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Trends and dietary implications of some chronic non-communicable diseases in peninsular Malaysia

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Non-communicable diseases with dietary implications, ischaemic heart disease, diabetes mellitus and cancers of the breast and colon are discussed in relation to their prevalence and mortality rates in peninsular Malaysia during the past few decades. The mortality rate due to diseases of the circulatory system has more than doubled since 1970, deaths due to ischaemic heart disease being the major cause. The prevalence of diabetes mellitus has risen from 0.65% in 1960 to about 4% currently. The mortality risk for both ischaemic heart disease and diabetes is highest in the Indian compared to Malay and Chinese populations. The Chinese show the highest mortality rate for cancers of the breast and colon. This could reflect, partly, because more people especially in the urban areas are seeking treatment and improved diagnosis. Empirical dietary data indicate an increase in the prevalence of hypercholesterolaemia among urban adults and overweight among urban and rural adults. Aggregate data from food balance sheets indicate increased availability of energy intake from fats and oils, sugar, and animal products, with concomitant decline in available energy from plant products. Continued public health education on the important linkage between diet and disease is called for.

Introduction

Economic growth with industrialization and urbanization in developing countries often brings in its wake changes in a population's dietary habits. Such dietary changes tend towards an excess intake of energy-dense foods that are rich in fat and free sugars, but low in complex carbohydrates[38]. Evidence from epidemiological studies has established the link between such a diet and risk of degenerative chronic diseases of middle and later adult life, particularly cardiovascular disease and certain types of cancer[13].

Malaysia has undergone remarkable socio-economic development in recent decades. Its economy has been expanding rapidly, for example between 1988 and 1990 the gross domestic product growth averaged about 9% annually. This has led to a rise in its income per capita from US$334 in 1970 to US$2300 in 1989. Ranked as an upper middle income country by the World Bank[37], Malaysia appears to be on course like other newly affluent countries in shedding off 'old' problems of undernutrition and infectious diseases for a 'new' array of challenges posed by increasing incidence of degenerative diseases such as cardiovascular diseases and neoplasms (Fig. 1).

This paper discusses the prevalences and mortality trends of selected types of non-communicable diseases in Malaysia which have dietary implications, namely ischaemic heart disease, diabetes mellitus, breast cancer and cancer of the digestive system. The diet-related risk factors of these degenerative diseases will be discussed in relations to the past and current dietary intake patterns of Malaysians.

The mortality data presented are based on medically certified and inspected cases only, which account for

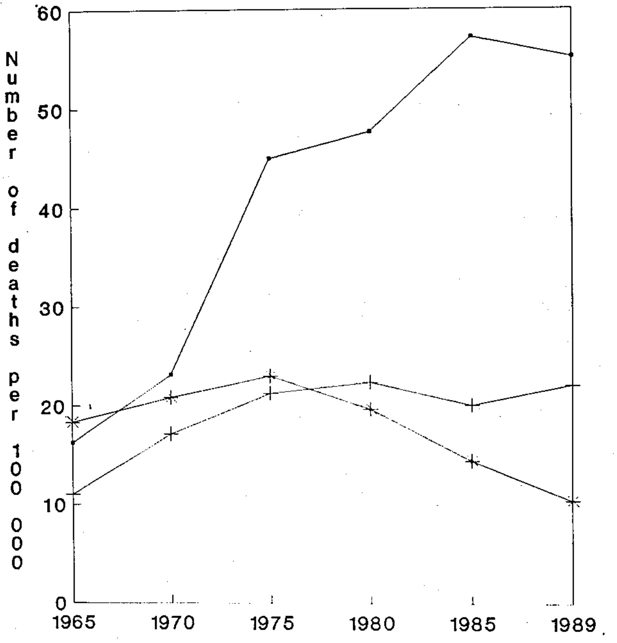

Fig. 1. Trends of leading causes of death in peninsular Malaysia[25]. Diseases of the circulatory system (—•—) Infectious and parasitic diseases (—✳—) Neoplasms (—+—).

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about 40% of the deaths occurring in peninsular Malaysia. Since the coverage of medically certified and inspected deaths is known to be more adequate in urban areas, the mortality data tend to have an urban bias. This article focuses on peninsular Malaysia as reliable data are less easily available for Sabah and Sarawak. Some comparisons of the data are presented on the basis of the three main ethnic communities in peninsular Malaysia, namely Malays, Chinese and Indians.

Ischaemic heart disease

Since 1970 diseases of the circulatory system have been the leading cause of deaths in peninsular Malaysia. In 1989, they contributed to almost 30% of the total certified death cases, followed by accidents, neoplasms and diseases of the respiratory system (Table 1). Death due to diseases of the circulatory system has increased fourfold from 1974 cases in 1965 to 7889 in 1989. In terms of mortality rates, its incidence has more than doubled between 1970 and 1989 from 24.1 to 55.2 per 100 000 (Table 2). The mortality rate for diseases of the circulatory system shows a predominance in the older age groups. For example, the mortality rate for the population aged between 45–65 years old was 188.2 per 100 000 in 1989, ie 3.4 times higher than that for the general population. The highest frequency distribution of coronary mortality is reported to have shifted from the 50–59 age group for both men and women in 1965, to the 60–69 age group by 1989[19].

Table 1. The leading causes of medically certified and inspected deaths in peninsular Malaysia[25].

Cause of death	1989[a] (%)	1989 Rank	1970 Rank
Diseases of the circulatory system	29.6	1	3
Accidents, poisoning and violence	13.4	2	4
Neoplasms	11.8	3	6
Diseases of the respiratory system	8.3	4	7
Certain conditions originating in the perinatal period	7.5	5	1
Symptoms of ill-defined and unknown causes	7.1	6	2
Infections and parasitic diseases	5.5	7	5
Diseases of the digestive system	4.4	8	8
Diseases of the genitourinary system	3.6	9	10
Congenital anomalies	3.0	10	9

[a] Total of medically certified and inspected deaths in 1989 was 26 639.

Among the diseases of the circulatory system, ischaemic heart disease contributes to a major proportion of the deaths in this category. In 1989, ischaemic heart disease was responsible for 38% of the deaths due to diseases of the circulatory system. It accounted for 11.7% of the total medically certified and inspected deaths in 1989. This is nearly three times the level in 1970 (4.3%) and the percentage appears to be still on the increase.

Table 2. Mortality rate of the main diseases of the circulatory systems in peninsular Malaysia[25,26].

Cause of mortality	Mortality rate per 100 000 population 1970		1989	
	45–64 years	All ages	45–64 years	All ages
Diseases of the circulatory system	98.2	24.1	188.2	55.2
Ischaemic heart disease	na	na	75.2	22.1
Cerebrovascular disease	na	na	47.5	16.

na = not available

The mortality rate for ischaemic heart disease among the 45–65 age group is about three to four times higher than that for the population as a whole (Table 2). For all ages, the ischaemic heart mortality male : female ratio was 2 : 1[25]. This sex mortality ratio in 1989 was higher for the Malays and Indians at 2.6 : 1 compared to 1.4 : 1 for the Chinese.

Indians in peninsular Malaysia are at a higher mortality risk for ischaemic heart disease than the Chinese and Malays (Fig 2). In 1988, the mortality rate for the Indians was 52.8 per 100 000, ie twice that for the Chinese (26.9) and four times higher than for the Malays (13.4). A similar finding was reported for Indians in Singapore whose death rate due to coronary heart disease was three times higher than that of the Chinese[12]. Immigrant Indians in England[27], Trinidad[28] and Uganda[32] have also been reported to have a relatively high mortality risk for coronary heart disease.

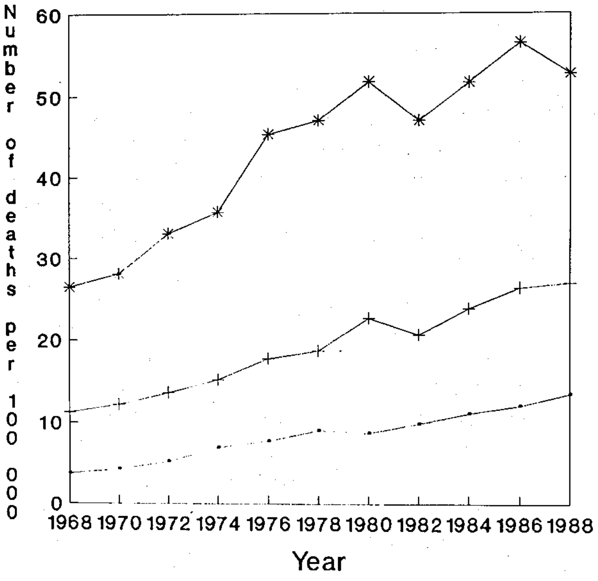

Fig. 2. Mortality rates due to ischaemic heart diseases in peninsular Malaysia[25]. (-·- Malay -+ Chinese -✳- Indian).

Diabetes mellitus

The prevalence of diabetes mellitus in Malaysia has risen from 0.65% in 1960 to 2.1% in 1981 and is currently estimated to be about 4%[30,31]. The prevalence of diabetes is reported to differ amongst the main ethnic groups. A study in 1966 reported the prevalence of diabetes of Malays, Chinese and Indians as 1.8%, 4.7% and 4.2% respectively[35]. A more recent study of 1996 railway workers found the highest prevalence among Indians (16.0%) followed by Chinese (4.9%) and Malays (3.0%)[18].

These results also point to relatively higher prevalence rates of diabetes among Malaysians when compared to the figures for their ethnic counterparts in Singapore (6.1%, 2.4% and 1.7% for Indians, Malays and Chinese respectively)[5]. Similarly high prevalence of diabetes have been reported for Indians in Fiji (13.3% to 14.8%)[11] and for Indians in South Africa (11.1% to 19.1%)[16]

The mortality rate due to diabetes among Malaysians is on an upward trend albeit gradually since the 1960s. For all ethnic groups combined and for both sexes, the mortality rate (for certified deaths only) has risen from 2.19 per 100 000 in 1965 to 3.21 per 100 000 in 1988. During this period the sex differential in the mortality rates appears to be small, being slightly higher for women. The mortality rates for men were 1.02 per 100 000 in 1965 and 2.67 per 100 000 in 1988, while the corresponding figures for women were 1.17 and 2.90 per 100 000 respectively (Fig. 3).

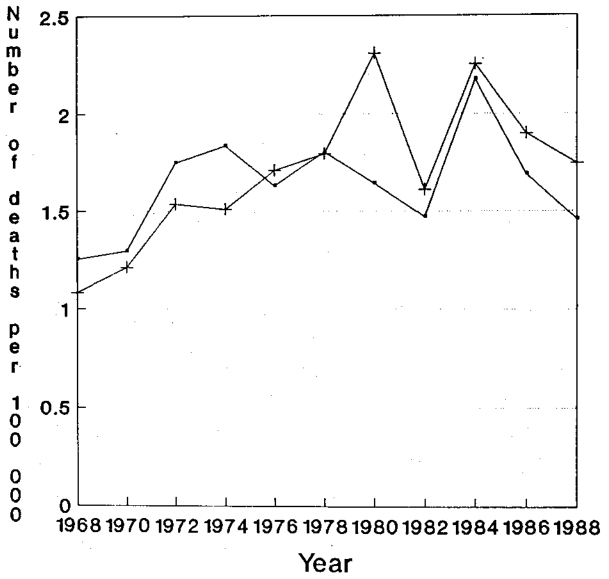

Fig. 3. Mortality rates due to diabetes mellitus by gender[25] (—— Male —+— Female).

As for ethnic differences, the mortality rate for Indians has been consistently highest among the three ethnic groups (7.42 per 100 000 persons in 1988) followed by Chinese (4.77) and Malays (1.63). However, between 1965 and 1988, the mortality rates for the latter two groups have increased faster (53% and 71% respectively for Malays and Chinese) than that for the Indians (10%).

Malignant neoplasms

In the last two decades, the rate of mortality due to malignant neoplasms has increased from about 15 to almost 20 per 100 000 (Table 3). This increase may be due in part to more people seeking treatment especially with increased urbanization, improved diagnosis and better reporting. Cancer of the digestive organs and peritoneum contribute to the largest number of deaths (30.2% in 1989) followed by neoplasms of the respiratory and intrathoracic organs (23.7%) (Table 4).

Table 3. Rates of medically certified deaths due to malignant neoplasm in peninsular Malaysia (per 100 000 persons)[26].

1967–1970	14.9
1971–1975	16.4
1976–1980	18.7
1981–1985	19.7
1986–1989	19.9

Table 4. Death due to malignant neoplasm in peninsular Malaysia in 1989[28].

Types	Number of cases	Per cent of total	Male:female ratio
Digestive organs and periotoneum	910	30.2	1.9 : 1
Respiratory and intra thoracic organs	714	23.7	3.0 : 1
Lymphatic and haemopoietic tissues	355	11.8	1.4 : 1
Genito-urinary organs	281	9.3	0.3 : 1
Lip, oral cavity and pharynx	264	8.8	3.1 : 1
Bone, connective tissue, skin and breast	241	8.0	0.1 : 1
Other and unspecified sites	247	8.2	1.4 : 1
Total	3012	100.0	1.4 : 1

Colon cancer together with cancers of the liver and stomach are the main types of cancer of the digestive organs and peritoneum. The mortality rate due to colon cancer among the Chinese appear to be increasing gradually from about 3.4 per 100 000 in 1982 to nearly 4.0 in 1988 (Fig. 4). The higher mortality rate reported for the Chinese as compared to that for the Malays and Indians could be partly reflective of the higher proportion of Chinese in the urban population of peninsular Malaysia.

Men have almost twice the mortality risk of women with regards to cancer of the digestive organs (Table 4). On the other hand, women encounter a much higher mortality risk with breast cancer and cancer of the genitourinary organs. The mortality rate for medically certified cases of breast cancer has been rising gradually from 1.8 per 100 000 in 1982 to 2.3 per 100 000 in 1988 (Fig. 5). During this period, the Chinese showed the highest mortality rate from breast cancer reaching 4.2 per

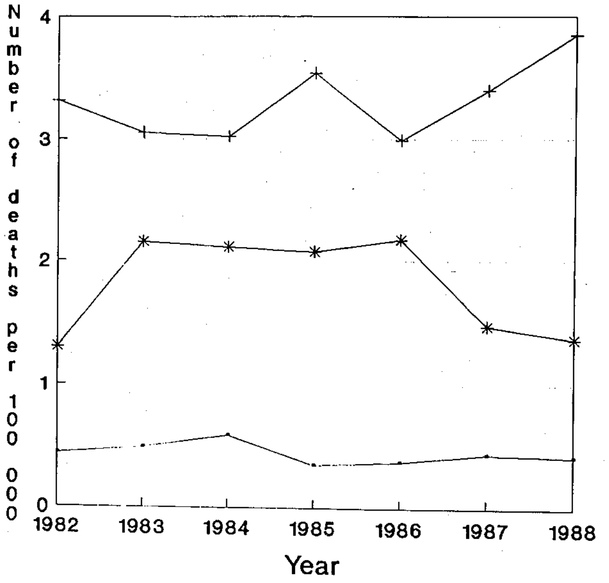

Fig. 4. Mortality rates due to colon cancer by ethnicity[25] (—·— Maley —+— Chinese —✳— Indian).

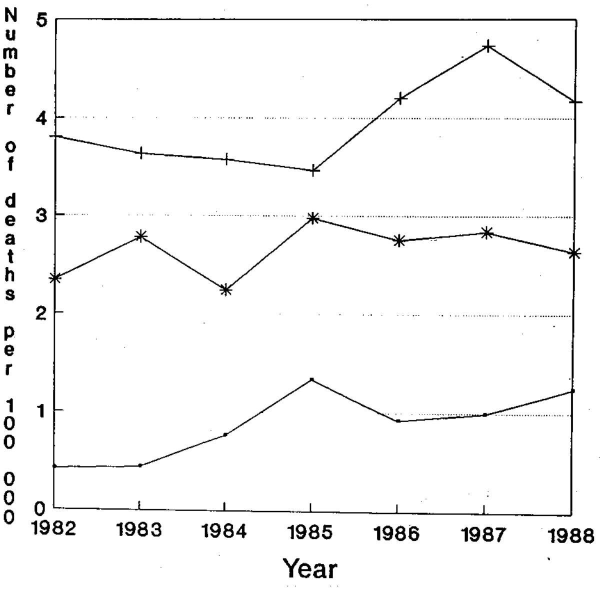

Fig. 5. Mortality rates due to breast cancer by ethnicity[25] (—·— Malay —+— Chinese —✳— Indian).

100 000 in 1988, compared to 2.7 and 1.2 for the Indians and Malays respectively.

Besides cancer of the digestive organs which have dietary implications, cancer of the oral cavity and pharynx have also been reported among the Malaysian population and their aetiology have been linked to dietary factors. In a study of cancer mortality registered in Kuala Lumpur during 1979–1982[24], it was found that nasopharyngeal cancer had a particularly high incidence among the Chinese, similar to findings in the Chinese community of Hong Kong, Taiwan, Singapore and China. Genetic predisposition to environmental factors including long-term consumption of salted fish is hypothesized to be the underlying aetiological basis[1,2]. It was also reported that a high preponderance of deaths due to mouth cancer occurred among Indians in Kuala Lumpur[24]. This is believed to be related to their customary habit of betel nut chewing, especially among the older age groups.

Diet-related risk actors of non-communicable diseases

It is well recognized that the association between diet and disease is very complex. In the case of chronic degenerative diseases, it is even more difficult to attribute its incidence on the influence of a specific dietary component because of the long latent period between the initiation of the disease and the manifestation of clinical symptoms. Nonetheless, epidemiological and experimental studies have identified high dietary intake of saturated fat as a leading cause of high blood cholesterol, which in turn is a high risk factor of coronary heart diseases. Other recognized risk factors of coronary heart disease include hypertension, smoking, obesity, diabetes, stress, high serum uric acid and inactive lifestyle[3].

In Malaysia over 95% of diabetic patients have Type II or non-insulin dependent diabetes (NIDD), which may respond to diet and weight reduction. An increased incidence of Type II diabetes is believed to be associated with an increased consumption of refined carbohydrates and fats and a decreased intake of fibre.

As for the link between diet and cancers of the breast and colon, evidence particularly from epidemiological and animal studies suggest that a number of dietary components serve as promoters of carcinogenesis[36]. These include saturated fat, meat and animal protein, nitrate and nitrite; on the other hand, dietary fibre, vitamin A and/or beta carotene, vitamins C and E and trace elements such as selenium have been attributed with having protective capabilities against these cancers.

The following section presents aggregate data and results of studies that indicate increased prevalences of hypercholesterolaemia and overweight, and increased availability of dietary energy from protein and fat sources in Malaysia.

Prevalence of hypercholesterolaemia

Since the 1960s there have been many studies determining the blood cholesterol levels of Malaysians. The mean serum cholesterol level of men aged between 25 to 55 years in the urban areas was found to be approximately 185 mg/dl in the 1960s[22]; by the 1980s, the average cholesterol level of a group of urban executives and professionals was reported to be about 230 mg/dl[33] (Table 5). The latter study identified 31% of the men as hypercholesterolaemic (cholesterol level exceeding 250 mg/dl). In comparison, in the early 1970s, less than 12% of a group of urban male workers aged 30 and above were found to be hypercholesterolaemic (level exceeding 200 mg/dl)[8].

Among the main ethnic groups, Indians are reported to have the highest prevalence of hypercholesterolaemia (43.2%), as compared to 35.2% and 24.2% among the Malays and Chinese respectively[33]. Earlier studies[8,22] did not find a significantly higher prevalence of hypercholesterolaemia among the Indians than the Chinese and Malays (Table 5). This development is of significance in light of the fact that the Indians presently show the highest mortality rate for ischaemic heart disease.

Communities living in the rural areas have been found to have a lower average serum cholesterol level than their urban counterparts. The mean blood cholesterol level for the aborigines in west Malaysia was found to be low at

Table 5. Mean serum cholesterol levels among Malaysian men in the urban areas by age and ethnic groups.

Age group	Malays	Chinese	Indians	All races	Reference
	(*n*) mg/dl	(*n* mg/dl	(*n* mg/dl		
30–39	(32)201	(38)189	(36)174	(106)187	22
40–49	(28)185	(33)193	(33)178	(94)185	
50–59	(16)188	(26)176	(23)175	(65)178	
30–39	(56)203	(102)197	(38)192	(196)198	8
40–49	(46)228	(52)206	(34)216	(132)216	
50–59	(21)237	(21)232	(15)217	(57)230	
25–34				(146)224	33
35–44				(209)236	
45–54				(51)239	
55–64	(176)236	(182)227	(37)247	(406)232	

Table 6. Prevalence of overweight among Malaysians as indicated by body mass index (BMI).

Age (years)	Number	Community	Gender	Prevalence of obesity (%)	Criteria for overweight	Reference
31–40	300	urban	male	44% Malays	BMI >21.5 male	17
				4% Chinese	BMI >20.5 female	
				24% Indians		
41–50				20% Malays		
				20% Chinese		
				27% Indians		
31–40	300	urban	female	20% Malays		17
				7% Chinese		
				50% Indians		
41–50				33% Malays		
				20% Chinese		
				27% Indians		
18+	522	poor rural Malays	male	5%	BMI >25 male BMI > female	9
18+	965	poor rural Malays	female	15%		
18+	134	rural mixed ethnicity	male	46%	BMI=15–29.9 male and female	15
18+	153	rural mixed ethnicity	female	43%		
25–34	146	urban executives mixed ethnicity	male	26.2%	BMI=25–30	33
35-44	209			29.3%		
45–54	51			33.3%		

about 156 mg/dl and none of them were hypercholesterolaemic[4]. The average cholesterol level among poor rural Malay men was reported to be also low, at 175 mg/dl9.

Prevalence of overweight

A number of studies have reported on the increased prevalence of overweight among Malaysians based on the definition of body mass index (BMI) exceeding 25 kg/m2 as overweight. Among urban subjects it was found that, on average, one quarter to one third of the men and women studied were overweight[17,33] (Table 6). In a study of a rural low income Malay community, 45.5% of 134 men and 43.1% of 153 women studies were found to be overweight[15]. The prevalence of overweight was found to increase with age for both men and women. In comparison, previous studies of poor Malay rural subjects had found a low prevalence of overweight. For example, in 16 villages studied in 1979–1983, it was found that only 5% of 522 men and 15% of 956 women aged 18 years and above were overweight[9].

Overweight is known to contribute to high serum lipid levels. Such a positive association was shown among Malaysian subjects who were overweight (BMI above 25), and they had higher levels of triglycerides and total cholesterol, and a significantly lower level of high-density lipoprotein cholesterol than the non-overweight subjects[10].

Increased availability of dietary energy

Based on data from the food balance sheets from 1965–1966 to 1986–1988, it is shown that Malaysians presently have available 21% more dietary energy per capita per day than two decades ago[21]. The increase in available dietary energy has been towards more energy from oils and fats, animal products and sugar (Fig. 6).

Energy intake from animal products, particularly chicken and eggs, has increased from 6.4% of the total available in 1964–1966 to 9.9% in 1986–1988. This has given rise to an increase in total animal fat available from 16.4 grams per capita per day in 1964–1966 to 24.8 grams in 1986–1988. In terms of protein availability (grams per capita per day), the amount of chicken and eggs available have increased five and three times respectively during the two decades mentioned.

As for cooking oils and fats, there has been a substantial shift since the 1960s from the use of coconut oil, a highly saturated oil to palm oil which has a higher content of unsaturated fatty acid. Palm oil together with palm kernel oil contributed to 40.7% of the total available fat in 1986–1988.

Energy from sugar constituted 14.3% of the total in 1986–1988, and its availability at 107 grams per capita per day places Malaysia among the highest users in the ASEAN region[20].

The food balance sheets are more likely to reflect the consumption patterns of the urban and upper income groups. This is indicated by past dietary studies which reported a much lower mean nutrient intake per capita in low income households than the average levels shown in the food balance sheets. For example, the mean energy intake averaged about 1900 kcal (8mJ) per capita per day among the rural poor and about 1400 kcal (5.9 mJ) for urban squatters, compared with the mean availability figure of 2665 kcal (11.2 mJ) per capita in the 1986–88 food balance sheet. The levels of energy intake by urban middle to upper income groups come closer to the food balance sheet level (Table 7).

While the availability of energy from sugar, animal products, and oils and fats has been on the upward trend, there has been a concomitant decline in the dietary energy from cereals and other plant products. The contribution from plant products has dropped from 56.7% of

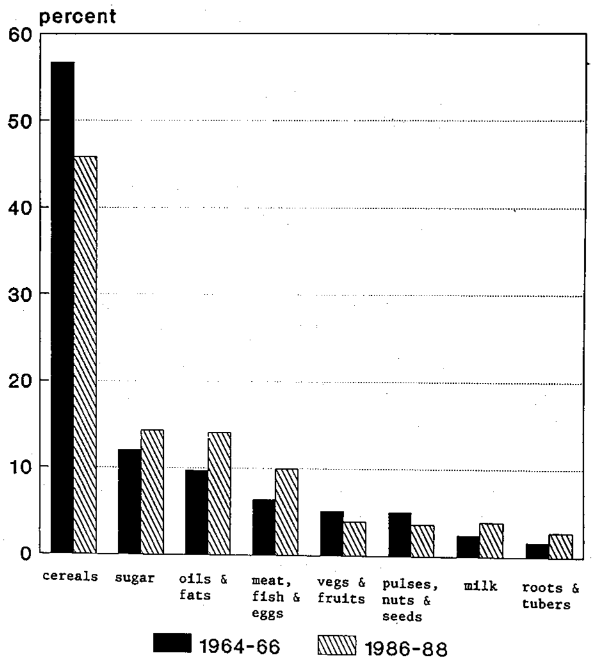

Fig. 6. Changes in sources of calories in Malaysia between 1964–66 and 1986–8[14].

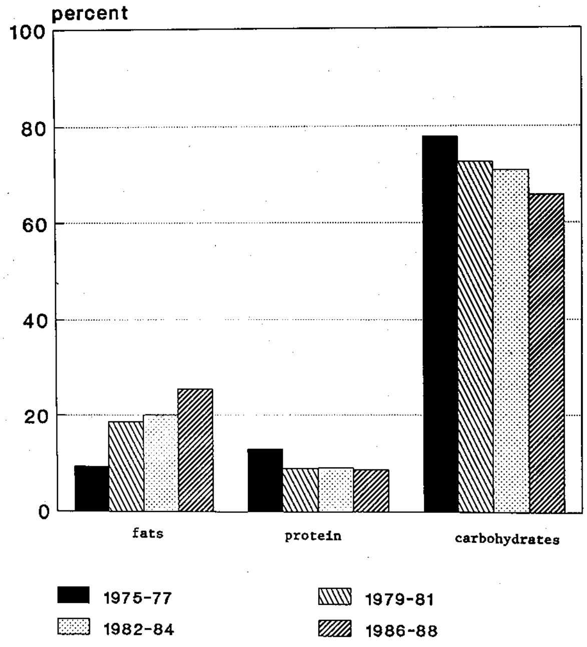

Fig. 7. Changes in composition of calories from protein, fat and carbohydrates[14].

Table 7. Dietary energy per capita intake levels of rural and urban communities in Malaysia.

Community	Mean intake kcal (MJ)	Mean intake as % of RDI (range)[a]	Number of households	Reference
1. Rural communities in Sabah:			99	7
Murut		153 (71–263)		
Upland Kadazan		86 (47–159)		
Coastal plain Kadazan		103 (75–152)		
Chinese		83 (42–98)		
2. Poverty rural villages	1874(7.87)	90 (70–101)	503	9
3. Rural and urban combined, mostly Malays	2297(9.65)	110	1219	39
4. Urban	2162(9.08)	110	100	29
Rural	1988(8.35)			
5. Urban squatters[b]				6
Malays	1412(5.93)	63	114[b]	
Chinese	1433(6.02)	64	63[b]	
Indians	1383(5.81)	61	86[b]	

[a] RDI for Malaysians[35]; [b] individuals (as opposed to households)

total energy intake in the 1960s to 45.9% currently. Meanwhile, the proportion of dietary energy from other plant products like pulses, nuts and oilseeds, fruits and vegetables has decreased too. The significance of this trend is related to the protective effects of plant foods such as cruciferous vegetables on colorectal cancer[23].

Overall, the food balance sheets indicate a dietary trend in Malaysia that is tending towards a decreasing proportion of energy intake from complex carbohydrates and a rising proportion from edible oils and fats and protein from animal sources (Figs 6, 7).

Conclusion

In Malaysia studies pertaining to diet-related non-communicable diseases are limited to reports on the prevalence of their risk factors, and epidemiological data based on mortality statistics, and hospital admissions and registration. Owing to the rapidly expanding economy in recent decades. Malaysia has undergone extensive socio-economic development. Among the effects of development is the influence on lifestyle behaviour of Malaysians particularly the affluents in urban areas. Lifestyle behaviour related to diet, smoking, socio-emotional stress, intake of alcohol and physical activity are important risk factors of degenerative diseases such as ischaemic heart diseases. Examining the mortality figures based on certified and inspected deaths which are more reflective of the urban population, there appears to be a rise of these diseases especially amongst the Indians. At the macro level, dietary data indicate in general a higher intake of animal products and edible oils and fats and lower consumption of fruits, vegetables and legumes. There is a need for in-depth studies on the lifestyle determinants of the different ethnic groups, especially of the Indian community, in order to obtain a better understanding of the ethnic differentials in the prevalences and mortality rates of the non-communicable diseases that have emerged in Malaysia. It is timely that the Malaysian government has in recent years conducted an active public campaign on healthy lifestyles, with emphasis directed towards dietary moderations. With increased public awareness of the importance of diet that is consistent with good health, the current rising advance of non-communicable diseases in Malaysia may be checked and a major problem for public health forestalled.

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摘　要

馬來西亞半島某些慢性退化性疾病的動向及其與膳食的關係

本文討論了過去幾十年來馬來西亞半島的缺血性心臟病、糖尿病，和乳癌，結腸癌等慢性退化性疾病的發病率和死亡率與膳食的關係。心血管疾病的死亡率自1970年以來增加超過一倍，致死原因主要是缺血性心臟病。糖尿病的患病率從1960年增加了 0.65%，而現在增加了約4%。缺血性心臟病和糖尿病二者的死亡危險，印度人較馬來人和中國人爲高，而乳癌和結腸癌的死亡率則以中國人爲最高，這可能城市居民較多尋求治療和診斷有關。經驗的膳食數据顯示都市的成人患高膽固醇血症增加，而體重超過正常在都市和鄉村的成人均有增加。由食物平衡報表的總數据，可以看出從脂肪，油，糖和動物產品獲得的熱量增加，而從植物產品獲得的熱量相應下降。作者認爲：繼續進行膳食與疾病間的重要性的公共衛生教育是恰當的。

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Telah dibahas angka prevalensi dan mortalitas penyakit-penyakit degeneratif khronis seperti penyakit jantung iskhemik, diabetes mellitus, kanker payudara dan usus besar dengan implikasi dietnya di Peninsular Malaysia selama beberapa dekade terakhir. Angka mortalitas akibat penyakit-penyakit sistim sirkulasi meningkat lebih dari dua kali lipat sejak 1970 dan kematian akibat penyakit jantung iskhemik merupakan penyebab utama. Angka prevalensi diabetes mellitus telah meningkat dari 0.65% pada tahun 1960 menjadi 4% akhir-akhir ini. Resiko mortalitas penyakit jantung iskhemik dan diabetes mellitus dietmukan tertinggi pada etnik India bila dibandingkan dengan etnik Melayu dan Cina. Etnik Cina menunjukkan angka mortalitas kanker payudara dan usus besar tertinggi. Keadaan ini merupakan refleksi perkembangan diagnosa akibat semakin meningkatnya kesadaran orang-orang kota mencari pengobatan. Data diet secara empirik menunjukkan peningkatan prevalensi hiperkolesterolemia di antara orang-orang kota dan pedesaan. Data pola makan menunjukkan peningkatan penggunaan kalori dari lemak dan minyak, gula dan produk-produk hewan, disertai dengan penurunan penggunaan kalori dari produk-produk tumbuhan. Kesinambungan pendidikan kesehatan masyarakat tentang pentingnya hubungan antara diet dan penyakit adalah tepat.