

POPULATION 70 MILLION: A CONSIDERATION OF HEALTH ASPECTS

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SUMMARY

A 70 million population for Malaysia by the year 2010 has been officially targetted for in the Mid-Term Review of the Fourth Malaysia Plan, 1981–1985. In response to this, a preliminary investigation was undertaken into the health aspects of population growth. For this exercise, infant mortality rate was used as the health indicator. From trends seen *vis-a-vis* population growth, it appears that thus far, population growth has not been associated negatively with health (as measured by IMR). In recognition of the relevance of the medical, economic and education factors to health, trends in Malaysia's population ratio, per capita GNP and rates of school enrolment were also drawn; the selection of these as proxies being based on completeness of time-serial records. Although statistical regressions established the high correlation between medical doctors:population ratio and school enrolment rate with IMR, the

limitations in this analysis did not permit any reliable inferences.

In view of the difficulties in projections of trends, a comparison of health and related variables was carried out for several countries with high populations as near to 70 million as were available. The characteristics associated with low mortality and high life expectancy (health indices) were identified as low population growth, high literacy and high per capita GNP; this being stated with explicit qualifications. Other determinants of health were also discussed in brief, and the need for careful planning in the distribution of human and material resources was noted.

INTRODUCTION

*"Recognizing that a large population constitutes an important human resource to create a larger consumer base with increasing purchasing power to generate and support industrial growth through productive exploitation of national resources, Malaysia could, therefore, plan for a larger population which could ultimately reach 70 million."*¹

This reversal in Malaysia's policy comes at a time when an industrialization strategy is being actively promoted in this country and is advocated, in part, to alleviate some of the constraints that a relatively small domestic market

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places on the development of industries. When considering the implications of such a policy, it is necessary to think of the time-frame within which a population of 70 million is expected to be attained. Ludicrously high fertility rates would be involved if it were to happen, say by the turn of the century, unless one expects mass in-migration to make a significant contribution. More realistically, however, the desired population is expected in about 115 years which therefore necessitates a transient period of increased fertility to generate sufficient momentum for growth to proceed to that defined population.

With a well-planned distribution of population and resources and as long as the social, political and economic structures are stable, 70 million could probably be easily absorbed. However, such an ideal remains stubbornly elusive. As far as history and current events depict, trends in population seem inextricably linked to trends in employment, income distribution and social change. For the individual and his community, the demand for basic needs is foremost — food, housing, jobs, education and health care. In addition, such services as garbage collection, post and telecommunications and public transport have become, by modern living standards, necessities as well. Health, being a state of mind as well as of body, is influenced by all these needs; the provision of which is an integral part of socio-economic development.

The relationship between population and economic trends is subject to controversy; whether population affects the economy or *vice-versa*, or the two are merely coincidental is debatable. Weeks² draws upon evidence from specific countries and explains three schools of thought. Briefly, the first is the theory, in line with Malthusian principles, that economic growth cannot be achieved without controlling the population. Since population increases geometrically and food supplies arithmetically, Malthus, in the late 19th century had envisaged teeming millions outstripping the earth's resources. Poverty and misery were prophesized to be inevitable conclusions.

In opposition to this, Marxists contend that population growth does not impede economic growth. Rather, it is the socio-political structure which determines events, and a more egalitarian approach should augur well for the fate of nations. Finally, the pro-natalists view population growth as economically stimulating, specifically for sparsely populated nations. A priori, more people create greater demands and this is claimed to act as a stimulus to innovative thinking, technical advancement and increased productivity. There is also an enlarged potential labour force, an expanded market for consumer goods, possibilities for economies of scale and increased national security. Provided that the available manpower is gainfully employed, the economy could flourish.

Whichever the ideology, there is no doubt that population is closely linked to development variables, of which health is part. In the event of a population increase, it is imperative that the health and related sectors be prepared to accommodate the increase and that the nation's economy allows for this extension. This paper is a preliminary investigation into the health aspects of a 70 million population.

HEALTH STATUS: INDICATORS AND TRENDS

The contemporary (WHO) definition of health is a state of physical, mental and social well-being, and not merely the absence of disease or disability. This holistic approach gives due recognition to various personal, environmental and community factors that have an influence on health and that need to be considered when monitoring levels of health. On account of the multiple and interactive factors involved, as well as the lack of objectivity in individual perceptions of a 'healthy' disposition, a quantitative assessment of health status by any singular yardstick is limited in accuracy.

Conventionally, mortality rates are considered to be indicative of morbidity rates and used as a measure of health status. The advantage is that death, being a final and indisputable event,

circumvents any diagnostic problems and hence inaccurate reporting which disease may be subject to. Registration of deaths is also a routine practice worldwide albeit with inconsistencies in quality of data. On the other hand, shortcomings in the use of mortality as an index of health status include the fact that it measures an end-point in the disease-making process, hence is not really a measure of the health of the surviving population. A high incidence of moderate to severe malnutrition in children, for example, need not necessarily concur with a high mortality rate, but the population is certainly far from having a high standard of health. As an indicator, its sensibility is also dependent on the reliability of documentation. Nevertheless, death rates prove to be very useful as an easily available means of health surveillance in a population.

In this paper, the statistics used as proxies for the state of health in this country are infant, neonatal, toddler and maternal mortality, these groups being the most vulnerable in any population. The data was obtained from publications of the Department of Statistics, Malaysia. Due to insufficient records on the East Malaysian states of Sabah and Sarawak, the situation is described for Peninsular Malaysia.

Fig. 1 shows trends in the various mortalities from 1957–1980. The most dramatic reduction has been for IMR which has fallen from 76 to 25 per 1000 live-births. Significant control over infant deaths has been achieved by effective treatment and prophylaxis of diseases such as malaria, smallpox, tuberculosis, whooping cough and diarrhoeal diseases. The improvement in other mortalities have been more gradual.

Generally, in developing countries, considerable declines in mortality, achieved particularly around the middle of this century, have been attributed not only to medical technology but to economic development and social transitions as well.³ The influence each of these has in the control of diseases has been variable depending on the

disease aetiology itself and its responsiveness either to medical intervention, public health measures or improvements in living standards or lifestyles.

Viewed against trends in population* (Fig. 2), the increase in population size, has so far not been negatively associated with improvements in health status. It is important to stress however, that this is true in as far as morbidity can be broadly correlated with mortality.

HEALTH DETERMINANTS

It was earlier stated that the bulk of mortality decline in the third world was contributed by medical technology and socio-economic progress. More specifically, availability of health care, efficacy of public health measures, education in general and health education in particular and nutritional adequacy each has a role in determining health status. Needless to say, for the individual, having the means to procure the requisites, be it cash or non-cash based, is critically important. For similar reasons, the economy of a country also has crucial relevance. It supports, among others, the capital intensive health and education sectors, sewerage and sanitary water systems and to a certain extent, food supply and distribution. On the relationship between education and mortality, Miro and Potter³ quote Preston⁴:

“Indeed, the slope of the relation between mortality and education within countries is generally so steep (especially at lower levels of development and life expectancies) that expenditures on education would at first sight, appear to be an effective way to reduce mortality”.

Generally speaking, one would expect the role of education to be one of instilling an awareness and understanding of health problems and their causes, instituting changes in behaviours particularly in personal hygiene and environmental

*Population censuses are carried out every 10 years and estimates are calculated for intercensal years from compound average annual growth rates, thus linearizing the growth curve.

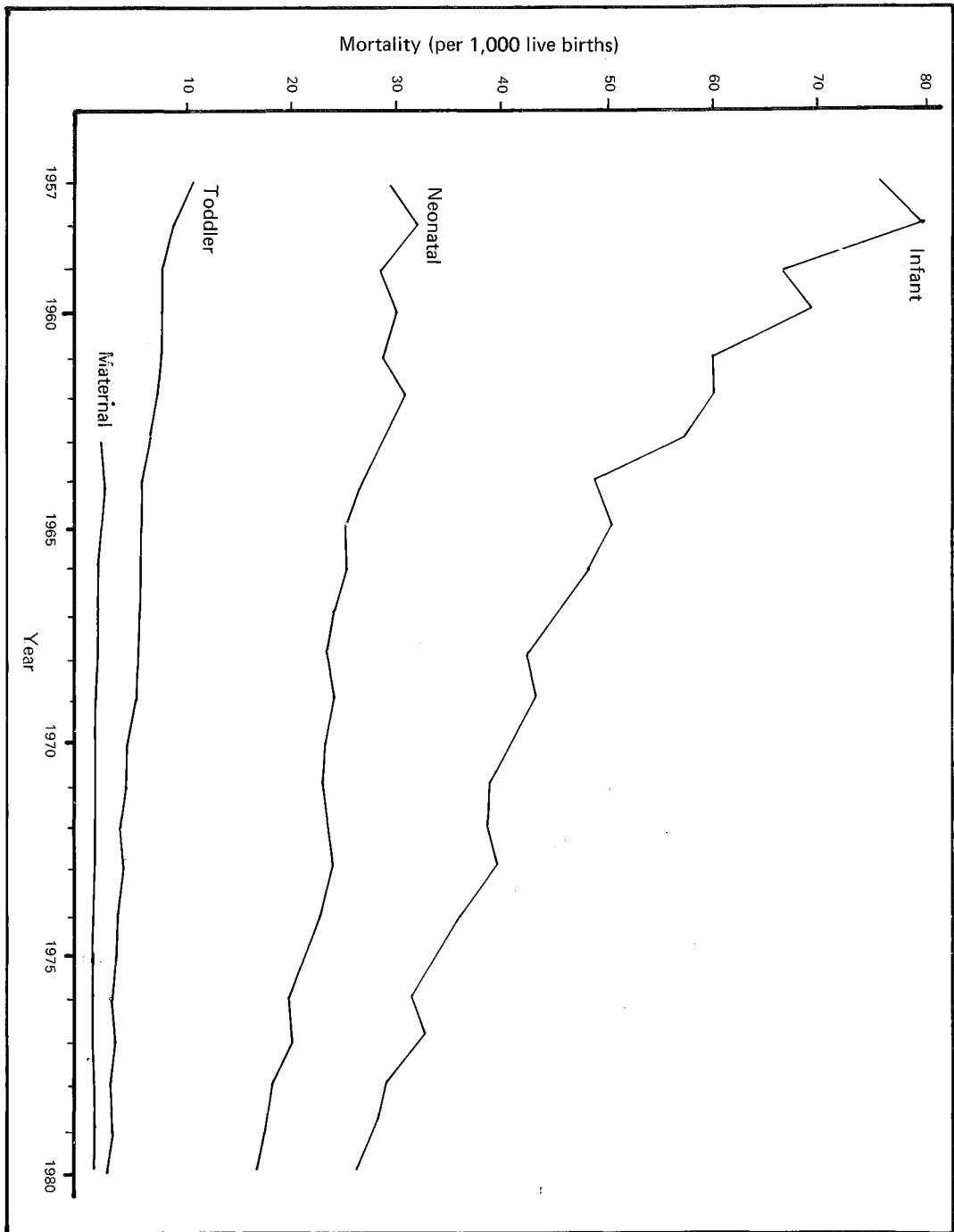


Fig. 1 Mortality trends in West Malaysia (1957 - 1980).

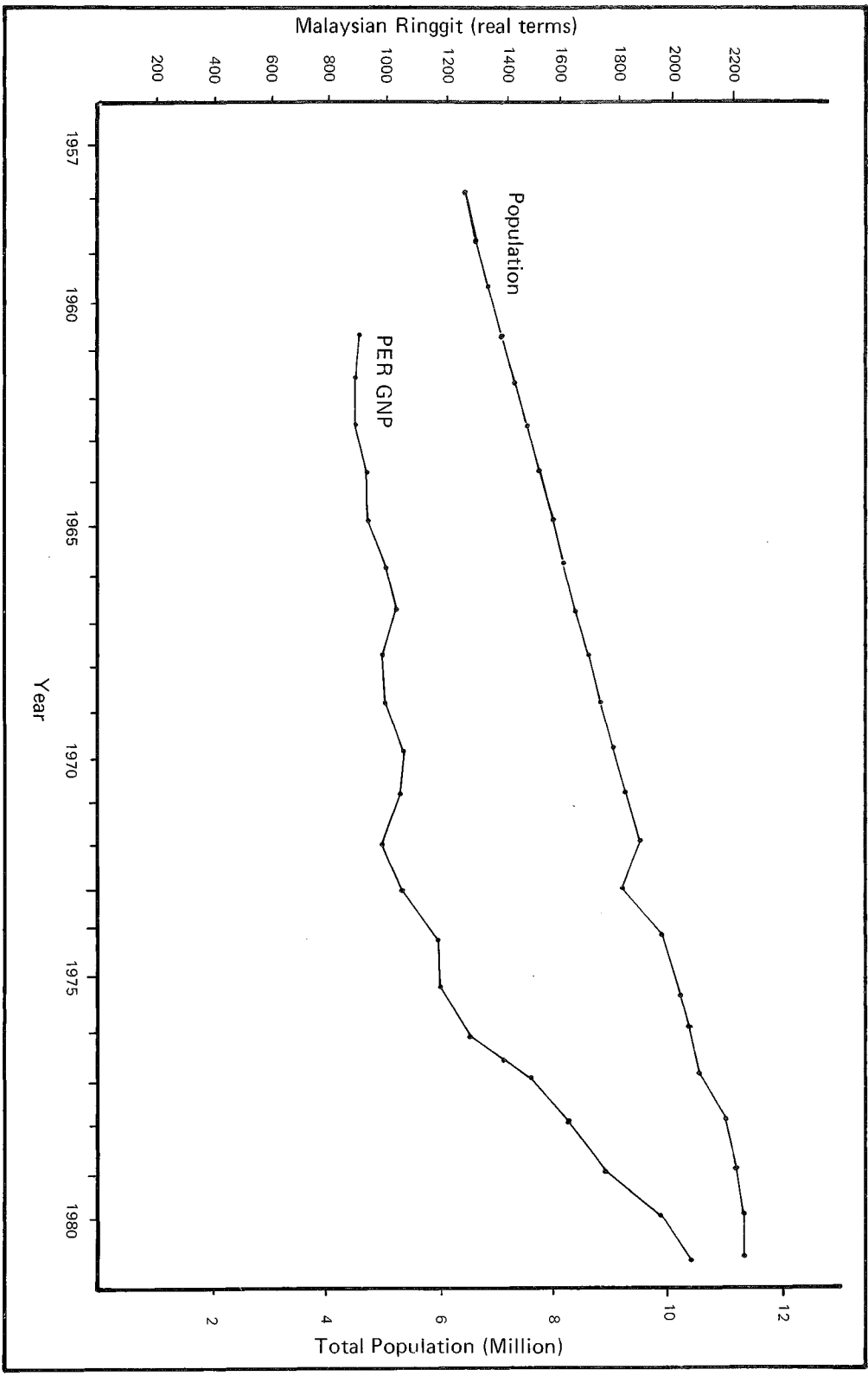


Fig. 2 Trends in population and Per capita GNP in Peninsular Malaysia (1957 - 1980).

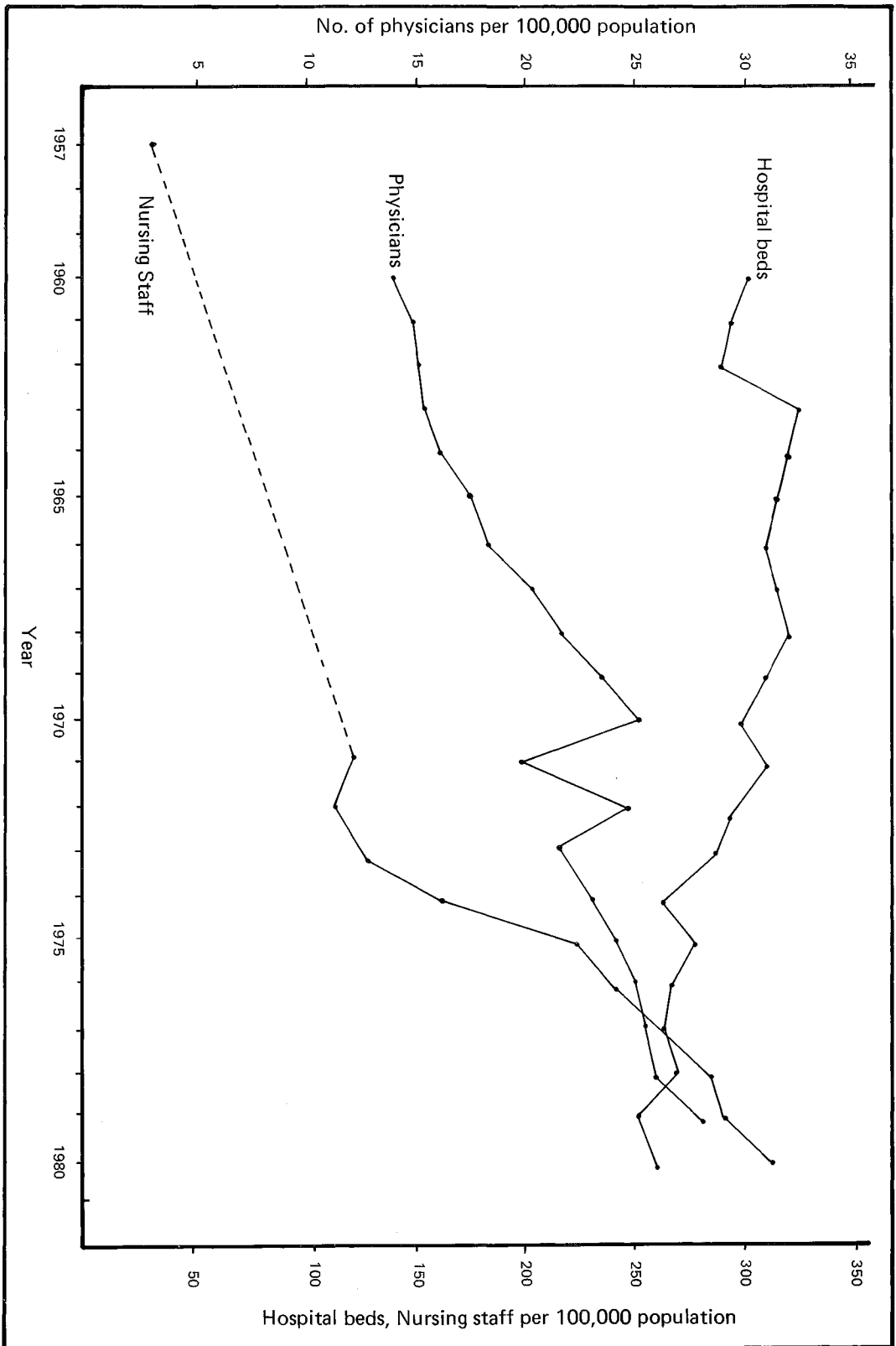


Fig. 3 Health services in Peninsular Malaysia: physicians, nursing staff and hospital beds per 1,000,000 population (1957 – 1980).

cleanliness and modifying attitudes towards acceptance of modern medicine, both therapeutic and preventive.

In line with this rationale, trends in selected socio-economic variables are also illustrated. Data selected to represent the education and income variables were % population (five to 19 years) enrolled in school (%PES) and per capita GNP (real terms), respectively. The availability of health care was represented by ratios of medical doctors: population, nursing staff: population, and government hospital beds: population. The period covered was 1960–1980. Others that could also have been looked at in the same context were household income, female literacy, and coverage of household piped water supply. However, the available data was insufficient. Fig. 2 shows that growth in the economy has undergone two phases; a slow incline in the sixties followed by a sharper one thereafter. This favourable trend has coincided with declines in mortality within the period specified, i.e., economic progress has not been negatively associated with health nor with increases in population.

In the past two decades, improvements have also been made in the health services. The physician-to-patient and nurse-to-patient ratios have risen fairly rapidly, more so in the latter (Fig. 3). Data for registered medical personnel, however, excludes the traditional healers, i.e., the Chinese *sinsehs*, Malay *bomohs* and Indian *ayurvedic* healers. These unorthodox medicine men and women still play an important role in health care in Malaysia as well as in neighbouring countries. If they were included in the statistics, the service ratio would improve considerably. In the case of hospital beds, supply has decreased since the late sixties period. Although contributions from the private sector were not included, this does seem to indicate a failure on the part of the government health service to keep up with population growth.

Finally, in the field of education, rates of school enrolment have increased since 1957

amongst the population of school-going age (five to 19 years) (Fig. 4). Correspondingly, literacy rates have also increased. Education has long been recognised as an entry-point in poverty eradication and social progress and to this end, a heavy portion of public expenditure is allocated each year. The trends depicted quantify the efforts in this sector.

STATISTICAL CORRELATIONS

Having related certain socio-economic variables to health, a regression analysis was undertaken to test the relationship between IMR (infant mortality used as proxy for health status) and those variables in the local context. Multiple regression is a general statistical technique which analyses the relationship between a dependent or criterion variable, in this case, IMR, and a set of independent or predictor variables. The predictor variables selected were medical doctors: population ratio, % school enrolment and per capita GNP, to represent respectively the health services, education and economy. Although others could have been included, the analysis was confined to the three variables described primarily for want of sufficient data.

The analysis showed a very high correlation between IMR and medical doctors population ratio and % school enrolment ($R^2 = 0.94$). Furthermore, it showed that the influence of the income variable (per capita GNP) could be fully accounted for by school enrolment alone. The results of the regression analyses were tabulated in Table I.

It might be inferred, *prima facie*, that improving the health service ratio and school enrolment rate ensures a low IMR. However, this regression model merely describes statistical association between sets of data which do not imply cause and effect relationships. A more sophisticated path analysis is required for that. Also the analysis was by no means an exhaustive one, as only three variables were computed. Thus, as the influence of GNP could be explained by school enrolment, likewise, the latter, and

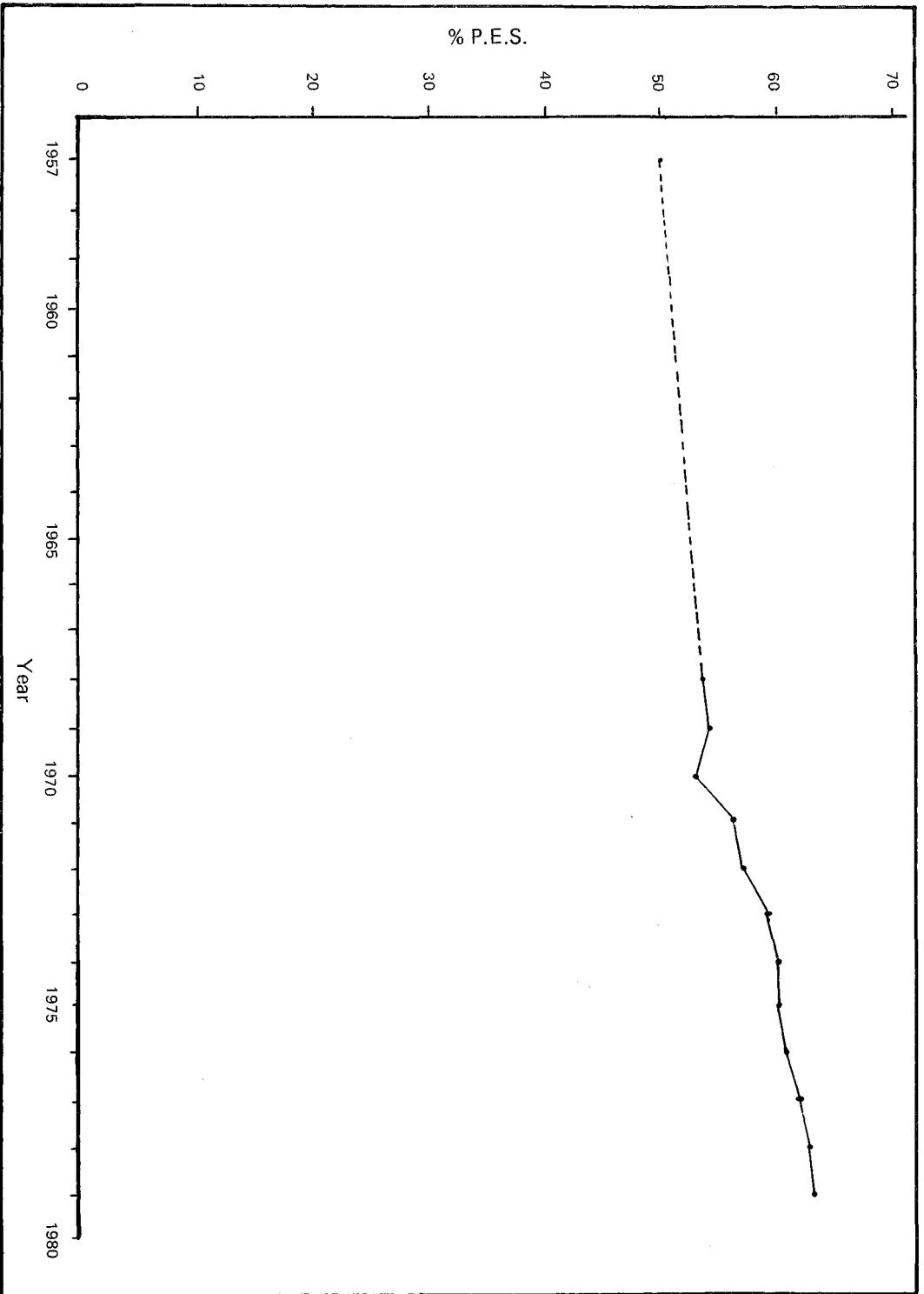


Fig. 4 Percentage of population (5-19 years) enrolled in primary and secondary schools in Peninsular Malaysia (1957-1980).

TABLE I
REGRESSIONS ON THE LINEAR DEPENDENCE OF LOG IMR: INDEPENDENT VARIABLES

Constant	Log Per Capita GNP	Log MD: Population	Log % P.E.S.	R ²	F-Test	Degrees of Freedom
4.48446	- 0.94*			0.83	89.9**	19
3.16307		- 1.18*		0.86	121.3**	19
7.151118			- 3.18*	0.89	138.9**	19
3.96026	- 0.46*	- 0.72*		0.93	105.5**	18
7.18751	- 0.00		- 3.2*	0.89	66.1**	17
5.59876		- 0.55*	- 1.87*	0.94	138.4**	17
5.59864	+ 0.00	- 0.55*	- 1.87*	0.94	86.9**	16

* - Sig. at 1%; ** - Sig. at F. 99.

Variable	Mean
IMR per 1000	= 43.18
Per capita GNP M\$	= 1,158.30
MD Population ratio	= 21.11
% P.E.S.	= 55.32

also medical doctors: population ratio may be mediated by some other factor or factors. In addition, it has been pointed out that whilst IMR is used as the dependent variable in this model, it could also be cast as an independent variable for percentage school enrolment, i.e., rates of school enrolment may vary according to IMR which may affect the number of persons surviving to school-going age.

Without reviewing in great detail the limitations of statistical analyses, suffice to just reiterate the main points. The regressions undertaken denote the close association between medical doctors to patient ratio and percentage school enrolment with IMR within the specified time period and without any further information on the nature of the relationships. That it has little value in predicting health outcome or in policy or program planning goes without saying. Firstly IMR has certain handicaps as a health indicator and secondly, the crux of the problem, which is increase in population, does not enter into this analysis at all.

CROSS-COUNTRY COMPARISONS

Given the formidable task of attempting a prediction on health outcome at population

70 million, one way of approaching the problem is by looking at situations where the population is currently thereabouts. For this exercise, a number of countries were selected from a listing, on various vital statistics, of 124 countries compiled by the World Bank.⁵ They were categorised into five groups according to per capita GNP (Table II).

It was decided that two countries would be selected from each category based on a population as near to 70 million as was found possible. The possibilities were, in fact, quite limited by imposing this criterion; no countries from the last two groups qualified and in the low-income and industrial market group, the closest figures available were, perforce, rather far off the mark

TABLE II
CATEGORISATION ACCORDING TO PER CAPITA GNP

Categories	Average per capita GNP (1979) US \$
Low-income countries	230
Middle-income	1420
Industrial market economies	9440
Capital surplus oil exporters	5470
Non-market industrial economies	4230

(see Table III). Exceptional consideration was given to the middle-income category to which Malaysia belongs. Here only one other country was selected which was Mexico. Her population of 65.6 million was the nearest to the stipulated 70 million amongst all the selections.

Various statistics from the selected countries that were relevant to health were next compared. Data compiled by a single source⁵ was used for better comparability. Even so, this element is uncertain due to discrepancies in definitions of terms and registration procedures between countries. Mortality data, for example, are at risk of under enumeration in developing countries and particularly so in destitute areas where rates are very high. In fact, for the data presented in

Table IV, the ratios of physician and nurses to population have been specified as not comparable cross-country. The general objective was to try and identify features associated with a high standard of health. Here again, the problem of an adequate index looms large and, as before, there is little alternative to infant mortality as the most sensitive measure.

Basic and health indicators are listed in Tables III and IV. From the tables, it is apparent that certain relevant features can be associated with low infant and toddler mortalities and life expectancy at birth, these being accepted indices of health status. These are: low population growth rates, crude birth rates and fertility; high literacy rates; high per capita GNP.

TABLE III
DEVELOPMENT INDICATORS OF SELECTED COUNTRIES (1979)

Basic indicators	Industrial market economies		Middle income		Low income	
	Japan	Germany Fed. Rep.	Mexico	Malaysia	Pakistan	Bangladesh
Total population (M) mid 1979	115.7	61.2	65.5	13.1	79.7	88.9
Average annual growth % (1970-1979)	1.1	0.1	2.9	2.2	3.1	3.0
Urbanization % (1980)						
$\frac{\text{Urban population} \times}{\text{Total population}}$	78.0	85	67	29	28	11
Average annual growth rate % (1970-1980)	1.1	0.4	4.2	3.1	4.3	6.8
Per Capita GNP US \$ (1979)	8,810.0	11,730.0	1,640	1,370	260	90
Average annual growth % (1960-1979)	—	3.3	2.7	4.0	2.9	-0.1
Adult literacy rate %	99	99	82	60	24	26
Crude birth rate (per 1000 population)						
1960	18	17	45	39	48	49
1979	15	10	36	28	44	44
Crude death rate (per 1000 population)						
1960	8	11	12	9	23	23
1979	7	12	7	6	14	16
Total fertility rate (1979)	1.8	1.5	5.0	3.8	6.5	5.7

Source: *World Development Report 1980* (Supplement on World Indicators).

TABLE IV
DEVELOPMENT INDICATORS OF SELECTED COUNTRIES (1979)

Health variables	Industrial market economies		Middle income		Low income	
	Japan	Germany Fed. Rep.	Mexico	Malaysia	Pakistan	Bangladesh
Life expectancy at birth 1979	76	73	66	68	52	49
Infant mortality rate (per 1000 live births) 1978	9	16	60	32	n.a	130
Toddler mortality (1-4) (per 1000 children (1-4) 1979)	1	1	5	2	15	19
Population per physician* 1977	850	490	1,820	8,730	3,760	8,780
Population per nursing person* 1977	290	260	1,400	1,290	9,980	56,880
Percentage of population with access to safe H ₂ O (including untreated but uncontaminated H ₂ O e.g. springs, boreholes, sanitary wells) 1975	—	—	62	62	29	53
Daily per capita calorie supply 1977	2,949	3,381	2,654	2,610	2,281	2,100
As percentage of requirement 1977	126	127	114	117	99	91

* Not comparable cross-country. Source: *World Development Report 1980*.

It is fitting to digress at this point for a brief note on GNP. The weaknesses of GNP as a reliable predictor for social development indicators like IMR has been emphasized.⁶⁻⁸ Very rich countries like Saudi Arabia and Libya, for example, have very high infant mortalities. In fact, the statistics for Saudi Arabia approximates that of Bangladesh at a GNP 90 times greater, one of the highest in the world. On the other hand, there are striking examples like Cuba, a middle-income nation, which has achieved a dramatic improvement from 70 per 1000 in 1960 to 19 in 1981. The effort in Sri Lanka is also worthy of comment; despite being considered a low income country, IMR has decreased by about 40% in the past two decades. A UNICEF publication illustrates the diversity in national incomes for each of four groups of countries categorised according to IMR, ranging from 'very high' over 100 per 1000 live-births to 'low' (less than 25).⁹ Thus it is less a matter of GNP per se, but

of policies and priorities appropriated to social development.

Returning now to the findings from the cross-country study. Although the listed characteristics featured consistently with favourable health indices, several qualifications need to be made. Firstly, the sampling was based purely on the basis of population size which excluded two categories of countries; the capital surplus oil exporters and non-market industrial countries. Secondly, by this non-random technique, the question of representatives was simply overlooked.

Be that as it may, it seems within reason to ascribe two events as being negative to health prospects, or at least, not ameliorative in consequence. These are high growth rates and low literacy in the population. Presuming the accuracy of this generalization, it would be useful

to be able to identify the cut-off points where these rates can offset efforts to improve health.

Although technically uninspiring, this section displays some of the options which may be a reality for Malaysia, if and when her population grows to such extents. Notwithstanding the inconsistency in the relationship between GNP and mortality, one prospective situation may be that of Mexico – if the economy grows *para passu* with population such that income per capita is more or less maintained at the same level, hence mimicking Mexico, might mortality figures also echo the appalling levels?

DISCUSSION

The health consequences of a 70 million population would depend on a variety of

factors. The demographic features, age and sex structures and geographic distribution determine health needs to some extent. Developmental factors such as labour utilisation, new technology, national priorities and levels of international assistance have influence as well (Fig. 5). In meeting the increased demand for health services, government policies may be targetted either towards maintaining current levels or towards desired levels, e.g. aspiring to the standards in developed nations. Budget allocations to the health sector and the relative importance given to its various components, i.e., preventive, curative, research and training, and its organisation are fundamental to how well the health services cope with population increase. Government policies and goals in other areas, like food production and prices, housing, education, employment and wages are also pertinent to health status.

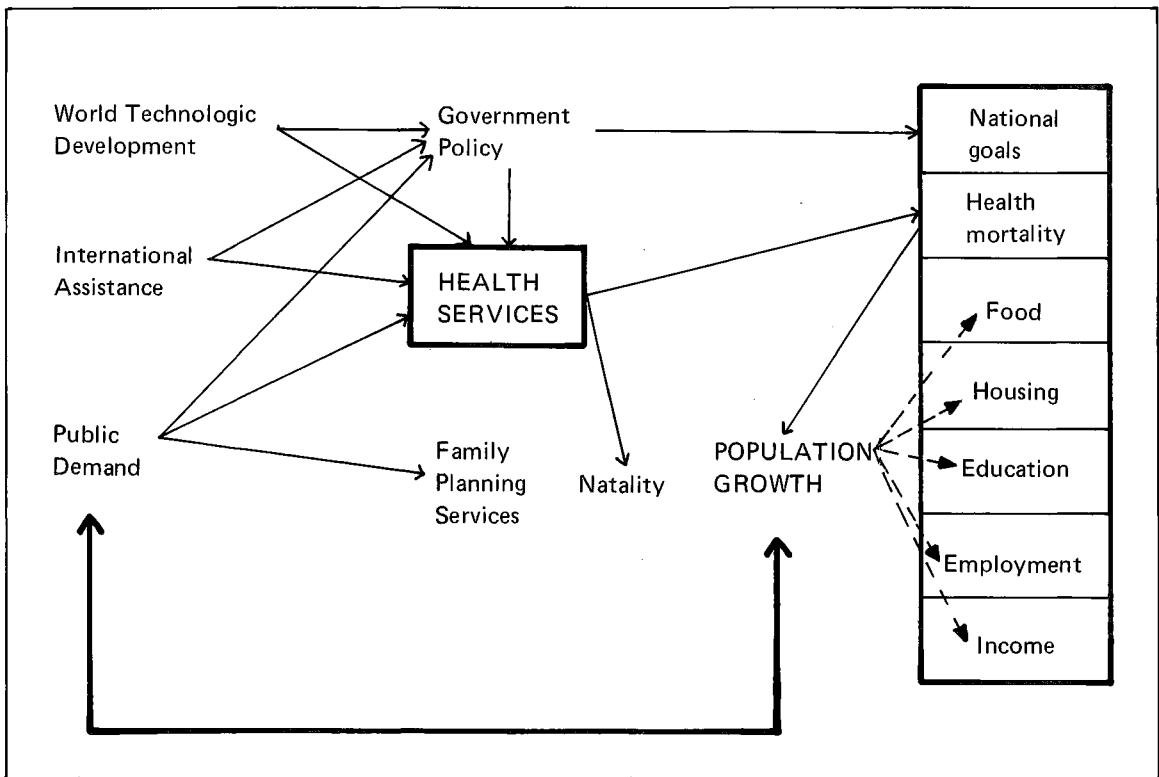


Fig. 5 Relationship between population growth and health services (Corsa and Oakley).¹⁰

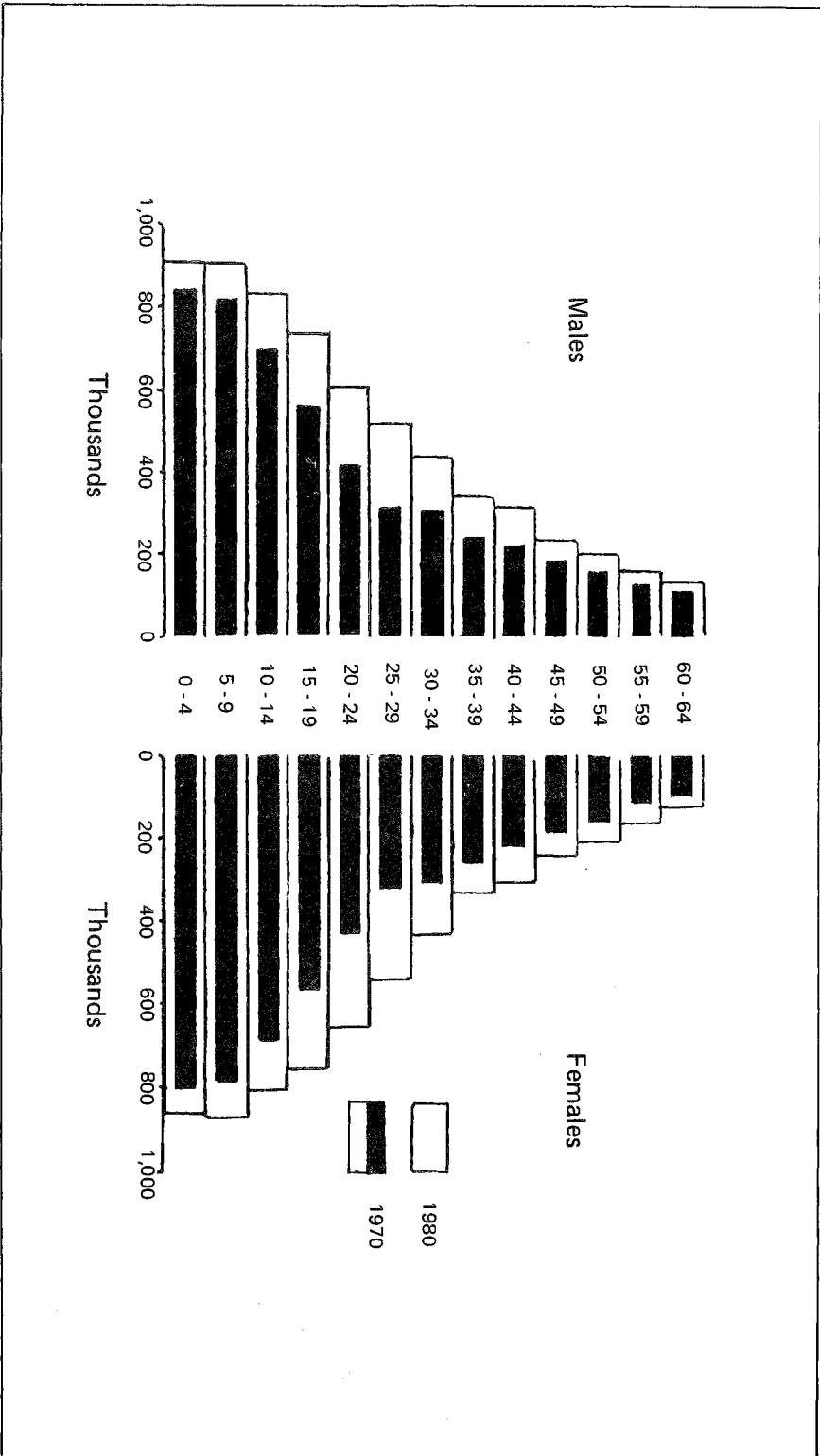
In terms of demography, two different patterns will emerge depending on whether growth occurs largely by increased fertility or if mass in-migration makes a sizeable contribution. Areas of high fertility will show a skewed age-distribution pattern, biased towards the under-15 age groups. The age distribution of Malaysia's population reflects this and is representative of the situation in most developing nations (Fig. 6). In 1970, the under-15 group constituted 45% of the population and the working age group 41%. In 1980, these shifted to 39% and 46%, respectively indicating a lowered fertility level. The proportion of the population over 60 years has increased only slightly in that time, illustrating a trend towards the pattern of the developed countries, which is characteristically diamond-shaped. Each of these shifts in the population structure will have an impact on demands from the health sector. Health planners have to consider the differential rate of requirement or utilisation of personal health services over an individual's life-span.¹⁰ Precedence may need to be given to maternal and child health care or to the elderly, particularly those who live alone or in institutions.

Another implication of a prominently young population is that more resources will have to be diverted to supporting this dependent age group. The International Planned Parenthood Federation¹¹ estimates the proportion of GNP required to feed, clothe, house, educate and care for the very young and the old as four times the population growth rate. So, the higher this growth, the greater will be the percentage of GNP needed to absorb the nation's dependents and correspondingly, the less there will be for other investments and development purposes.

On the other hand, mass in-migration which involves mainly people in the 15–35 year group, will push up the productive segment of the population. International migration flows consist largely of manpower exchanges between countries in response to labour shortages or employment opportunities, the underlying motivation being economic gain. At present, Malaysia is experiencing an influx of cheap labour from

Indonesia and the Philippines coupled with an outflow of highly skilled personnel to higher income countries like Singapore and the Middle-East. These movements will impinge on the population structure as well as the social and economic set-ups. Highly qualified emigrants are usually over 40's who take their families with them whereas immigrants tend to be younger (20–35 years), and hence, in their most fertile period. In his study, Mehmet¹² highlights the loss in expensive educational investment in the 'brain-drain' which is not redressed by the incoming migrants who, in contrast, are low-skilled and poorly educated. Their willingness to accept low wages also impede attempts to eradicate poverty. And, as ill-health is a manifestation of poverty, health problems are compounded. Furthermore, migrants from a common background tend to cluster together which alienates them from the host society and distances them from available health resources.

While the influx of Third World migrants are now creating problems for some developed countries, e.g., the USA, West Germany and Sweden, developing nations are becoming burdened with internal migration, particularly rural-urban movements. In the cities, the arrival of young and nubile people speeds up urban growth rates significantly. Pollution, jostling crowds and nerve-racking traffic are painstakingly tolerated on account of the many advantages urban living has to offer; the employment and business opportunities, available modern facilities, public services, easier access to medical care, availability and variety of foodstuffs and last but not least, the 'bright lights'. In the rural areas, the comparatively backward conditions and dearth of economic incentives serve as 'push factors' for the people. The rural exodus is thus quite understandable. It is estimated that about 60% of urban growth is attributable to natural increase.¹³ In this country, the acceleration of rural-urban migration coincides with specific events in her history, namely colonial rule, post-war emergency and finally, the post independence era.¹⁴ Current annual urban growth rate is 4.5%.¹



Source: Annual Statistics Bulletin, 1980

Fig. 6 Population distribution by age, group and sex: Malaysia (1970, 1980).

The literature on the relationships between population growth, migration and development is extensive but yields no hard and fast rules.¹⁵ While some defend the economic benefits, others contend that the costs far outweigh the gains. Admittedly, developed nations are highly urbanised but the examples of Lagos, Mexico City and Jakarta lend strong support to the counter argument. Apparently relationships are peculiar to each place, the time and the conditions.

In the Federal Territory, amidst the seemingly random scatter of impressive tower blocks and array of modern housing schemes, lie 144 squatter settlements where some 249,584 people make their homes.¹⁶ Typically, a squatter settlement consists of wooden self-constructed houses with communal public stand-pipes. Services such as garbage disposal and sewerage are rare, but supply of electricity quite common. The unhealthy environment is conducive to the rapid spread of diseases but fortunately, no serious outbreak has yet been documented. The importance of the environment is shown in the improved health found amongst re-housed squatters in Kuala Lumpur as reflected by their utilization of health services.¹⁷ Rapid urbanisation thus introduces two separate issues — the inadequacy of urban resources and the under-utilization of rural ones. Congested urban areas will foster problems associated with overcrowding and lack of basic amenities, which are magnified in squatter and slum areas. Greater interpersonal contact or human interaction is likely to increase risk of disease infection.

The deterioration of health may also manifest indirectly through stress, either physical or mental. Malnutrition undermines the body's capacity to fight infections^{18,19} to the extent that certain diseases are fatal only in the malnourished child. Similarly, psychological well-being is included in the definition of health. Cassel,²⁰ reviewing evidence regarding the health consequences of population density and crowding, concludes "*..... increased population density increases the importance of the social environment as a determinant of physiological response to various*

stimuli, including disease-producing agents; that within this social environment, the quality of social interactions and position within the group seem to be important factors; and that given time, adaptation to these social changes can and does occur, but the newcomers to the situation will always be the segment of the population at risk".

This phenomenon of biological and social adjustment or adaptation to environmental changes will modify health status.

In this paper, national averages of IMR were used as an index of health status. The data showed that, by this assessment, health has improved for the nation as a whole and that this was highly correlated with school enrolment and the health service ratios. However, average or mean values obscure important differentials by ethnicity or community,²¹ and by area, which may be considerable and warrant special attention. Table V shows that although mortality from diseases of early infancy still ranks high, its contribution to the total number of deaths in the past decade has fallen. At the same time, while certain causes of death, namely communicable diseases like gastroenteritis and TB have been controlled, others have taken their places. More people now die from circulatory diseases, i.e., diseases of affluence. Thus based only on declining IMR, an inference of better health may be spurious. Another limitation of using IMR, is that it gives little indication of the health of the survivors. Several studies have revealed that under nutrition, especially Protein-Energy and Iron-deficiency anaemia, and helminthic gut infestations are still common amongst the rural and urban poor.²²⁻²⁶ Although not fatal, these debilitating ailments retard the physical and mental development of underprivileged children, very often sealing the cycle of poverty.

CONCLUSION

In the preceding paragraphs, some aspects of health were discussed in the context of a large population. Linear regressions on West Malaysian

TABLE V
10 MAJOR CAUSES OF DEATH IN GOVERNMENT HOSPITALS IN PENINSULAR MALAYSIA
BY RANK ORDER % PERCENTAGE (1970, 1977 AND 1980)

Causes	1970		1977		1980	
	Rank	(%)	Rank	(%)	Rank	(%)
Accidents	3	(8.06)	3	(11.36)	3	(13.14)
Gastroenteritis	8	(4.06)	8	(2.71)	8	(1.87)
Complication of pregnancy	9	(1.47)	10	(0.66)	—	
Heart disease	1	(13.94)	2	(15.68)	1	(16.44)
Disease of early infancy	2	(18.86)	1	(18.65)	2	(14.90)
Cardiovascular diseases	6	(16.71)	4	(7.69)	4	(7.93)
Neoplasms	4	(7.21)	5	(7.07)	5	(7.78)
Pneumonia	5	(6.55)	6	(5.17)	6	(4.05)
Tuberculosis	7	(5.88)	7	(3.16)	7	(3.12)
Diseases of the liver	—		9	(2.12)	—	

Source: Facts and Figures, *Malaysia National Population and Family Development Programme*, 1982.

trends showed a very high correlation between % school enrolment and medical doctors: population ratio with IMR for the period 1957–1980. However, the analysis merely examined degrees of collinearity and did not consider any path analytical models i.e., causal relationships, between the variables. Furthermore, only three variables were involved rendering the correlation exercise rather limited in scope. Therefore, the results do not lend themselves to any policy-making inferences.

Selected cross-country comparisons showed, first and foremost, that the real issue is not the size of the population but its pace of growth and the social and economic climate at the time. Three common characteristics were identified in countries with low mortality and high life expectancy. These were low fertility rates (and low rates of population growth), high literacy rates and high per capita GNP. The last of these is included with great reservations in view of the strong arguments against GNP as a predictor for social development.

It is not possible to accurately project the rates of infant mortality or any other measure of health from the methods used in this study. The

statistical correlations, drawn from past trends, cannot be extrapolated and the value of the cross-country comparisons is limited by the fact that it would be too presumptuous to consider the fate of nations as running the same course, even though history has been known to repeat itself.

Difficulties in forecasting due to limitations in techniques are exacerbated by the unpredictable spontaneity of population behaviour. In addition, nothing can be foretold of medical and technological breakthroughs which may alter the demography of a country considerably. The health system, for one, may be much more efficient in its delivery *via*, perhaps, computerized diagnosis or the transfer of simplified therapeutic techniques to the layman. This dispenses with the need for personal attention from overburdened physicians. Unforeseeable events such as these make attempts at predictions highly vulnerable to error.

In effect, this paper gives an overview of the issue in question. More importantly, by selecting IMR as the indicator for health status and by using average values, it neglects morbidity patterns and differentials between areas, communities or

social strata. It is these inequities in distribution, precipitated or compounded by rapid population growth, which will be the source of serious social and medical problems, as exemplified in many countries today. Another negative aspect of population growth is rapid urbanisation. This rising and uncontrollable trend needs extensively researched policy and programs in socio-economic development planning.

Finally, it may be added that the future also depends on political stability and global events or policies that affect the nation.

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REFERENCES

- 1 *Mid-Term Review of the Fourth Malaysia Plan 1981-1985*: 21-59.
- 2 Weeks J R. Demographic perspectives. In: *Population - an introduction to concepts and issues*. California: Wadsworth, 1978.
- 3 Miro C A, Potter J E. Population policy: research priorities in the developing world. *Report of the International Review Group of Social Science Research in Population and Development*. London: Frances Pinter, 1980.
- 4 Preston S H. Mortality, morbidity and development. Paper presented at the *Seminar on Population and Development in the ECWA Region*, 20 September, 1978.
- 5 *World Bank Development Report*. Annexe on World Indicators. World Bank, 1980.
- 6 Morawetz D. *25 years of Economic Development, 1950-1975*. World Bank, 1977.
- 7 Morris M D. *Measuring the condition of the world's poor. The physical qualities of life index*. Pergamon Policy Studies. Pergamon Press, 1979.
- 8 Hickee -, Streeten - Indicators of development: the need for a basic needs yardstick. *World Development I*, 1979.
- 9 UNICEF. The state of the world's children 1984. *Ideas Forum*, Issue No. 15, 1983/84.
- 10 Corsa L, Oakley D. Consequences of population growth for health services in less developed countries - an initial approach. In *Rapid Population Growth: Consequences and Policy Implications, Vol. II*. Pub for National Academy of Sciences: John Hopkins Press, 1971.
- 11 IPPF. *Population*. International Planned Parenthood Federation, 1973.
- 12 Mehmet O. Inter-regional labour migration, poverty and income distribution: the case of Peninsular Malaysia. Paper presented at a *Seminar on Current Population Policy and Research in Malaysia*. Population Studies Unit, Faculty of Economics and Administration, University of Malaya, Dec. 1983.
- 13 Davis K. World urbanisation, 1950-1970, vol. II. *Analysis of trends, relationships and development*. Population Monograph Series No. 9, Berkeley University of California, 1972.
- 14 Kok K L. *Levels, trends and patterns of urbanisation*. Discussion Paper No. 2. Population Studies Unit, Faculty of Economics and Administration, University of Malaya, 1981.
- 15 Kols A, Lewison D. Migration, population growth and development. *Population Reports*. Special Topics, Series M, No. 7, 1983.
- 16 Kassim A. *A history of squatting in West Malaysia with special reference to the Malays in Kuala Lumpur*. Dept of Anthropology and Sociology, University of Malaya, 1981.

- 17 Meade M S, Wegelin E A. Some aspects of the health environment of squatters and rehabilitated squatters in Kuala Lumpur, Malaysia. *The Journal of Tropical Geography* 1975; 41: 45-59.
- 18 Scrimshaw N S, Taylor C E, Gordon J E. *Interactions of Nutrition and Infection*. WHO Monograph Series No. 57, WHO, Geneva.
- 19 Chandra R K. Nutrition as a critical determinant in susceptibility to infection. *World Review of Nutrition and Dietetics* 1976; 25: 166-188.
- 20 Cassel J. Health consequences of population density and crowding. In *Rapid Population Growth: Consequences and Policy Implications Vol II*. Published for National Academy of Sciences, California: Wadsworth, 1971.
- 21 Abu Bakar N, Takashita Y J, Majumdar P K, Tan B A. The changing ethnic patterns of mortality in Malaysia, 1957-1979. *National Family Planning Board*. Research Paper No. 6, 1983.
- 22 Chong Y H. Aspects of ecology of food and nutrition in Peninsular Malaysia. *Environmental Child Health*, Monograph No. 47, October 1976; 237-256.
- 23 Chen S T. Prevalence of protein-calorie malnutrition in a group of Malaysian school-children. *Med J Mal* 1977; 31(4): 266-269.
- 24 George R, Foo L K, Chong Y H, Abraham S C E. Severe protein-calorie malnutrition in Kuala Lumpur. *Journal of Tropical Paediatrics* 1981; 27: 250-262.
- 25 Kan S P. Soil-transmitted helminthiasis in Selangor, Malaysia. *Med J Mal* 1982; 37(2): 180-190.
- 26 Bisseru B, Aziz A. Intestinal parasites, eosinophilia haemoglobin and gamma-globulin of Malays, Chinese and Indian school-children. *Med J Mal* 1970; 25: 29-33.