rural districts in Selangor and Malacca have low crude birth rates when compared to the median district. Most of the other districts are within  $\pm 10\%$  of the median value. In terms of general fertility rate, from Figure 2, it can be seen that again most of the districts of Kelantan and Trengganu have general fertility rates which are between 10% to 30% higher than the median district. The northern districts of Johore - Segamat, Muar, Kluang and Mersing - and the northeastern districts of Negeri Sembilan also have general fertility rates which are between 10% to 30% higher than the median district. However the coastal districts

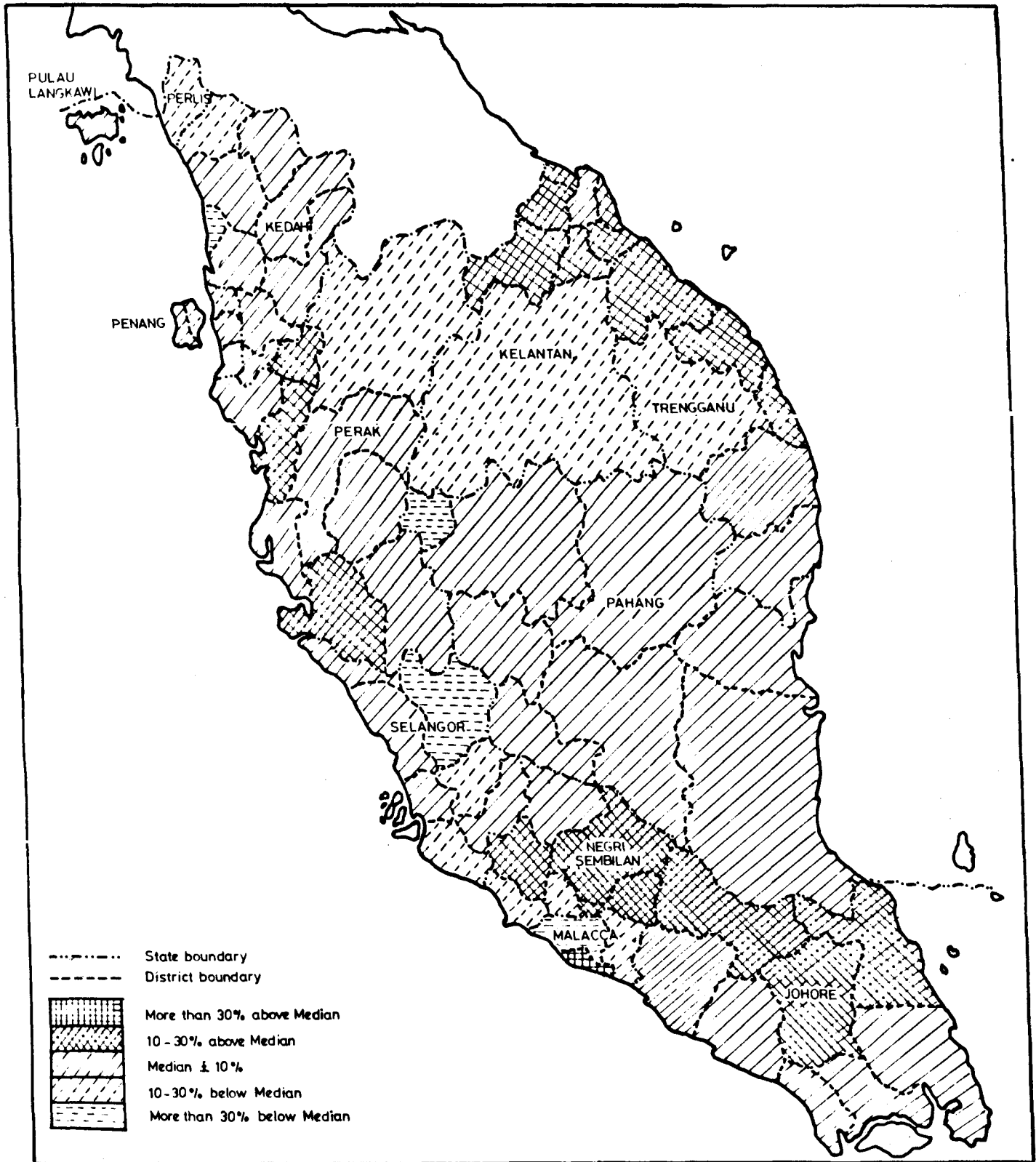
# PENINSULAR MALAYSIA - CRUDE BIRTH RATE BY DISTRICT

FIGURE 1



# PENINSULAR MALAYSIA - GENERAL FERTILITY RATE BY DISTRICT

FIGURE 2



of Negeri Sembilan and Selangor and the rural districts of Malacca appear to have general fertility rates which are between 10% to 30% below the median district. Most of the other districts are within +10% of the median value.

## 6.2 Determinants of Fertility

### 6.2.1 Pooled Sample

The principal-component factor analysis was performed on the 26 independent socio-economic variables and 2 fertility measures in order to extract the main dimensions (factors) of the socio-economic variables, and the relationship of these factors with the fertility measures. The factor analysis programme available in the IBM 360 Scientific Subroutine Package (SPS)<sup>5</sup> was used and the principal factors were rotated using the varimax criterion. We first performed the analysis on the data from the pooled sample of 70 districts. One of the first decisions in factor analysis is specifying the number of factors to be rotated. This is not a straight forward process. Based upon the analyses of results produced by rotating 4 through to 10 factors, the number of factors was set at 5 using the inferential criterion of Rummel (1970). The summary of the results of this analysis is presented in Table 2. In Table 2 we have included only factor loadings whose absolute value are at least 0.3 and have assigned each variable to that factor on which it has the highest or second highest loading. The commonality ( $h_1^2$ ) of each variable is

---

<sup>5</sup>IBM Application Programme # GH20-0205-4, System/360 Scientific Subroutine Package Version III Programme's Manual, Technical Publications, IBM, White Plains, N.Y., 1968.

Table 2

Principle-component Factor Loadings for Pooled Sample

Item	Factors					$h^2$
	I Status of Economic Development & Literacy	II Child Mortality	III Status of Women	IV Availa- bility of Social Amenities	V Demo- graphic Pressure	
X <sub>2</sub> Infant mortality rate		0.99				0.99
X <sub>3</sub> Toddler mortality rate		0.38				0.30
X <sub>11</sub> % economically active females employed			0.85			0.77
X <sub>12</sub> % employed females employed in agriculture			0.84			0.87
X <sub>20</sub> % of females ≥ 10 years of age staying at home			- 0.80			0.66
X <sub>21</sub> % of females between 10-19 years of age married	- 0.51		- 0.68			0.79
X <sub>22</sub> Ratio of female to male literacy	- 0.30		0.33			0.21
X <sub>23</sub> Number of doctors per 1,000 MWRA				0.93		0.92
X <sub>24</sub> % of permanent quarters with electricity service				0.91		0.91
X <sub>25</sub> % of permanent quarters with running water supply				0.82		0.76
X <sub>4</sub> Population density					0.93	0.95
X <sub>6</sub> % population in towns between 1,000-9,999 people					0.43	0.22
X <sub>7</sub> % population in towns ≥ 10,000 people	0.44				0.41	0.40
X <sub>5</sub> Dependency ratio			- 0.35		0.61	0.60
X <sub>26</sub> Number of people per bedroom in dwelling					0.97	0.96
X <sub>17</sub> % of Malays in district population	- 0.86					0.87
X <sub>18</sub> % of Chinese in district population	0.76		- 0.39			0.79
X <sub>19</sub> % of Indians in district population	0.67				- 0.35	0.60
X <sub>16</sub> Number of motor vehicles per 1000 people	0.85			0.38		0.92
X <sub>1</sub> District gross product per capita	0.80					0.69

Table 2 (contd.)

Item	Factors					$R^2$
	I Status of Economic Development Literacy	II Child Mortality	III Status of Women	IV Availa- bility of Social Amenities	V Demo- graphic Pressure	
$X_8$ % of district gross product originating from agriculture	- 0.58			- 0.35	- 0.37	0.76
$X_{13}$ % of males $\geq$ 15 years without formal schooling	- 0.67		- 0.54		- 0.32	0.84
$X_{14}$ % of females $\geq$ 15 years without formal schooling	- 0.71		- 0.45			0.73
$X_9$ % of economically active males employed	0.65					0.56
$X_{10}$ % of employed males employed in agriculture	- 0.97					0.96
$X_{15}$ % of population literate	0.62		0.41			0.60
$y_1$ Crude birth rate	- 0.11	0.05	- 0.13	- 0.03	- 0.79	0.66
$y_2$ General fertility rate	- 0.18	0.05	- 0.22	- 0.21	- 0.71	0.63

given in the right-hand column of the table. From the table it can be seen that a reasonable separation exists on the factors. Only 5 out of the 26 socio-economic variables have a loading of 0.4 or more on more than one factor. The five factors listed account for over 66% of the variance in the crude birth rate and over 63% of the variance in the general fertility rate.

The five factors can be broadly interpreted as:

Factor I - Status of Economic Development and Literacy

This factor consists of eleven variables. They include variables which reflect the status of economic development in the district like district gross product per capita, percentage of district gross product originating from agriculture, percentage of economically active males employed and the number of motor vehicles per 1,000 people, and variables which reflect the racial composition of the district. In the context of Malaysian economic development the Chinese (and to a certain extent the Indians) have a history of being actively involved in trading and industrial activities while the Malays have mainly been involved in traditional agricultural activities (for example, see Lim (1973)). Within this factor we also have variables that relate to the status of literacy in the district e.g. the percentage of males (and females)  $\geq 15$  years of age without formal schooling and the percentage of population literate. These literacy variables are, in general, related to economic development variables (e.g. the Pearson



correlation coefficient between district gross product per capita and percentage population literate ( $r_{xy}$ ) is 0.53). This direct relationship between literacy and economic development variables can be explained partially by the fact that districts with higher industrial activities and higher per capita district gross product have tended to receive higher educational allocations from the central government (see Malaysia, Economic Planning Unit (1974)).

#### Factor II - Child Mortality

This factor contains both the mortality rate variables relevant to this study i.e. infant mortality rate and toddler mortality rate. The factor loading of the infant mortality rate on the factor is high, being 0.99. However, the factor loading of the toddler mortality rate on the factor is rather low, being only about 0.38.

#### Factor III - Status of Women

This factor contains 5 variables all relating to the status of women in terms of labour force participation and literacy rate relative to males in the district. A strong direct relationship between percentage of economically active females employed and the percentage of employed females employed in agriculture sector ( $r_{xy} = 0.83$ ) was found.<sup>6</sup> In the Malaysian context,

---

<sup>6</sup>Whereas there is no apparent relationship between percentage of economically males employed and percentage of employed males employed in agriculture ( $r_{xy} = 0.05$ ).

especially in the rural context, female involvement in agricultural activities is not an indication of 'low status'. Rather it is an indication of their direct participation in household economic activities and household decision making. There is also a direct relationship between the percentage of economically active females employed and the female to male literacy ratio ( $r_{xy} = 0.58$ ), indicating that there tends to be a higher rate of female participation in the labour force in districts where the female to male literacy ratio is higher. Conversely there is an inverse relationship between the percentage of females  $\geq 10$  years of age staying at home and the female to male literacy ratio ( $r_{xy} = 0.41$ ), and an inverse relationship between the percentage of females between 10 to 19 years of age married and the female to male literacy ratio ( $r_{xy} = -0.32$ ). In brief, then, this factor indicates the relative standing of the female in the district in terms of their literacy rate vis-a-vis the males and in terms of their participation in the economic activities in the area.

#### Factor IV - Availability of Social Amenities

This factor consists of three variables reflecting the availability (or otherwise) of social amenities to women and in private dwellings i.e. the number of

doctors per thousand married women in the reproductive age, percentage of permanent quarters with electricity service and percentage of permanent quarters with running water supply. The factor loading of each variable on the factor is very high, each being over 0.82.

#### Factor V - Demographic Pressure

This factor include five variables which describe the status of 'overcrowding' or demographic pressure in the district. Three of the variables - population density, percentage of population in towns between 1,000 to 9,999 people and percentage of population in towns over 9,999 people - reflect the demographic pressure at the macro level. The remaining two variables - dependency ratio, and the number of people per bedroom in a dwelling - reflect the demographic pressure at the micro or household level. There is a strong degree of positive correlation between the macro and micro variables e.g. the Pearson correlation coefficient between population density and number of people per bedroom in a dwelling is 0.52.

#### 6.2.2 Effects of Factors on Fertility Measures in Pooled Sample

The effects of the factors on fertility measures can be studied more closely by examining the square of the factor loadings between the fertility measures and factors. Table 3 summarises these values.

From Table 3 it can be seen that the five factors together account for 66% of the variance in the crude birth rate and 63% of the

Table 3

Summary of Effects of Factors on Fertility  
Measures - Pooled Sample

Fertility Measures	Effect of Factors					Total Percentage of variance Accounted
	I Status of Economic Development & Literacy	II Child Mortality	III Status of Women	IV Availa- bility of Social Amenities	V Demo- graphic Pressure	
Crude birth rate	1.2 (-)	n.s.	1.7 (-)	n.s.	62.4 (-)	66.0
General fertility rate	3.2 (-)	n.s.	4.8 (-)	4.4 (-)	50.4 (-)	63.0

n.s. implies not significant (less than 1% in variance explained)

variance in the general fertility rate. Factor I (the Status of Economic Development and Literacy) is seen to have some, though marginal, negative effect on the fertility measures. This result is not surprising and is consistent with the result of Friedlander and Silver (1967) which found a weak partial negative coefficient between level of economic development and fertility for developing countries,<sup>7</sup> and that of Farooq and Tuncer (1974) which found a weak negative relationship between female literacy and crude birth rate in

<sup>7</sup>It must, however, be pointed out that this study was performed on a inter-country basis.

their study for Turkey.<sup>8</sup> Education has the direct effect of providing information on methods of fertility control. It may also raise the desire for material goods and lower the relative desire for children. Further literacy, in the Malaysian case, is clearly related to economic development. Economic development increases job opportunities for women and thus, in the process, increases the costs of raising children. In fact, with increasing education and economic development the ideal family size itself may be altered. The weak effect of this factor on fertility found in this study suggests that though literacy and economic development are important for reduction in fertility, their effects on fertility tends to be small and can be felt only on a long-term basis.

Factor II (Child Mortality) is found to have insignificant effects on fertility. This may be attributable to the fact that, compared with other developing countries, the rate of infant and toddler mortality is rather low<sup>9</sup> and that families, in general, have a high degree of confidence in the availability of medical services when their children are sick, and in the survival of their children after birth. The result does not mean that child mortality rates have no effect on fertility: rather it indicates that child mortality rates have dropped (over the entire country) to a level at which people has attained a sense of

---

<sup>8</sup>See also Janowitz (1971), and Adelman (1963) for further evidence of negative relationship between literacy and fertility.

<sup>9</sup>The mean infant mortality rate for West Malaysia is 48.0 which is relatively low when compared to other developing countries.

confidence with respect to the survival of their offsprings, and any further reduction in the mortality rates, by themselves, would not have a significant effect on fertility level.

The Status of Women Factor (Factor III) is found to have a significant negative effect on the fertility measures, particularly with respect to the general fertility rate. Although it has been well-established that in developed economies there is a negative relationship between female labour force participation (included in Factor III) and fertility (for example, see Sweet (1973) and Berent (1970)), no clear-cut relationship can be found for developing economies. Our finding add to that of a number of other studies which detected a negative relationship between female participation in the labour force and fertility for developing countries (Hass (1977), Heer and Turner (1965) and Maurer et. al. (1973)).

Factor IV (Availability of Social Amenities Factor) is found to have some negative effect on the general fertility rate. This indicates that availability of medical services and better domestic living conditions tend to reduce the general fertility rate. This conforms to common sense rationale since availability of medical services implies availability of advice and prescriptions for contraceptives, and availability of utility services like electricity enable households to have television and radio which allow for quick diffusion of information and modern ideas.

Factor V (Demographic Pressure) is, by far, the most important determinant of fertility within the Malaysian context. From Table 3 it can be seen that the factor alone accounts for 62.4% of the variance in

the crude birth rate and 50.4% of the variance in the general fertility rate. Our finding of a negative relationship between demographic pressure and fertility conforms to the findings of Adelman (1963) and Friedlander and Silver (1967), though these studies were on a cross-country basis. The fact that both macro and household demographic variables are included in this factor and are highly correlated among themselves indicate that macro variables like population density are really proxy variables for the household variables which reflect the relative price of living space. The large proportion of variance explained in the fertility measures by this single factor can be explained by the fact that there is a high degree of uneven distribution of population in the country. Whereas metropolitan towns tends to be highly congested, the rural districts are scarcely populated. This study indicates that the single most important factor affecting the fertility behaviour of a household is its immediate environment i.e. the relative availability of living space in its household. Families in more congested households tend to be less fertile than families in less congested households.

### 6.2.3 Effects of Factors on Rich and Poor Districts

One criticism of studies like that of Adelman (1963), Weintraub (1962) and Russett et. al. (1964) is that these studies pooled the data of developed and developing countries together in one single sample for the purpose of analysis. Such a method failed to recognise that developed and developing countries respond differently, particularly in their fertility behaviour, to socio-economic factors.

To cite two possible important examples: (i) Variation in the level of contraceptive knowledge would have important effects on the fertility behaviour. While in developed countries perfect (or almost perfect) awareness of contraceptive knowledge can be assumed, this is certainly not so in developing countries. (ii) Opportunity cost of mother-time spent on children is related to economic development. While in developed countries the opportunity cost is high, in developing countries with their extended family norm and the relative availability of domestic helps, the opportunity cost is certainly much lower. To avoid such sources of errors, studies like Friedlander and Silver (1967) and Janowitz (1971) have treated developed and developing countries as different samples for the purpose of analysis. As a consequence, some of the conclusions drawn from these two studies were different from that of the others that treated these two groups of countries as similar units for the purpose of analysis.

In this section we adopted the approach of separating the developed (or rich) districts from the developing (or poor) districts for the purpose of analysis. Although the reasons for the separation of the two groups for analytical purposes is less persuasive in intra-country studies, nevertheless such a separation would shed further light on the conclusions drawn from the analysis on the pooled sample

For the purpose of separating the districts into the rich and the poor categories we ranked the districts in descending order of district gross product per capita. The top 35 districts are classified as the rich districts, while the bottom 35 districts are classified as



the poor districts. Principal-component factor analysis was then performed on each of the two samples of rich and poor districts. Based upon analysis of the results produced by rotating 4 through 10 factors, the number of factors were set at five for the rich districts and four for the poor districts. The principal factors were rotated using the varimax criterion. The summary of the results of the analysis are presented in Tables 4 and 5. In each of Tables 4 and 5 we have included only factor loadings whose absolute value are at least 0.3 and have assigned each variable to that factor on which it has the highest or second highest loading.

From Table 4 it can be seen that the five principal factors derived from the sample of rich districts - Status of Economic Development and Literacy, Child Mortality, Status of Women, Availability of Social Amenities and Demographic Pressure - are more or less identical to the five factors derived from the pooled sample. The five factors now account for 74% of the variance in the crude birth rate and 73% of the variance in the general fertility rate for the rich districts. From the factor analysis performed for the sample of poor districts only four factors emerged clearly i.e. Status of Economic Development and Literacy, Child Mortality, Demographic Pressure and Status of Women. The variables associated with Availability of Social Amenities did not stand out on their own as a factor; their relative high correlation with economic development and literacy have led to these variables being grouped under the first factor. Tables 6 and 7 summarise more clearly the effects of the identified factors on the fertility measures. Just as in the pooled

Table 4

Principal-component Factor Loadings for Rich Sub-sample

Item	Factors					$h^2$ i
	I Status of Economic Development & Literacy	II Child Mortality	III Status of Women	IV Availa- bility of social amenities	V Demo- graphic Pressure	
X <sub>2</sub> Infant mortality rate		0.99				0.99
X <sub>3</sub> Toddler mortality rate		0.66				0.52
X <sub>11</sub> % economically active females employed			0.83			0.73
X <sub>12</sub> % employed females employed in agriculture	- 0.40		0.85			0.94
X <sub>20</sub> % of females $\geq 10$ years of age staying at home			- 0.91			0.86
X <sub>21</sub> % of females between 10-19 years of age married			- 0.86		0.30	0.86
X <sub>22</sub> Ratio of female to male literacy			0.77			0.73
X <sub>23</sub> Number of doctors per 1,000 MWRA				0.78	0.38	0.81
X <sub>24</sub> % of permanent quarters with electricity service				0.78	0.41	0.83
X <sub>25</sub> % of permanent quarters with running water supply	- 0.42			0.74		0.79
X <sub>4</sub> Population density			- 0.30	0.43	0.76	0.90
X <sub>6</sub> % of population in towns between 1,000-9,999 people					0.59	0.54
X <sub>7</sub> % of population in towns $\geq 10,000$ people					0.38	0.25
X <sub>5</sub> Dependency ratio				0.47	0.68	0.76
X <sub>26</sub> Number of people per bedroom in dwelling					0.98	0.98
X <sub>17</sub> % of Malays in district population	- 0.56					0.70
X <sub>18</sub> % of Chinese in district population	0.85					0.83
X <sub>19</sub> % of Indians in district population	0.49				0.34	0.40
X <sub>16</sub> Number of motor vehicles per 1,000 people	0.71				0.54	0.88
X <sub>1</sub> District gross product per capita	0.73					0.60

Table 4 (contd.)

Item	Factors					$h_1^2$
	I Status of Economic Development & Literacy	II Child Mortality	III Status of Women	IV Availa- bility of Social Amenities	V Demo- graphic Pressure	
$X_8$ % of district gross product originating from agriculture	- 0.76					0.84
$X_{13}$ % of males $\geq$ 15 years without formal schooling	- 0.83				- 0.35	0.85
$X_{14}$ % of females $\geq$ 15 years without formal schooling	- 0.71				- 0.31	0.61
$X_9$ % of economically active males employed	0.49					0.36
$X_{10}$ % of employed males employed in agriculture	- 0.97					0.97
$X_{15}$ % of population literate	0.69				- 0.31	0.64
$y_1$ Crude birth rate	- 0.18	0.24	- 0.51	- 0.57	- 0.26	0.74
$y_2$ General fertility rate	- 0.16	0.23	- 0.47	- 0.65	- 0.08	0.73

Table 5

Principal-component Factor Loadings for Poor Sub-sample

Item	Factors				$h_1^2$
	I Status of Economic Development & Literacy	II Child Mortality	III Demo- graphic Pressure	IV Status of Women	
X <sub>2</sub> Infant mortality rate		0.99			0.99
X <sub>3</sub> Toddler mortality rate		0.49			0.29
X <sub>11</sub> % economically active females employed	- 0.44			0.82	0.92
X <sub>12</sub> % employed females employed in agriculture	- 0.40		- 0.38	0.76	0.88
X <sub>20</sub> % females ≥ 10 years staying at home				- 0.84	0.79
X <sub>21</sub> % females between 10-19 years of age married	- 0.35			- 0.83	0.84
X <sub>22</sub> Ratio of female to male literacy				0.45	0.34
X <sub>6</sub> % population in towns between 1,000-9,999 people			0.44		0.29
X <sub>7</sub> % population in towns ≥ 10,000 people	0.30		0.68		0.57
X <sub>8</sub> % district gross product originating from agriculture	- 0.34		- 0.81		0.83
X <sub>4</sub> Population density			0.45		0.44
X <sub>5</sub> Dependency ratio			0.45		0.25
X <sub>26</sub> Number of persons per bedroom in dwelling			0.97		0.97
X <sub>17</sub> % Malays in district population	- 0.78				0.81
X <sub>16</sub> Number of motor vehicles per 1,000 people	0.86				0.77
X <sub>1</sub> District gross product per capita	0.67		0.41	0.32	0.75
X <sub>18</sub> % Chinese in district population	0.84				0.79
X <sub>13</sub> % males ≥ 15 years of age without formal schooling	- 0.86			- 0.32	0.89
X <sub>14</sub> % females ≥ 15 years of age without formal schooling	- 0.72			- 0.30	0.68
X <sub>9</sub> % economically active males employed	0.78				0.68
X <sub>10</sub> % employed males employed in agriculture	- 0.97				0.92
X <sub>24</sub> % permanent quarters with electricity service	0.74				0.61
X <sub>25</sub> % permanent quarters with running water supply	0.74	0.33			0.67
X <sub>15</sub> % population literate	0.73				0.58
X <sub>19</sub> % Indians in district population	0.67				0.49
X <sub>23</sub> Number of doctors per 1,000 MWRA	0.55		0.44		0.61
y <sub>1</sub> Crude birth rate	- 0.37	- 0.09	- 0.48	0.06	0.40
y <sub>2</sub> General fertility rate	- 0.20	- 0.09	- 0.73	- 0.09	0.60

Table 6

Summary of Effects of Factors on Fertility  
Measures - Rich Districts

Effects of Factors						
Fertility Measures	I Status of Economic Development & Literacy	II Child Mortality	III Status of Women	IV Availa- bility of Social Amenities	V Demo- graphic Pressure	Total Percentage of Variance Accounted
Crude birth rate	3.2 (-)	5.8	26.0 (-)	32.5 (-)	6.8 (-)	74.0
General fertility rate	2.6 (-)	5.3	22.1 (-)	42.3 (-)	n.s.	73.0

n.s. implies not significant (less than 1% in variance explained).

Table 7

Summary of Effects of Factors on Fertility  
Measures - Poor Districts

Effects of Factors					
Fertility Measures	I Status of Economic Development & Literacy	II Child Mortality	III Demographic Pressure	IV Status of Women	Total Percentage of Variance Accounted
Crude birth rate	13.7 (-)	n.s.	23.0 (-)	n.s.	40.0
General fertility rate	4.0 (-)	n.s.	53.3 (-)	n.s.	60.0

n.s. implies not significant (less than 1% in variance explained).

sample, the Status of Economic Development and Literacy factor has a significant negative effect on both the fertility measures for each of the two disaggregated samples. The effects tend to be more pronounced for the poor districts than the rich ones. This is not surprising since the distribution of economic development and literacy among the poor districts tend to be more unequal than that in the rich districts.<sup>10</sup> The Child Mortality factor is seen to have some significant positive effect on the two fertility measures for the sample of rich districts. Although this result is in conformity with common sense rationale and have been found in other studies based on cross-national data (e.g. Friedlander and Silver (1967)), its emergence to significance in the rich sub-sample from insignificance in the pooled sample and insignificance in the poor sub-sample is surprising. This may be attributable to the fact the child mortality rate (especially infant mortality rate) figures are subjected to measurement errors particularly in the poor districts, where many of the births are still delivered at home. The Status of Women factor, although insignificant with respect to effects on fertility measures in the poor sub-sample and marginal with respect to effects on these measures in the pooled sample, has a substantial negative effect on the fertility measures in the rich sub-sample. The factor account for 26.0% and 22.1% of the variance in the crude birth rate and general fertility rate respectively in the rich sub-sample. This factor may have assumed such prominence for the

---

<sup>10</sup>For example the mean (and standard deviation) of percentage literacy for the sample of rich and poor districts are 61.6% (s.d. = 5.07%) and 52.8% (s.d. = 12.8%) respectively.

rich districts by virtue of the fact that it is only in the rich (and more "modernised") districts that the concept of a working husband and a housewife have been clearly defined. In the poorer districts, nearly all the wives have to perform off-family activities in one form or another in order to supplement the family income so that the family can remain above the poverty level (see, for example, Cheong et. al, (1977)). Hence in these districts the issue of status of women is non-existence since the majority of them are already working and helping to supplement their family income. The pronounced significance of this factor for the rich districts indicates that in the more developed districts where better paying jobs for women are more readily available and where the opportunity-cost of looking after children by the wife at home is higher, female participation in the labour force does have a considerable negative impact on their fertility. The Availability of Social Amenities factor, although relatively unimportant in both the pooled sample and the poor sub-sample, is the single most important factor with respect to its effects (negative) on the fertility measures for the rich sub-sample. It accounts for 32.5% and 42.3% of the crude birth rate and the general fertility rate respectively for the rich sub-sample. This lends firmer support to the hypothesis that presence of other leisure activities (e.g. availability of television through availability of electricity) tend to reduce fertility level. The absence of this factor in the poor sub-sample may be due to the consistently low and insufficient variation in the social amenity variables for the poor

districts.<sup>11</sup>

The Demographic Pressure factor, the factor which was found to be most prominent for the pooled sample, maintains its paramount role (negatively) only in the poor sub-sample. It accounts for 23.0% and 53.3% of the variance in the crude birth rate and the general fertility rate respectively for the poor sub-sample. In the rich sub-sample, it has some significant negative effect only on the crude birth rate. This is interesting and it suggests that in the Malaysian context families in the poorer districts respond, in terms of their fertility behaviour, more to direct environmental factors like relative availability of living space and less to more indirect variables like status of women and availability of social amenities.

#### 7. Conclusions and Policy Implications

As was stated earlier, a study on the determinants of fertility based, particularly, on intra-national data can have policy implications in terms of the design of the population policy that ought to be pursued. In this respect the study has been fairly fruitful. Contrary to many other studies (principally using cross-country data) which found a substantial relationship between economic development and literacy, we found that economic development and literacy have only a marginal effect on fertility in Malaysia. This is true both for the pooled sample and the disaggregated

---

<sup>11</sup>For example, the mean (and standard deviation) of the percentage of electrified household is 21.83% (s.d. = 10.0%) in the poor sub-sample.



samples. The pertinent conclusion is that, in Malaysia, though economic development and modernisation does reduce fertility this process, solely by itself, would not be sufficient to ensure a rate of fertility decline consistent with a healthy rate of growth in national income. To achieve a rate of fertility decline consistent with the overall target of 2.0 percent by 1985,<sup>12</sup> a vigorous national family planning programme ought to be implemented side by side with economic development. This, of course, has been initiated in 1967 with the formation of the Malaysian National Family Planning Board. A key current controversy with regard to family planning programmes relates to their effectiveness. Is it economic development that makes them effective or is it that they have been effective independently of economic development?<sup>13</sup> What this study shows indirectly is that the programme is indispensable, and should be more vigorously implemented, if the overall population target is to be achieved in Malaysia.

We found that the single most important socio-economic factor that can reduce fertility is demographic pressure at the household level. This is particularly true for families in the poorer districts. This suggests that families in Malaysia view reduced fertility more as a response to an immediate (though, of course, not necessarily unimportant) problem - that of insufficient living space at reasonable cost. It cannot be denied that there is

---

<sup>12</sup>Malaysia (1976) p. 412.

<sup>13</sup>See, for example, Berelson (1974) for a detail discussion of this issue.

an acute shortage of housing suitable for poor families.<sup>14</sup> According to the 1970 Population and Housing Census (Malaysia, Department of Statistics (1975)) on the average there are 7.07 persons living in an urban quarter with an implied number of persons per room of 3.08<sup>15</sup> which is above the United Nations recommended optimal density of 1.4 to 2.2 persons per room, and also above its set limit of 3 persons per room above which overcrowding occurs (Malaysia, The Treasury (1973), p. 62). This density is expected to become more acute as urbanization and development continues unless a more comprehensive housing policy is adopted. With respect to fertility reduction therein lies the dilemma - would a comprehensive housing policy, which would ease the problem of inadequate cheap living space for the present, increase the fertility rates and hence raise the problem of overcrowding again sometime in the future? From this study it can be inferred that to break this cycle any comprehensive housing policy must be implemented side by side with the family planning programme. In any completed low cost housing scheme, a publicity campaign ought to be sustained stressing the fact that the occupants' present state of relative comfort in terms of living space can only be maintained through a low level of fertility.

---

<sup>14</sup> See, for example, Malaysia (1976) Chapter XIX for a detailed discussion of this issue.

<sup>15</sup> There is on the average 2.29 rooms per living quarter in 1970.

The study also shows that an indirect factor like availability of social amenities have some negative effects on fertility. Results from the disaggregated samples indicate that among the poor districts the factor has no significant effect on fertility because of the consistently low levels of social amenity variables in these districts. In the rich districts where there is a sufficient variation in the values of the social amenity variables, this factor assumes very pronounced significance. This finding is revealing. It indicates that in the poor districts social amenities like running water, electricity supply and medical care are enjoyed by only a small proportion of the households. In the rich districts where there is a better distribution of these amenities, they tend to have significant negative effects on fertility possibly because of their modernizing influence. This latter point provides another strong justification (besides improvement in societal welfare) for the provision of these facilities throughout the country.

Status of women, particularly with respect to their participation in the labour force, has a significant negative effect on fertility especially in the richer districts where the opportunity cost of women staying at home is higher. Although women participation in the labour force has not been explicitly used as a policy instrument for fertility control, this study indicates that this can be used rather effectively should the need arise particularly when Malaysia has attained a nearly full employment situation.

Child mortality is seen to have very marginal effects on fertility. Child mortality rates, particularly infant mortality rate,

have been on the decline in Malaysia for a long time and this study indicates that they have reached a level at which further decline of the mortality rates, by themselves, would have little or no effect on fertility. This does not mean that public health programmes should not be further improved for the betterment of society; but it does show that as a policy instrument for fertility control, further improvements in child mortality rates would be relatively ineffective.

Appendix

List of Variables

	<u>Variable</u>	<u>Sources</u>
y <sub>1</sub>	Crude birth rate	a and b
y <sub>2</sub>	General fertility rate	a and c
x <sub>1</sub>	District gross product per capita	d
x <sub>2</sub>	Infant mortality rate	a
x <sub>3</sub>	Toddler mortality rate	a
x <sub>4</sub>	Population density	b and e
x <sub>5</sub>	Dependency Ratio <sup>1</sup>	c
x <sub>6</sub>	% population in towns between 1,000 to 9,999 people	c
x <sub>7</sub>	% population in towns $\geq$ 10,000 people	c
x <sub>8</sub>	% district gross product originating from agriculture	d
x <sub>9</sub>	% economically active males employed	c
x <sub>10</sub>	% employed males employed in agriculture	c
x <sub>11</sub>	% economically active females employed	c
x <sub>12</sub>	% employed females employed in agriculture	c
x <sub>13</sub>	% males $\geq$ 15 years of age without formal schooling	c
x <sub>14</sub>	% females $\geq$ 15 years of age without formal schooling	c
x <sub>15</sub>	% population literate	c
x <sub>16</sub>	Number of motor vehicles per 1,000 people <sup>2</sup>	f
x <sub>17</sub>	% Malays in district population	c

	<u>Variables</u>	<u>Sources</u>
x <sub>18</sub>	% Chinese in district population	c
x <sub>19</sub>	% Indians in district population	c
x <sub>20</sub>	% female $\geq$ 10 years of age staying at home	c
x <sub>21</sub>	% females between 10 to 19 years of age married	c
x <sub>22</sub>	Ratio of female literacy to male literacy	c
x <sub>23</sub>	Number of doctors per 1,000 married women between ages of 15 to 44 years (MWRA)	c
x <sub>24</sub>	% of permanent quarters with electricity service	c
x <sub>25</sub>	% of permanent quarters with running water supply	c
x <sub>26</sub>	Number of persons per bedroom in dwelling	c

Sources:

- a - Malaysia, Department of Statistics (1972).
- b - Malaysia, Department of Statistics (1975).
- c - Malaysia, Department of Statistics, 1970 Census of Population and Housing for Malaysia, unpublished data
- d - Salih and Lo (1975).
- e - District sizes obtained from Department of Surveying, Kuala Lumpur, 1977.
- f - Data obtained from Economic Planning Unit, Prime Minister's Department, Kuala Lumpur, 1977.

Notes:

- 1 - Population in ages 0-14 and  $\geq$  65 years/Population between ages of 15 to 64 years.
- 2 - Two motor cycles is assumed to have the weight of one motor car.

## References

- Adelman, I., 1963, "An Econometric Analysis of Population Growth", American Economic Review, 53: 314-338.
- \_\_\_\_\_, and C. Morris, 1966, "A Quantitative Study of Social and Political Determinants of Fertility", Economic Development and Cultural Change, 14: 129-157.
- Bell, C., 1976, "Fertility, Mortality and Standard of Living", Washington: Mimeo., World Bank.
- Berelson, B., 1974, "An Evaluation of Efforts of Population Control Programs", Studies in Family Planning, 5: 2-12.
- Berent, J., 1970, "Some Demographic Aspects of Female Employment in Eastern Europe and U.S.S.R.", International Labour Review, 101: 175-192.
- Cain, G.G., and A. Weininger, 1973, "Economic Determinants of Fertility: Results from Cross-Sectional Aggregate Data", Demography, 10: 205-223.
- Cheong, K.C., et. al., 1977, Regional Development in Malaysia: A Case Study of Johore Tenggara, Tokyo: Mimeo., The Institute of Developing Economies.
- Coale, A.J., and E.M. Hoover, 1958, Population Growth and Economic Development in Low-Income Countries, Princeton: Princeton University Press.
- Conroy, M.E., and N.R. Folbre, 1976, Population Growth as a Determinant to Economic Growth: A Reappraisal of the Evidence, Institute of Society, Ethics and Life Science, Occasional Population Paper.
- Ekanem, I.I., 1972, "A Further Note in the Relations between Economic Development and Fertility", Demography, 9: 383-398.
- Farooq, G.M., and B. Tuncer, 1974, "Fertility and Economic and Social Development in Turkey: A Cross-Sectional and Time Series Study", Population Studies, 28: 263-276.
- Friedlander, S., and M. Silver, 1967, "A Quantitative Study of Determinants of Fertility Behaviour", Demography, 4: 30-70.
- Green, P.E., and D.S. Tull, 1975, Research for Marketing Decisions, Englewood Cliffe: Prentice-Hall.
- Harman, H.S., 1970, Modern Factor Analysis, Chicago: University of Chicago Press.

- Hass, P., 1972, "Maternal Role Incompatibility and Fertility in Urban Latin America", Journal of Soc. Issues, 28: 111-127.
- Heer, D., 1966, "Economic Development and Fertility", Demography, 3: 423-444.
- \_\_\_\_\_ and E.S. Turner, 1965, "Areal Differences in Latin American Fertility", Population Studies, 18: 279-292.
- Janowitz, B.S., 1971, "An Empirical Study of Socioeconomic Development on Fertility Rates", Demography, 8: 319-330.
- Kasarde, J.D., 1971, "Economic Structure and Fertility: A Comparative Analysis", Demography, 8: 307-317.
- Leiberstein, H., 1957, Economic Backwardness and Economic Growth, New York: John Wiley.
- Lim, D., 1973, Economic Growth and Development in West Malaysia 1947-1970, Kuala Lumpur: Oxford University Press.
- Malaysia, 1976, The Third Malaysia Plan, 1976-1980, Kuala Lumpur: Government Printers.
- \_\_\_\_\_ Department of Statistics, 1960, 1957 Population Census of the Federation of Malaya, Kuala Lumpur.
- \_\_\_\_\_ Department of Statistics, 1972, Vital Statistics: West Malaysia, 1970, Kuala Lumpur.
- \_\_\_\_\_ Department of Statistics, 1975, 1970 General Report, Population Census of Malaysia, Kuala Lumpur.
- \_\_\_\_\_ Economic Planning Unit, 1974, Regional Development Strategy: Report on a Research Project, Kuala Lumpur: Mimeo., Economic Planning Unit.
- \_\_\_\_\_ The Treasury, 1973, Economic Report, 1973/74, Kuala Lumpur: Government Printers.
- Maurer, K., R. Ratajczak, and T.P. Schultz, 1973, "Marriage, Fertility and Labour Force Participation of Thai Women: An Econometric Study", Santa Monica: Mimeo., Rand Institute.
- Retherford, R.D., and L.J. Cho, 1973, "Comparative Analysis of Recent Fertility Trends in East Asia", in International Union for the Scientific Study of Population, Internal Population Conference, Liege, 3: 163-181.
- Rummel, R.J., 1970, Applied Factor Analysis, Evanston: Northwestern University Press.



- Russett, B.M., et. al., 1964, World Handbook of Social and Political Indicators, New Haven: Yale University Press.
- Salih, K., and F.C. Lo, 1975, Industrialization Strategy, Regional Development and the Growth Centre Approach: A Case Study of West Malaysia, Nagoya: U.N. Centre for Regional Development.
- Saw, S.H. 1966, "Pattern of Fertility Decline in Malaya, 1956-1966", Kajian Ekonomi Malaysia, 3: 7-14.
- Stycos, J.M., 1964, "Problems of Fertility Control in Underdeveloped Areas", in S. Mudd, The Population Crisis and the Use of World Resources, Bloomington: Indiana University Press, 1964.
- Sweet, J.A., 1973, Women in the Labour Force, New York: Seminar Press.
- United Nations, 1953, The Determinants and Consequences of Population Trends, Population Studies No. 17, New York.
- Weintraub, R., 1962, "The Birth Rate and Economic Development: An Empirical Study", Econometrica, 40: 813-817.
- Wrong, D.H., 1962, Population and Society, New York: Random House.

# SEAPRAP

## THE SOUTHEAST ASIA POPULATION RESEARCH AWARDS PROGRAM

### PROGRAM OBJECTIVES

- \* To strengthen the research capabilities of young Southeast Asian social scientists, and to provide them with technical support and guidance if required.
- \* To increase the quantity and quality of social science research on population problems in Southeast Asia.
- \* To facilitate the flow of information about population research developed in the program as well as its implications for policy and planning among researchers in the region, and between researchers, government planners and policy makers.

### ILLUSTRATIVE RESEARCH AREAS

The range of the research areas include a wide variety of research problems relating to population, but excludes reproductive biology. The following are some examples of research areas that could fall within the general focus of the Program:

- \* Factors contributing to or related to fertility regulation and family planning programs; familial, psychological, social, political and economic effects of family planning and contraception.
- \* Antecedents, processes, and consequences (demographic, cultural, social, psychological, political, economic) of population structure, distribution, growth and change.
- \* Family structure, sexual behaviour and the relationship between child-bearing patterns and child development.
- \* Inter-relationships between population variables and the process of social and economic development (housing, education, health, quality of the environment, etc).
- \* Population policy, including the interaction of population variables and economic policies, policy implications of population distribution and movement with reference to both urban and rural settings, and the interaction of population variables and law.
- \* Evaluation of on-going population education programs and/or development of knowledge-based population education program.

- \* Incentive schemes — infrastructures, opportunities; overall economic and social development programs.

### SELECTION CRITERIA

Selection will be made by a Program Committee of distinguished Southeast Asian scholars in the social sciences and population. The following factors will be considered in evaluating research proposals:

1. relevance of the proposed research to current issues of population in the particular countries of Southeast Asia;
2. its potential contribution to policy formation, program implementation, and problem solving;
3. adequacy of research design, including problem definition, method of procedure, proposed mode of analysis, and knowledge of literature;
4. feasibility of the project, including time requirement; budget; and availability, accessibility, and reliability of data;
5. Applicant's potential for further development.

### DURATION AND AMOUNT OF AWARDS

Research awards will be made for a period of up to one year. In exceptional cases, requests for limited extension may be considered. The amount of an award will depend on location, type and size of the project, but the maximum should not exceed US\$7,500.

### QUALIFICATIONS OF APPLICANTS

The Program is open to nationals of the following countries: Burma, Indonesia, Kampuchea, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam. Particular emphasis will be placed on attracting young social scientists in provincial areas.

Applications are invited from the following:

- \* Graduate students in thesis programs
- \* Faculty members
- \* Staff members in appropriate governmental and other organizations.

Full-time commitment is preferable but applicants must at least be able to devote a substantial part of their time to the research project. Advisers may be provided, depending on the needs of applicants.