

# The importance of the nutrition transition for health

---

## Diet-related chronic diseases

It has been agreed for many years that the nature and quality of diets affect the risk of chronic diseases, including some that for half a century have been the major causes of premature death in the developed world [38, 39]. Diet-related chronic diseases vary in severity. They include diseases that are disagreeable, notably tooth decay and various gut disorders; others that are disabling, such as adult-onset diabetes, obesity, and osteoporosis; and others that are deadly, notably IHD and other CVDs, with hyperlipidemia and angina or precursors, cerebrovascular disease and its precursor hypertension, and certain cancers [39]. A major report [40] specifies cancers, the risks for which are modified by food and nutrition (including alcohol), as well as by physical activity and body composition. Some of these cancers have additional nondietary causes, notably the use of tobacco and cancers of the mouth, throat, esophagus, and lung. The same report [40] lists other cancers for which the evidence of relationship with diet is inconclusive. Similar reports have focused on diet-related factors and CVD [39, 41–43].

It has been proposed [44] that chronic diseases tend to emerge and become epidemic in a predictable order, as a result of a nutrition transition to which human physiology is not adapted. Thus, overweight and obesity, adult-onset diabetes, and cerebrovascular disease become public health problems within a generation. Severe gut diseases, notably cancers of the colon and rectum, emerge later in the stages of dietary change and economic development. CVDs and breast cancer might take two generations to become epidemic. This hypothesis, based on preliminary observations and anecdotes, is supported by some epidemiological studies [40] but has not yet been rigorously tested.

Diets that increase the risk of chronic diseases are those relatively high in total fat, saturated fat, sugar, salt, alcohol, refined grains, and foods of animal origin. Diets that protect against chronic diseases are relatively high in minimally processed grains, legumes, fiber,

vegetables, fruits, and foods of plant origin. However, plant-based diets that are monotonous, very high in staple grains or starchy roots, and low in vegetables, fruits, and foods of animal origin can increase the risk of deficiency diseases. Such “poverty diets” [40] emphasize the need for plant-based diets to be varied and not too high in grains or roots of any one type. It has been estimated [40] that appropriate diets and lifestyle can reduce cancer risks by 30% to 40%. Comparable estimates, based on epidemiological and other analyses, could and should be made for other major diet-related chronic diseases.

The major relationships between various components of the diet and chronic diseases are summarized in table 5. Perhaps the most important aspect of these findings is that linked demographic and nutrition transitions produce lifestyle shifts that are associated with rapid increases in the risk of major diet-related chronic diseases. This emphasizes the importance of further research to underpin effective policies and programs that are designed to control epidemic diet-related chronic diseases.

## General mortality trends

It is commonly supposed that infectious and deficiency diseases are the main public health problems throughout Asia and the Pacific but the following review of mortality trends reveals a more complex picture.

Infectious and parasitic diseases were the major causes of all deaths in Asia during much of the twentieth century and before. Although they remain very important, they no longer represent the major cause of death in any country studied here. In the countries that are furthest along in the nutrition transition (such as Singapore, with higher fat diets and higher rates of obesity) cancers and CVD together account for close to 60% of all deaths: a rate similar to those of North America and western Europe. In the PRC and the Republic of Korea, now more than half of all

TABLE 5. The possible effects of dietary intake and body composition on noncommunicable diseases

Dietary factor	Mechanisms	Health outcomes
Excess energy intake ↑	Adipose tissue development ↑, metabolic changes	NIDDM ↑(a), CHD ↑(a), hormone-dependent (e.g., breast) or GI (e.g., colon and rectal) cancers ↑(a), osteoarthritis ↑(a), gallbladder disease ↑(a)
Total fat ↑	Passive overconsumption, IR ↑	NIDDM ↑(b), CHD ↑(a), prostate cancer ↑(b), breast cancer ↑(c), colon and rectal cancer ↑(b)
Animal fat ↑	Unclear, fat metabolism byproducts	Colon cancer ↑(b)
Saturated fat ↑	TC ↑, LDL-C ↑, TG ↑, HDL-C ↓	Atherosclerosis ↑(a), CHD ↑(a), hypertension ↑(b), NIDDM ↑(b)
<i>Trans</i> fatty acids ↑	LDL-C ↑, HDL-C ↓, TC ↑, immune system ↓	Cancers ↑(d), CHD ↑(c)
Monounsaturated fatty acids ↑	LDL-C ↓	Cancers ↓(c), CHD ↓(b)
Polyunsaturated fatty acids ↑	HDL-C ↑, some are antiinflammatory	Cancers ↑(b), CHD ↓(b)
Sodium ↑	Abnormal renal function ↑, disturbed electrolyte balance ↑	Hypertension ↑(a), stroke ↑(a)
Antioxidants ↓	Oxidize LDL-C, change functions	CHD ↑(b)
Dietary fiber ↓	TC ↑, HDL-C ↓, IR ↑, TG ↑	CHD ↑(b), NIDDM ↑(b), stroke ↑(c), colon cancer (c) ↑
Fetal malnutrition/stunting ↑	Central adipose tissue ↑, IR ↑, metabolic changes	NIDDM ↑(b), hypertension ↑(b), CHD ↑(b)
Fruit and vegetable ↑	Prevent oxidation LDL-C, fiber ↑	Stroke ↓(b), cancers ↓(a)

The relationships between dietary factors and health outcomes are categorized as (a) well-established; (b) fairly well-established but data not complete; (c) still under debate; and (d) indicative data to date. Epidemiological studies support much of what is presented here but the literature is controversial, especially with respect to mechanisms. This table omits the effects of reduced physical activity, which are most important in increasing obesity, reducing fitness, and increasing insulin resistance.

CVD = cardiovascular diseases; GI = gastrointestinal; HDL-C = high density lipoprotein cholesterol; IR = insulin resistance; LDL-C = low density lipoprotein cholesterol; NIDDM = noninsulin dependent diabetes mellitus; TC = total cholesterol; TG = total glycerides.

deaths are caused by these two categories of chronic disease. They are also important causes of death in less developed countries.

There are no systematic data on morbidity available for the Asia-Pacific region. Few countries have reliable and representative morbidity data over meaningful periods. However, reasonably reliable trends for the proportions of deaths, by cause of death, for selected countries in each country group, can be constructed from World Health Organization (WHO) sources (table 6).

Causes of death data are not uniformly collected and classified across the region [46]. Death registrations are fully operational in only a few Asian countries and there are many gaps. The focus here is on the proportion of deaths by cause, rather than on age-specific rates or overall rates of death by cause. A major increase in chronic diseases in Asia has been predicted over the next two decades, based on demographic projections from these same, poorly measured mortality data of 1960 to 1990 [47]. The present review emphasizes the nutrition transition-related dynamics

that will be a major component of driving this change, and suggests that these dynamics are accelerating the increases in disease predicted [47]. From this source, for two randomly selected countries in each economic grouping, trends are presented in the proportion of deaths, by cause of death, for as many time points as are available, from the 1960s to the 1990s (table 6). This is indicative of trends across the whole region. The five categories are for infectious and parasitic diseases, cancers, diabetes, CVD, and all other causes. Accidents are a major component. It was not possible to obtain detailed age-specific mortality data, and so age-standardized trends cannot be followed.

Actual data and projections of deaths by cause, in India and the PRC for 1990 and 2020 are projected in figure 20. It has been projected [47] that India will experience a marked reduction in mortality, related to a large decline in deaths caused by infectious disease and parasitic infections. In contrast, it was predicted [47] that the PRC will experience an increase in mortality, related to the large increase in noncommunicable diseases (NCDs), in particular CVD and cancers,

TABLE 6. Trends in the proportion of deaths, by cause, in some Asian countries, grouped by income, and in the Fiji Islands, during the 1960s, 1970s, 1980s, and 1990s

Group	Causes of death	1960s	1970s	1980s	1990s
High-income					
Singapore (year)		(1967)	(1975)	(1987)	(1996)
	All infectious diseases	14.8	18.2	12.5	14.4
	Cancers	14.2	18.2	23.8	25.6
	Diabetes	—	2.3	3.7	2.1
	Cardiovascular disease	8.2	28.3	35.5	37.8
Korea, Rep. of (year)		62.8	33.0	24.5	20.2
				(1987)	(1995)
	All infectious diseases			5.8	4.6
	Cancers			16.7	21.0
	Diabetes			1.4	3.3
	Cardiovascular disease			22.0	21.1
	Other			54.2	50.0
Middle-income					
Malaysia (year)		(1965)	(1976)	(1987)	(1996)
	All infectious diseases	18.5	17.6	12.0	13.7
	Cancers	6.5	8.9	10.4	10.1
	Diabetes	0.8	1.5	—	—
	Cardiovascular disease	9.1	20.0	18.9	18.9
Thailand (year)		65.0	52.0	58.7	57.3
		(1966)	(1975)	(1987)	(1995)
	All infectious diseases	14.0	17.2	7.3	6.4
	Cancers	1.5	3.2	7.3	9.3
	Diabetes	0.2	0.5	0.9	1.3
	Cardiovascular disease	2.5	4.4	3.5	15.5
	Other	81.2	74.7	81.1	67.5
Upper low-income					
Sri Lanka (year)		(1967)	(1975)	(1988)	(1991)
	All infectious diseases	6.4	10.1	12.2	9.5
	Cancers	3.7	3.7	5.7	5.9
	Diabetes	1.3	1.2	1.2	1.3
	Cardiovascular disease	11.9	10.3	30.2	29.8
People's Republic of China (year)		76.7	74.7	50.7	53.5
				(1987)	(1994)
	All infectious diseases			19.3	20.5
	Cancers			15.9	19.3
	Diabetes			—	—
	Cardiovascular disease			27.5	28.2
	Other			37.3	32.0
Lower low-income					
Kyrgyz Republic (year)					(1995)
	All infectious diseases				12.4
	Cancers				8.4
	Diabetes				1.0
	Cardiovascular disease				36.8
India (year)					41.5
			(1975)	(1987)	
	All infectious diseases		29.9	17.4	
	Cancers		3.6	3.6	
	Diabetes		0	1.3	
	Cardiovascular disease		8.9	9.2	
	Other		57.6	68.4	

*continued*

TABLE 6. Trends in the proportion of deaths, by cause, in some Asian countries, grouped by income, and in the Fiji Islands, during the 1960s, 1970s, 1980s, and 1990s (*continued*)

Group	Causes of death	1960s	1970s	1980s	1990s
Fiji Islands (year)	All infectious diseases		(1970) 10.4	(1985) 15.2	
	Cancers		7.5	10.1	
	Diabetes		3.4	5.5	
	Cardiovascular disease		20.6	36.0	
	Other		58.0	33.2	

Source: ref. 45.

Data before 1975 and after 1990 are not available.

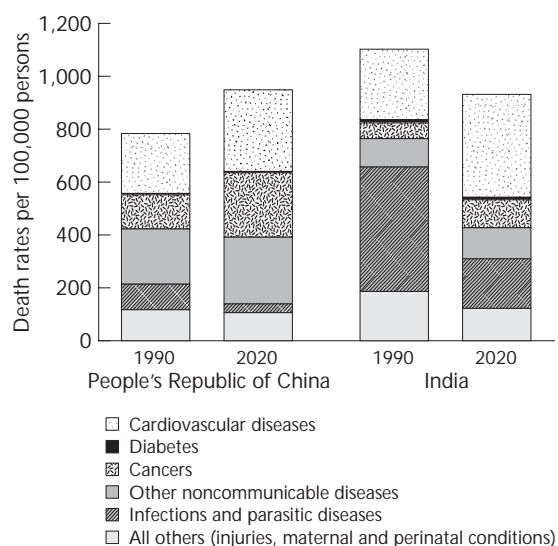


FIG. 20. Actual (1990) and projected (2020) deaths by cause in the People's Republic of China and India. Source: Modified from ref. 47

combined with an aging of the population. Deaths in India from these same NCDs will also increase, reducing the overall decline in deaths.

At very early stages of economic development and nutrition transition, when deaths caused by infectious disease and parasitic infections are still very high, the chronic disease that causes much mortality is hemorrhagic stroke. Hypertension and stroke rates increase with economic development [39]. Where resources allow, treatment of hypertension can lead to a decrease in cerebrovascular disease, as in the Republic of Korea. India and the PRC are vast countries in which different areas, and rural and urban areas in general, are at different stages of transition. A most remarkable epidemic of adult-onset diabetes and related conditions is emerging in urban India [5].

At a later stage of the nutrition transition, CVDs emerge as the primary cause of chronic disease deaths. In the Republic of Fiji Islands, where major diet and

lifestyle shifts have been followed by very high levels of obesity, diabetes, and other causes of CVD, over a third of deaths were caused by CVDs by the 1970s. CVDs were also the most common cause of death in the 1990s in the Kyrgyz Republic, a country with very high levels of obesity and also very high consumption of fats. In 1993, over 30.4% of the dietary energy intake of Kyrgyz adults came from fat [48]. The Republic of Korea is at a relatively late stage of transition and its low level of deaths from CVD is remarkable [10]. It is suggested that this is because of a high intake of vegetables and low intake of fat, and therefore less obesity than might be expected in a high-income country.

At late stages of the nutrition transition, in countries with relatively high average incomes, deaths from certain cancers increase in absolute and relative importance. Deaths from cancers in Singapore and the Republic of Korea account for 21 to 26% of total deaths. In the PRC, cancers cause almost 20% of all deaths. These rates are all similar to those in developed countries. Elsewhere in Asia, almost 5 to 10% of deaths are caused by cancers. Mortality by site-specific cancers varies among countries [40].

One chronic disease that is linked directly to obesity and inactivity, and for which there are relatively good Asian and Pacific data, is adult-onset diabetes. From the best available sources on adult-onset diabetes in Asia, the following data and projections were published for total cases in the region: 1994, 51.2 million; 2000, 94.7 million; and 2010, 138.1 million [49]. The International Diabetes Institute, Caulfield, Australia, and the World Health Organization (WHO) have developed country-specific estimates of the prevalence of diabetes. WHO, on its website [<http://www.diabetes.com.au/home.htm>] has projected that the most rapid increase in diabetes will be in India, where a rise is projected from the 1997 estimate of 20.8 million cases to 57.2 million in 2025. In the PRC, the corresponding projected rise is from 17.1 million to 37.6 million cases.

Two pathologies that are intimately related to diet, and that are believed or known to increase the risk of various chronic diseases, are now briefly reviewed. These are nutrition and other insults to fetal and infant