

Socio- economic Development and Mortality Patterns and Trends in Malaysia

While the quality of life in Malaysia has improved tremendously with socio-economic development, it could be enhanced further by reducing the relatively high mortality level of certain disadvantaged groups

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Mortality in Peninsular Malaysia has reached a level which is quite similar to that prevailing in the low mortality countries (World Health Organization, 1982: 17). As in countries such as China, Japan, Singapore and Sri

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Lanka, neoplasms and cardiovascular diseases, which previously had been minor causes of death in Malaysia,^{1/} have become important in recent years (World Health Organization, 1982: 20).

However, Malaysia lags behind the industrialized countries in terms of other social indicators, such as the number of physicians and nursing personnel, potable water supply and proper sewerage facilities. For example, in 1982, the number of persons per physician and nurse in Malaysia were, respectively, 7,910 and 940^{2/} compared with 1,150 and 320 for Singapore and 780 and 240 for Japan (World Bank, 1984: 265). In 1980, a potable water supply was available to only about 59 per cent of the population of Malaysia, with a coverage of about 89 per cent in the urban areas and 43 per cent in the rural areas (Fifth Malaysia Plan, 1986: 474). In 1985, the percentage of the population supplied with potable water was about 71 per cent, with a coverage of about 93 and 52 per cent in the urban areas and rural areas, respectively.

In terms of sewerage facilities, about 31 per cent of the population in 1985 were provided with flush toilets connected to septic and run-off tanks and other communal centralized sewerage systems (Fifth Malaysia Plan, 1986: 474). The percentage of the population with pour-flush toilets increased from 30 per cent in 1980 to 39 per cent in 1985, mainly in the rural areas. In 1985, the proportion of the population without modern toilet facilities was about 15 per cent while those without any access to a sewerage disposal system made up 10 per cent of the population.

How did Malaysia arrive at the present level of mortality? The path taken by mortality decline in the process of development in Malaysia has not been fully documented.^{3/} In the initial phase of mortality decline, mortality levels were found to be less dependent on national development strategies partly because of cost-effective medical technologies. However, the process of development seems to offer some explanation for the more recent decline.

The purpose of this article is to systematically document changes in

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1. Malaysia is made up of Peninsular Malaysia (also known as West Malaysia and previously as Malaya) and East Malaysia consisting of Sabah and Sarawak. Data on Peninsular Malaysia are more complete and reliable and hence most studies concentrate on this part of Malaysia. Registration data are found to be very incomplete in Sabah and Sarawak (Leete and Kwok, 1986). Peninsular Malaysia consists of the Federal Territory and 11 States, namely, Perlis, Kedah, Penang, Perak, Selangor, Negri Sembilan, Malacca, Johore, Kelantan, Terengganu and Pahang.
 2. These figures are much higher than the vital statistics figures. However, this does not change the basic picture as presented.
 3. Trends and differentials in mortality in Peninsular Malaysia have been described in a few studies (e.g. Hirschman, 1980; Kwok, 1982; Noor Laily et al., 1983).

mortality levels and differentials in Malaysia over time and to relate these to changes in development indicators and health-related policies. Much of the discussion necessarily focuses on Peninsular Malaysia in view of the lower reliability and availability of data for Sabah and Sarawak. On the other hand, given the lag in the development of the latter two States, their general state of health and mortality level may be deduced from the early experiences of Peninsular Malaysia.

An overview of mortality patterns and trends

The first half of the century saw a substantial decline in the crude death rate (CDR).^{4/} In part this can be traced to developments in tropical medicine, to improved health facilities and to the benefits of economic development arising from wealth realised from tin and rubber. Mortality decline has been less rapid in recent years because of the relatively low level of mortality; hence, linkages to social and economic development are less easily established. To some extent also, the slower decline has been due to the older age structure of the current population.

In Peninsular Malaysia, the early part of the century saw rapid development of the country through the expansion of the rubber and tin industries. These industries were supported largely by immigrant labour, with estates employing Indian labour and the tin mines Chinese labour.

The Malay community remained largely in the rural areas, occupied by such pursuits as fishing and rice cultivation. Mortality was high owing to the prevalence of tropical diseases such as malaria, beriberi, smallpox, cholera, plague and rabies. The staple diet of the Chinese was polished rice, which, because it lacks thiamine, led to the occurrence of beriberi; as for pioneer estate workers, they were exposed to malaria (Institute for Medical Research, 1951; Strahan, 1948; Jones, 1953). Thus, in the early 1920s the CDR was higher for the Chinese and Indians than for the Malays (see **table 1** on the next page).

Remedial measures undertaken by the authorities included the expansion of hospital and health services into the estates, and the setting up of training centres for anti-malaria and hospital workers. These measures, together with a comprehensive malaria -eradication programme, improvements in sanitation laws and increased provision of public utilities and education, resulted in beriberi being eliminated and the incidence of malaria, typhus and smallpox being greatly reduced by the time of the Second World War. These acti-

^{4/} While the limitations of the crude death rate are well known, it is used in this article because it is the only indicator for which extensive data are available.

Table 1: Crude death rates and infant mortality rates in Peninsular Malaysia*

Year	Crude death rate				Infant mortality rate			
	Total	Malays	Chinese	Indians	Total	Malays	Chinese	Indians
1921	28.5	25.4	26.8	37.2				
1931	19.1	18.8	18.9	20.5				
1940	18.6	21.8	18.8	14.4				
1947	19.4	24.3	14.3	15.8				
1950	15.8	18.7	12.7	13.6				
1960	9.6	11.2	1.8	9.0	68.86	81.36	42.45	65.11
1970	1.3	1.6	6.6	8.5	40.79	41.55	28.51	46.02
1980	5.9	5.5	5.8	7.6	24.87	27.53	17.11	30.33
1984	5.6	5.3	5.5	7.3	18.10	20.40	11.68	18.81

* *Note:* Data prior to 1947 were for the Federated Malay States, i.e. Perak, Selangor, Negri Sembilan and Pahang, four of the eleven states in Peninsular Malaysia). As such, they are not directly comparable with figures from 1947 for Peninsular Malaysia. Earlier figures also probably suffer from a higher incidence of under-reporting than later figures. However, these figures are presented to ascertain general trends.

Source: Data provided by the Department of Statistics, Kuala Lumpur, Malaysia.

vities, however, had a minimal effect on the rural population. A few travelling dispensaries were available to people in the rural areas, but they were still largely dependent on traditional systems of medical care (Chen, 1981: 5). As such, substantial declines in the CDR were effected by 1940 for the Chinese and Indian population, but not for the Malays.

The Second World War saw a breakdown in many of the medical facilities and the subsequent return of malaria. Malnutrition and cholera were also problems, especially in the rural areas and estates. By 1947, with the decline in importance of other diseases, tuberculosis became a more important cause of death.

The history of public health in Sabah and Sarawak is somewhat similar to that of Peninsular Malaysia. Organised medical care was introduced in Sabah in 1882 soon after the formation of the Chartered Company in 1881 (Virdi and Chan, 1981). The first dispensary was built in 1914, and by 1923, there were nine hospitals, which were confined to the main commercial centres. Travelling dispensary facilities were gradually introduced to cover as

much of Sabah as possible. At this time, both malaria and beriberi were important causes of death.

Conditions in Sabah improved greatly with the implementation of laws governing the provision of facilities on the estates. For example, in 1922, the CDR on the estates was 26.5 per thousand and that for the whole territory was 19.4. By 1940, the rate was 4.4 per thousand on the estates and 20.4 for the whole territory (Virdi and Chan, 1981: 367). Some diseases, such as yaws and beriberi, reappeared during the War, but were subsequently brought under control. The medical department was reorganised and medical facilities extended to a wide segment of the population. The CDR fell from 13.3 per thousand in 1948 to 5.7 in 1963.

Unlike in Sabah, the development of health facilities in Sarawak took place later. In 1949, there were only two government hospitals and 23 rural dispensaries. Medical facilities were extended to the rural population through travelling dispensaries; by 1953, there were 16 of these. Malaria was the most important cause of death until a major malaria-eradication scheme reduced its intensity in 1959 (Jackson, 1968: 190-195).

Thus, for all three regions, Peninsular Malaysia, Sabah and Sarawak, post-war development and independence^{5/} saw a continued decline in the CDR and infant mortality rate. This was a result of improved medical services both in terms of physical facilities and personnel, particularly in the rural areas, and considerable social and economic changes (table 2 on the next page). Per capita gross domestic product (GDP) grew by an average of 7.7 per cent per annum from 1970 to 1982 and stood at \$US1,862 in 1982 (World Bank, 1984: 219-221). In 1985, the per capita income was \$US2,113 (Economic Report 1985/86, table 1.2). Besides the spread of modern medical services, major improvements have been made in terms of transportation and communications, and progress made in social development. For example, about three quarters of contemporary women (aged 15-19 years in 1980) attended secondary school, whereas a generation previously (those aged 35-39 years in 1980) only 15 per cent of women were able to attend secondary school (1980 Population Census 2: 508-511).

In post-independence Peninsular Malaysia, there was also a shift in emphasis from the provision of health facilities in the urban areas and estates to other rural areas. Rural health services involved the setting up of one rural health unit for every 50,000 of the rural population. The units would provide basic health services including maternal and child health, environmental

5/ Peninsular Malaysia became independent in 1957. Sabah and Sarawak became independent as part of Malaysia in 1963.

Table 2: Some socio-economic and demographic indicators, Peninsular Malaysia, 1957-1980

	1957	1970	1980
Percentage of females with secondary and tertiary education	3.5	10.8	23.3
Percentage urban population	26.7	28.8	37.5
Percentage of living quarters with			
• Piped water: Total	n.a.	48.0	68.0
Rural	n.a.	37.0	59.0
Urban	n.a.	81.0	86.0
• Electricity: Total	n.a.	44.0	68.0
Rural	n.a.	31.0	58.0
Urban	n.a.	83.0	88.0
• Flush/pour-flush toilets:			
Total	n.a.	18.0	60.0
Rural	n.a.	11.0	54.0
Urban	n.a.	42.0	72.0
GDP per capita	n.a.	1 167	3 344
Physician-population ratio*	0.14	0.27	0.28
Crude death rate	12.4	7.0	5.6
Infant mortality rate	75.5	40.8	24.0
Maternal mortality rate	2.8	1.5	0.6
Expectation of life at birth: Male	55.8	62.2	66.7
Female	58.2	66.5	71.6
Median household income (\$M per month)	n.a.	166	263

* Note: per 1,000 population.

Sources: 1957, 1970 and 1980 Population Census; *1980 General Report Housing Census*, Vol. 1; Fourth Malaysia Plan; Third Malaysia Plan.

sanitation, curative medicine, the control of communicable diseases, dental care and health education (Chen, 1981: 7). In the estates and mines, the provision of medical care remained the responsibility of the companies that owned them. As a result, medical facilities in the estates deteriorated and were reported to be generally of very poor quality (Ministry of Health, Annual Report 1981: 280). This development in medical care would probably be reflected in the CDR for the ethnic groups during that period (**table 1**). The greatest decline was registered among the Malays (recall that the Malay population at the time of independence comprised people mostly from the rural areas); the least decline, among the Indians, who generally remained in the

Table 3: Expectation of life at birth (e⁰) for Peninsular Malaysia by sex and ethnic group, 1957-1979

Year	Total*		Malays		Chinese		Indians	
	Male	Female	Male	Female	Male	Female	Male	Female
1957	55.8	58.2	50.2	53.7	59.5	66.7	57.1	54.6
1967	63.5	66.3	61.7	63.0	66.6	71.9	62.2	62.1
1970	63.5	68.2	63.7	65.5	65.1	73.4	60.2	63.9
1975	65.4	70.8	66.1	69.0	66.7	74.8	60.7	65.1
1979	67.2	72.5	67.9	71.0	68.1	75.8	63.2	68.0
Number of years gained								
1957-1967	7.7	8.1	11.5	9.6	7.1	5.2	5.1	7.5
1967-1977	2.6	5.1	5.1	6.8	0.7	3.3	0.3	4.8
1969-1979	3.4	5.8	5.5	7.2	1.5	3.8	1.6	6.8
1957-1979	11.4	14.3	17.7	16.6	8.6	9.1	6.1	13.4

* Note: Includes "Others".

Source: Selected years taken from Noor Laily et al. (1983, p. 2).

estates. The Malays were subsequently also affected by the Government's efforts to raise their living standard under the New Economic Policy^{6/}

The same trends are seen in figures for expectation of life at birth (table 3). The gain in life expectancy over the period was greatest for the Malay – the most significant period being 1957-1967, which saw the introduction of oral health programmes. The period 1957-1967 also saw the greatest gains within each ethnic group. When comparing groups, however, the use of expectation of life at birth has serious limitations and may result in wrong or different conclusions (cf. Pollard, 1982: 547). In view of this, age-specific death rates are also used for analysis.

^{6/} The New Economic Policy was introduced in 1970 to promote national unity through the strategy of (a) eradicating poverty by raising income levels and increasing employment opportunities of all Malaysians, and (b) accelerating the process of restructuring the society to correct economic imbalances so as to reduce and eventually eliminate the identification of race with economic function (Mid-term Review of Second Malaysia Plan).

Appendix 1: Age-specific death rates (Mx) by sex and ethnic group for Peninsular Malaysia: Average for 1967-1969

Age	Male				Female			
	Peninsular Malaysia	Malays	Chinese	Indians	Peninsular Malaysia	Malays	Chinese	Indians
0	.050350	.058388	.035136	.059429	.039736	.045646	.026538	.052073
1	.005285	.007098	.002650	.005088	.005165	.006911	.002354	.005682
5	.001752	.002429	.000887	.001536	.001689	.002346	.0007517	.001722
10	.001115	.001367	.000824	.001023	.000932	.001226	.000531	.000940
15	.001404	.001598	.001165	.001457	.001190	.001489	.000716	.001579
20	.001912	.001870	.001901	.002015	.001810	.002401	.000920	.002644
25	.001963	.001994	.001882	.002041	.001938	.002433	.001176	.002824
30	.002723	.003045	.002276	.003026	.002859	.003844	.001529	.003383
35	.003552	.003552	.003108	.004726	.003417	.004172	.002165	.004145
40	.005546	.005721	.004917	.006268	.004458	.005116	.003304	.005108
45	.008156	.008482	.007240	.008848	.006689	.007556	.004522	.009908
50	.012410	.012644	.011632	.013702	.009086	.010998	.006239	.012635
55	.018359	.019450	.0164087	.021436	.013903	.017025	.009027	.022362
60	.028347	.031062	.026354	.028483	.022054	.028311	.014428	.038923
65	.041412	.041529	.040633	.046199	.031477	.038486	.023085	.051856
70	.049237	.042884	.052648	.064747	.034824	.037497	.030027	.074859
75+ *	.126756	.135570	.112894	.136793	.124298	.134324	.113647	.136536

* Note: The age-specific death rates (M_{75+}) for this oldest, open-ended age group are estimated by dividing d_{75+} by T_{75} in the respective life tables.

Source: Noor Laily et al. (1983, p. 54).

**Appendix 2: Age-specific death rates (Mx) by sex and ethnic group for
Peninsular Malaysia: Average for 1977-1979**

Age	Male					Female						
	Peninsular Malaysia	Malays	Chinese	Indians	Peninsular Malaysia	Malays	Chinese	Indians	Peninsular Malaysia	Malays	Chinese	Indians
0	.031552	.037059	.021254	.031877	.024439	.028006	.015813	.030262	.024439	.028006	.015813	.030262
1	.002511	.003252	.001193	.002559	.002462	.003160	.001114	.002772	.002462	.003160	.001114	.002772
5	.001030	.001288	.000624	.001016	.000850	.001097	.000429	.000863	.000850	.001097	.000429	.000863
10	.000769	.000828	.000647	.000873	.000560	.000667	.000357	.000642	.000560	.000667	.000357	.000642
15	.001135	.001043	.001198	.001369	.000746	.000767	.000516	.001363	.000746	.000767	.000516	.001363
20	.001607	.001500	.001576	.002168	.000993	.001111	.000656	.001492	.000993	.001111	.000656	.001492
25	.001778	.001716	.001685	.002394	.001122	.001306	.000758	.001493	.001122	.001306	.000758	.001493
30	.002094	.002061	.001837	.002909	.001582	.001945	.001045	.001822	.001582	.001945	.001045	.001822
35	.002838	.002642	.002639	.004897	.002126	.002543	.001451	.002538	.002126	.002543	.001451	.002538
40	.004367	.004255	.003670	.007583	.003050	.003476	.002092	.004356	.003050	.003476	.002092	.004356
45	.007137	.006819	.006482	.010402	.004521	.004994	.003429	.005917	.004521	.004994	.003429	.005917
50	.011419	.010608	.010634	.016967	.006965	.007480	.005381	.009691	.006965	.007480	.005381	.009691
55	.018680	.017935	.017303	.024331	.012404	.013588	.009122	.017871	.012404	.013588	.009122	.017871
60	.027446	.026165	.026629	.034283	.018292	.020679	.013591	.027826	.018292	.020679	.013591	.027826
65	.046862	.046568	.044881	.055409	.033134	.040264	.023884	.048354	.033134	.040264	.023884	.048354
70	.060676	.053643	.065493	.069447	.042549	.046390	.036959	.060474	.042549	.046390	.036959	.060474
75	.100964	.081914	.120175	.139050	.082038	.079566	.082893	.097208	.082038	.079566	.082893	.097208
80 + }												

Source: Noor Laily et al. (1983, p. 55).

A comparison of age-specific death rates by sex and ethnic groups ([appendices 1 and 2](#)) sheds more light on the matter. The figures indicate that for all ethnic groups, the most remarkable gains were in the ages 0-5 years for both sexes and in a large portion of those in the reproductive years (15 - 49) for females (Noor Laily et al., 1983: 48). During the period 1977-1979, in virtually all ages of each ethnic group, male mortality was higher than female mortality ([appendix 2](#)), a pattern consistent with improved maternal and ante-natal care and the availability of child health facilities. The establishment of the National Family Planning Programme as a national policy in 1966 to encourage family planning and the spacing of children for better health and welfare of mothers and children also probably made an important contribution. The maternal mortality rate for all three ethnic groups fell sharply during the period 1970-1971. The introduction of the Applied Food and Nutritional Project, which was launched in 1969 together with the Supplementary Feeding Programme for primary school children, contributed to the improvement of the health status of this group. Mothers may also have benefited from not having to care for malnourished and frequently ill children. In contrast to the Malays and Chinese, the risk of mortality among Indian males in the adult age groups increased during the 1977-1979 period. The deteriorating health services in the estates may be partially responsible, because quite a large number of Indians still live on the estates. However, further investigations are necessary to examine whether this may also be due to poor working conditions, since occupational health and safety of workers on estates are factors seldom seriously taken into consideration.

The improvements in the provision of health-care, especially maternal and child health care, are reflected particularly in the declines in the infant mortality rate ([table 1](#)). They are also reflected in the changes in the principal causes of death. In the early 1970s, the principal cause of death in government hospitals was diseases of early infancy (19.3 per cent in 1971). By 1981, heart diseases (17 per cent) became a more important cause of death than diseases of early infancy (13.9 per cent) (Ministry of Health, Annual Report 1981: 283). The changes in infant mortality and its two components, neonatal and post-neonatal mortality,^{7/} contributed greatly towards the reduction in overall mortality levels and, therefore, deserve closer examination.

Infant mortality

During the period 1957-1984, for which vital registration data are available, the infant mortality rate and its two components, the neonatal and post-

^{7/} Neonatal deaths are those that occur within one week of birth while post-neonatal deaths include those occurring between one and four weeks of birth.

neonatal rates, registered substantial declines for all the three ethnic groups (table 4). The median values for the years noted in table 4 show that infant mortality rates fell by 68-76 per cent, neonatal rates by 52-59 per cent and post-neonatal rates by 78-86 per cent. The largest decline in neonatal rates was registered among the Malays, while the declines in post-neonatal rates for Malays and Chinese were similar and substantially larger than those for Indians. For all three ethnic groups, post-neonatal mortality levels fell faster than the neonatal mortality levels; by the early 1980s, the former were 32-65 per cent of the neonatal rates.

These changes affected relative ethnic differentials in neonatal and post-neonatal rates. Relative differentials between the Indians and Malays in both neonatal and post-neonatal rates narrowed considerably, and by the early 1980s the rates for Malays and Indians were at similar levels. The Chinese-Malay differentials were reduced only in respect of neonatal rates. By the

Table 4: Median values of infant, neonatal and post-neonatal mortality rates by ethnic group, Peninsular Malaysia, 1957-1984

	Neonatal			Post-neonatal		
	Malays	Chinese	Indians	Malays	Chinese	Indians
1957-1959	34.6	22.2	30.6	61.0	24.7	40.9
1960-1964	34.3	21.1	30.1	29.0	14.2	23.4
1965-1969	25.8	20.0	28.3	27.5	10.9	24.5
1970-1974	24.2	19.5	26.8	18.8	7.9	18.4
1975-1979	19.8	15.6	21.4	14.6	5.6	15.2
1980-1984	14.2	10.7	13.9	9.2	3.4	9.2
	Infant mortality					
	Malays	Chinese	Indians			
1957-1959	95.6	46.9	71.5			
1960-1964	73.3	35.3	53.5			
1965-1969	53.3	30.9	52.8			
1970-1974	43.0	27.4	45.2			
1975-1979	34.4	21.2	36.6			
1980-1984	23.4	14.1	23.1			

Source: Various issues of Vital Statistics and Report of the Registrar-General on Population, Births, Deaths, Marriages and Adoptions.

late 1970s and early 1980s, the neonatal rates for the Chinese were 75-80 per cent of the rates for Malays and in terms of post-neonatal mortality, the rates for the Chinese remained at about 36-40 per cent of the rates for Malays throughout the period under review. The narrowing of the Malay-Chinese differentials in neonatal and post-neonatal rates was partly a reflection of the slower decline in the rates for the Chinese, which were at relatively low levels.

The discussion of some of the factors associated with the changes in ethnic differentials in neonatal and post-neonatal mortality follows three basic notions. Firstly, the general experience has been that while exogenous changes, such as large-scale public, social and health intervention programmes, contribute to the general decline in mortality levels, differentials will persist if the capacities of families, in particular of poorer groups, to control their own environment, are not improved. Secondly, the factors over which families can exercise some control may usefully be classified into socio-economic factors and proximate factors^{8/} (Mosley and Chen, 1984). The socio-economic factors operate through the more basic proximate factors which, in turn, influence the risk of disease and mortality. Thirdly, differentials in social and economic factors are more closely associated with differentials in post-neonatal than in neonatal mortality. Differentials in post-neonatal mortality, which are closely associated with the risks of infection and malnutrition, are most sensitive to improvements in general health conditions. As infant mortality declines, deaths are increasingly concentrated in the neonatal period, particularly the early weeks of life, because of prematurity, birth injury and congenital malformation. Although improvements in social and economic conditions are also conducive to a reduction in neonatal deaths, those improvements are not sufficient by themselves; obstetric and paediatric care and the provision of institutional facilities through the public health system are also required.

The process of socio-economic development in Malaysia over the last 28 years has resulted in changes in several of the factors mentioned. The development and spread of the rural health service since 1957 was a major factor associated with the sharp decline in the neonatal and post-neonatal mortality rates for Malays. The lower birth-weight and shorter pregnancy intervals among the Indians may also be responsible for the higher neonatal rates for Indians (DaVanzo *et al.*, 1983; DaVanzo and Haaga, 1982). The data on average birth-weights from 1977 to 1984 show that Indian babies weighed, on average, 5-6 per cent less than Malay or Chinese babies (**table 5**). The lower

^{8/} The proximate factors may be grouped into the following categories: (a) maternal factors, (b) environmental contamination, (c) nutrient deficiency, (d) injury and (e) personal illness control.

Table 5: Birth-weight (in kg) by ethnic group, Peninsular Malaysia, 1977-1984

Year	Malays	Chinese	Indians
1977	3.10	3.10	2.90
1978	3.10	3.12	2.93
1979	3.10	3.12	2.93
1980	3.10	3.12	2.93
1981	3.10	3.13	2.93
1982	3.10	3.15	2.94
1983	3.10	3.15	2.94
1984	3.12	3.17	2.97

Source: Vital Statistics, various issues.

average for Indians reflects the higher proportion of Indian births with very low birth-weight (below 2.5 kg). However, it must be pointed out that the results should be treated with caution as only about 57 per cent of births are reported with birth-weight information (Vital Statistics, various issues). Short intervals have been found to be associated with higher neonatal mortality through (a) gestational prematurity, which is related to low birth-weight, or (b) nutritional deficiency of the mother, or (c) competition for the mother's attention of a previous young and surviving infant.

The decline in employment in the agricultural sector during the period 1962-1967, where the majority of rural Indians are employed, could also have affected the neonatal and post-neonatal rates for Indians. It was estimated that some 54,000 workers were displaced from this sector (Second Malaysia Plan, 1971).

Other socio-economic factors are also associated with the decline in infant mortality over the past 28 years. It is not possible to quantify all these factors, but information is available on the distribution of some of them (table 6). These variables are frequently taken as determinants of the level of infant mortality, since they reflect differences in (a) the mothers' choices and skills in health care practices, (b) socio-economic status and condition, and (c) control over the environment.

With the exception of female educational attainment, there are obvious ethnic differences in the other variables. A relatively smaller proportion of

Table 6: Percentage distribution within ethnic group of selected socio-economic variables, 1980, and median household income, 1979: Peninsular Malaysia

	Malays	Chinese	Indians
Per cent of females with secondary and tertiary education	24.1	25.6	24.6
Per cent urban population	25.2	56.1	41.0
Per cent living quarters with:			
• Piped water	56.8	86.0	86.0
• Electricity	57.0	90.5	75.2
• Flush/pour-flush toilets	57.6	64.8	60.6
Median household income (\$M per month)	327	620	521

Source: Unpublished tabulations, 1980 Population and Housing Census; Mid-term Review of Fourth Malaysia Plan, 1984, p. 94.

the Malays live in urban areas and as a result they have limited access to piped water, electricity and proper toilets. Partly as a consequence of this concentration in the rural sector, the median household income^{9/} of Malays is about half that of the Chinese and 40 per cent that of the Indians. The higher socio-economic status of the Chinese may partly explain the relatively lower infant mortality level among the Chinese, but this same explanation cannot be used for the Indians, since, by the 1980s, their infant mortality rates were similar to those of the Malays. This implies that the influence of socio-economic factors on infant mortality differentials may be mediated by more proximate factors, such as differences in behavioural patterns and cultural practices of families, in particular, their choices and skills in health-care practices.

It is clear that mortality patterns and trends in Malaysia generally are related to economic development and improvement in health facilities and are characterized by ethnic differentials. Further evidence for this can be seen in a comparison of perinatal mortality rates^{10/} across States in Peninsular

^{9/} The manner in which income is measured is not stated; it is assumed that income in kind is imputed. As such, these figures do not indicate real differences as a large proportion of the Malays still live in rural areas where the cost of living is low, and non-Malays, particularly the Chinese, live mainly in urban areas.

^{10/} Perinatal mortality is defined according to the World Health Organization (WHO, 1972) as deaths of fetuses or infants weighing 1,000 grams or more, or, where birth-weight is unavailable, the corresponding gestational age (28 weeks), or body length (25 cm crown to heel). In general terms, these are still-births beyond 28 weeks of pregnancy plus first-week neonatal deaths.

Malaysia and in a study of pregnancy wastage (which includes still-births, spontaneous and induced abortions). High mortality levels are found in States with low levels of development. For example, in 1982, high perinatal mortality was found in States with a low physician-population ratio and a high incidence of poverty (table 7). These included States such as Perlis, Pahang, Kedah, Kelantan and Terengganu. These poorer States are more rural in character, with the majority of the population engaged in primary industries, i.e. in agriculture, forestry, mining and quarrying, and fishing. Access to basic services, such as piped water, electricity and flush/pour-flush toilets, is also lower in those States.^{11/}

Pregnancy wastage was found to be highest among Indians (12 per cent) followed by the Chinese (10 per cent) and lastly the Malays (8 per cent) (Tey, 1985). The low Malay rate was largely a result of their low rate of induced abortion (0.6 per cent), compared with the Chinese (3.4 per cent) and Indians (2.7 per cent).

Summary and conclusion

Malaysia has a fairly low mortality level. However, in terms of social indicators, such as the provision of medical personnel and amenities including potable water supply and sanitation, it lags behind some other countries.

Mortality trends indicate a decline for all ethnic groups and in all regions of Malaysia. However, these declines have not been similar for all sub-groups of the population in all periods. For example, before independence in 1957, there were substantial declines in the CDR for the Chinese and Indians but not for the Malays in Peninsular Malaysia. This was largely a result of the lack of medical and health care facilities in the rural areas, where most of the Malays lived. However, a much larger decline in the Malay CDR was achieved in the post-independence period, largely as a result of improved rural health services, and social and economic conditions. The improvement in health status for Sabah and Sarawak started much later than in Peninsular Malaysia; rural health services in these two States showed substantial improvements only after they joined Malaysia in 1963.

The infant mortality rate and its two components, the neonatal and post-neonatal rates, declined substantially for all ethnic groups in Peninsular Malaysia. As a result, absolute ethnic differentials as a whole were greatly reduced, and both absolute and relative Malay-Indian differentials were almost eliminated.

11/ A study by Tey and Noor Laily (1984), using district level data for 1982, showed that socio-economic factors, sanitation, piped water supply, utilization of health facilities and services, and family size were significant in explaining the differentials in mortality level.

Table 7: Selected reproductive and socio-economic indicators by State, 1982 (with rank order in parentheses)

Region	State	Perinatal mortality (per 1,000 births)	Low birth-weight (per cent)	% of live- births with known weights	Registered physicians per 10,000 population*	Incidence of poverty*
Central	Federal Territory	24.7 (5)	9.1 (2)	90	11.5 (1)	14.0 (1)
	Selangor	14.6 (1)	10.4 (3)	53	2.1 (4)	24.2 (2)
	Malacca	20.4 (2)	8.0 (1)	29	2.7 (3)	35.9 (6)
	Negri Sembilan	25.8 (6)	11.0 (7)	90	2.7 (3)	31.4 (4)
South	Johore	21.7 (3)	9.1 (2)	69	2.0 (5)	33.2 (5)
North	Penang	24.5 (4)	9.1 (2)	17	3.6 (2)	30.9 (3)
	Perlis	27.0 (9)	10.6 (4)	64	1.6 (7)	50.0 (9)
	Perak	26.5 (7)	10.6 (4)	74	2.7 (3)	43.1 (8)
	Kedah	28.6 (11)	11.2 (8)	40	1.4 (8)	55.4 (12)
East	Pahang	26.8 (8)	10.7 (5)	47	1.7 (6)	42.6 (7)
	Kelantan	27.7 (10)	10.8 (6)	26	0.9 (10)	50.0 (10)
	Terengganu	29.2 (12)	11.2 (8)	32	1.3 (9)	51.2 (11)
Peninsular Malaysia	24.6	10.0	60	2.6	38.5	

Notes: Perinatal mortality for Federal Territory and Selangor combined = 20.3 per 1,000 births.

% low birth-weight = $\frac{\text{No. of live births (2,500g)}}{\text{No. of live births with known weights}} \times 100$ (i.e. excludes births where birth-weight is not available)

% incidence of poverty - % of households below poverty line

* Mid-term Review of the Fourth Malaysia Plan, 1984.

Perinatal mortality rate: Perinatal deaths per 1,000 births (live births and still-births)

Source: 1982 Vital Statistics.

Several factors contributed to these changes. Among them were the rural health service and the Government's efforts to raise the living standard of the Malays under the New Economic Policy. Although the lower infant mortality of the Chinese can be explained by their advantageous socio-economic position, the same reason cannot explain the lower decline in infant mortality levels of the Indians.

The observed decline in mortality levels in the past 28 years indicates that the quality of life in Malaysia has improved tremendously with socio-economic development. However, much still needs to be done to narrow, if not to eliminate, the existing mortality differentials of different groups in the country. Indeed, the quality of life of the general population can be further enhanced by reducing the high mortality level of disadvantaged groups.

For example, it is clear that the development and the spread of the rural health service since 1957 has contributed substantially to the decline in the mortality levels of Malays, but a further decline can be effected only through the spread of the service to pockets of less accessible families, which currently are not in the mainstream of development. Moreover, it has been noticed that exogenous changes in the control of the environment through large-scale public health intervention programmes alone can succeed only to a certain extent. Mortality differentials tend to persist if the capacities of poorer families to control their own environment are not improved through socio-economic development. However, socio-economic development that improves the socio-economic status of families takes time and is expensive, unless cheaper alternatives are found.

This article has also highlighted the importance of birth-weight data in the study of infant mortality. Currently, the coverage of these data is less than satisfactory and improvements made to their coverage are necessary if they are to be useful for mortality research. The vital registration data in Sabah and Sarawak would also have to be greatly improved in coverage and reliability to be of use for such research.

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