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CHANGING LIFESTYLES AND HEALTH

Technical Discussions

Although the impact of the noncommunicable "diseases of affluence" was first felt in the industrialized countries, it is now global. Changes in both demography and society have led to the situation where already more deaths from "lifestyle" diseases occur in the developing world than in the developed world and by early next century they will be more than twice as many. Some countries have seen encouraging declines in several of these diseases, and this is presumed to be largely owing to lifestyle changes. Perhaps the more negative effects of lifestyle changes can be averted in countries now undergoing transition.

1. WHY "LIFESTYLES"?

An aspiration to "change lifestyles" in order to "promote health" has emerged as a dominant theme of public health policy in industrialized countries over the past decade or so. The emphasis has been placed on "lifestyles" so that the measures thought necessary for the prevention of noncommunicable diseases are clearly distinguished from those used to combat infection such as ensuring safe water supplies, excreta disposal and immunization.

The term "lifestyle" (in German, *Lebensstil*) comes from the sociologist Max Weber who was active in Germany at the beginning of this century. He used the term to designate the style of living that social groups adopted to express and sustain their identity in the social world. The term was taken up by market researchers in Western countries in their studies of "consumer behaviour". Their aim was to facilitate the "targeting" of marketing campaigns by identifying different market "segments" and making their marketing approach appropriate to the "lifestyle" of the chosen segments. The term thus brings to its usage in public health connotations of consumption and living habits that are typical for a particular social category at a particular time and place but which may be regarded as still changeable. Some such habits - those involved with eating, smoking, drinking and physical activity - are immediately recognizable as the major presumed determinants of noncommunicable diseases: hence the usefulness of "lifestyle" in discussing policies to reduce the incidence of these diseases.

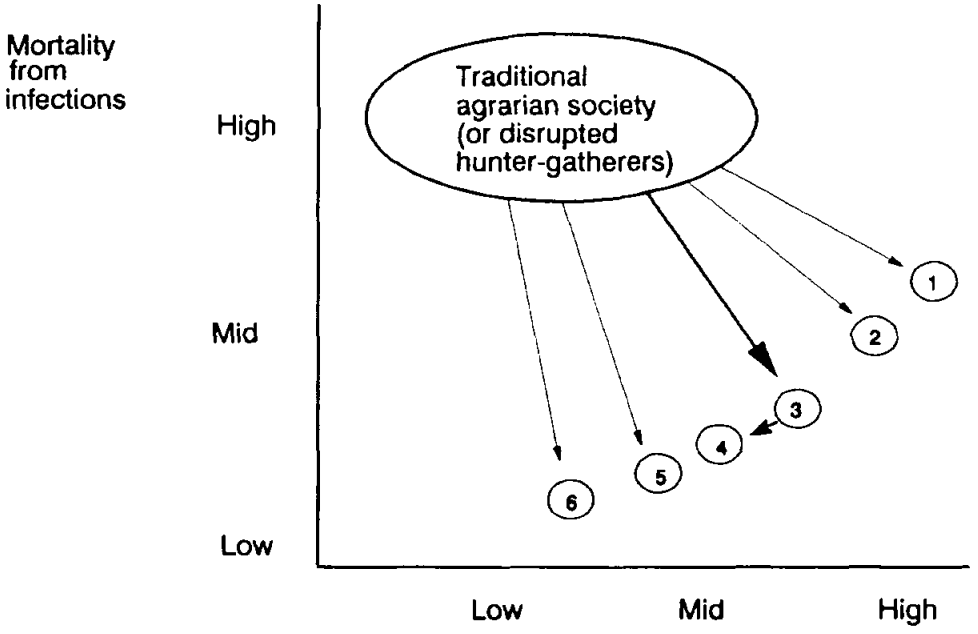
The noncommunicable "diseases of affluence" include ischaemic heart disease, cancers of the lung, colon and breast, non-insulin-dependent diabetes, smoking-induced chronic lung disease, and injury from car smashes. Although their impact was first felt in the countries now industrialized, this impact is now global. The prevention of noncommunicable diseases is becoming a major public health policy issue in developing countries as well.

2. CHANGES IN NONCOMMUNICABLE DISEASES PREVALENCE IN LOW TO MEDIUM INCOME COUNTRIES

Agrarian (and disrupted hunter-gatherer) cultures were characterized by very high fertility and matching very high mortality - mostly from gut and respiratory infections. With socioeconomic modernization, the decline in mortality from infections has been roughly uniform in extent but the off-setting rise of noncommunicable diseases has been highly variable. As shown in the figure below, there have been several "paths from high mortality".

North Western Europe, North America and Australasia have followed a "central" path whereby some of the benefits of the decline in the infective causes of adult mortality (such as tuberculosis and pneumonia) have been offset by rising mortality from noncommunicable diseases. These offsetting effects have been more marked in males. Thus in Australia, the level of male mortality in late middle age stood roughly constant for 50 years (from 1920 to 1970) as the rise in heart attacks, lung cancer, car smashes etc. negated the gains against the traditional killers. Since the turn-around in noncommunicable disease mortality trends around 1970, total mortality has declined rapidly.

Paths from high mortality



Illustrative "points of transition"

1. Nauru, Native North Americans, Australian Aborigines, 1980s
2. Hungary, mid 1980s
3. North American whites, Australia, late 1960s
4. North American whites, Australia, late 1980s
5. Greece, South European migrants to Australia, 1980s
6. Japan, Hawaiian Japanese, 1980s

Among the countries with a broadly European culture, the overall rise of noncommunicable diseases has been less marked in Southern Europe. In consequence, the decline of fatal infections has left them with adult mortality levels that are among the lowest in Europe. By contrast the countries of Eastern Europe have, over the last two or three decades, had higher than average upsurges of noncommunicable diseases, negating the advances due to reduced mortality from infectious diseases. Mortality rates between the ages of 35 and 64 in some East European populations are about 2.5 times "Mediterranean" rates.

There is also great variation in the magnitude of the rise of noncommunicable diseases in the Western Pacific Region. Among East Asian populations the net rise has generally been small (or possibly non-existent) with the result that the lowest adult male mortality levels in the world are now to be found in this Region. Japan has the lowest national rates but rates are also low in the cities of China and in the ethnic Asian population of Hawaii. Furthermore it seems that net mortality from noncommunicable diseases is falling from what is a relatively low peak in Japan and in parts of China. In Japan, from 1972 to 1982, the rate of coronary heart-related deaths dropped by 21.6% for males and 34.5% for females. A major reason is probably that animal fat intakes and blood cholesterol concentrations have not risen to levels associated with epidemics of ischaemic heart disease, although there is cause for some concern from recent reports in the larger cities of China.

Western Pacific Region populations that appear to be experiencing significant rises in noncommunicable diseases include Fiji, Malaysia, Samoa and the Micronesian countries. Increases in mortality from these diseases that are "above average" have been experienced in Nauru and among Australian Aborigines and the noncommunicable disease epidemics in these populations show little signs of abating.

The demographic transition

In their review, "The health sector in developing countries: problems for the 1990s and beyond", Mosley, Jamison and Henderson emphasize the major changes in disease patterns that will need to be addressed.[1] "The nature (and perhaps primacy) of primary prevention will markedly change. Different personnel skills and mixes of facilities will be required." This change in disease pattern is being produced by two transitions, the demographic and the epidemiological.

The age structure of a population is primarily determined by the birth rate, not the death rate. Nevertheless, the shift in the age distribution of the living is inevitably accompanied by a shift in the age distribution of deaths. Estimates for Asia between 1985 and 2015, are that total numbers under the age of 15 will increase only slightly, whereas the number aged more than 45 will more than double. The total number of deaths occurring under age 5 will fall to 32% of their 1985 levels whereas the numbers occurring at ages 45 to 64 will increase by about 60%, and those occurring over 64 will more than double. Thus the change in the age structure alone will "be accompanied by more than a doubling of chronic disease among adults relative to acute diseases among infants and children".

Epidemiological transitions

To the effects on relative disease frequency that flow directly from a change of the age structure must be added the changes in the age-specific frequency of diseases associated with modernization (the "epidemiological transition").

Bulatao, Lopez and Stephens have estimated the distribution of deaths by major causal group for 1985 and made projections for 2015 for developing and developed countries using World Bank demographic projections and recent relationships between the level of mortality and its composition by cause (Table 1).

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[1]Mosley W., Jamison D., Henderson D. The health sector in developing countries: problems for the 1990s and beyond. *Ann. Rev. Public Health*, 1990; 11: 335-358.

Table 1. Projected distribution of deaths by major causal group and development[2]

Disease category	Developed countries deaths (millions)			Developing countries deaths (millions)		
	1985	2015	Ratio	1985	2015	Ratio
Infectious	1.08	1.02	0.9	13.64	9.08	0.7
Cardiovascular	6.00	7.69	1.3	7.20	16.73	2.3
Neoplasms	2.16	2.61	1.2	2.65	6.69	2.5
Injury	0.72	0.73	1.0	3.03	3.35	1.1
Other	2.04	2.45	1.2	11.38	11.95	1.3
Total deaths	12.00	14.50	1.2	37.90	47.8	1.3

Although the assumptions on which these projections are based are open to challenge, the broad implications seem inescapable: there are already more deaths from noncommunicable diseases and injury occurring in the developing world than the developed, and by early next century it will be more than double. Within the developing countries this group of conditions will then account for more than 50% of all deaths.

In the Western Pacific Region these processes are already well under way. For 29 of the 35 countries and areas that make up the Region, at least 5 "leading causes of mortality" are listed in the regional data bank; for 26 of those 29 at least 3 of the 5 leading causes are noncommunicable diseases and for 13 of them, 4 or 5 are (see Annex).

The net rise of noncommunicable diseases with modernization is likely to be highly variable between countries. The East Asian cultures, in particular, do not appear to be experiencing major epidemics of ischaemic heart disease - probably in part because animal fat consumption has not risen to the levels associated with epidemics of this disease.

3. CHANGING LIFESTYLES AND HEALTH

Changing lifestyles and the historic decline in infection

Public health measures (and curative measures) were not the only sources of the modern decline in mortality from infection and it is easy to overestimate their contribution. Changes in personal and domestic habits, especially those relating to cleanliness, practices within the household concerned with the rearing of children, along with the general increase in food consumption, have probably been more important. These are reasonably described as changes in "lifestyle" in Weber's sense.

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[2]Bulatao R., Lopez A., Stephens P. Estimates and projections of mortality by cause: methodology and detailed tables. In Jamison D., Mosley W. (eds), Evolving health sector priorities in developing countries. Washington, World Bank, 1989 ("in draft").

In the pre-modern West, the mode of life of city dwellers was associated with appallingly high mortality, especially from infection in early life. Life expectancy in the cities was commonly below 20 years and their populations could only be sustained by new recruits from the surrounding countryside.[3] Today, throughout the world, mortality in cities is typically lower than in rural areas. We have clearly learnt how to make urban life compatible with health, even if the relative importance of the various lessons learnt is not entirely clear and the contribution of the factors involved in the modern decline in mortality continues to be debated.

Because the development of effective clinical measures (such as antibiotics and vaccines) came too late to make a major contribution to decline in mortality in Western countries, Thomas McKeown turned his attention to the role of "public health measures" (safe water and sewerage) and improvements in diet.[4] He noted that public health measures were principally directed at food and water-borne infections but that quantitatively the decline in air-borne infection by reducing overcrowding and improving poor housing had been more important. Nevertheless he opted for the improvement of diet as the most important underlying cause of the observed decline in mortality. This decline had been initiated by an increase in food production and then rendered sustainable by the control of births. There are thus good grounds for according a significant role in the modern decline in deaths from infection to what might be called "changing lifestyles".

A strong clue is provided by the paramount importance of maternal literacy in the recent declines in mortality in developing countries. This points to the importance of changes within the household - among other things, in the way that children are cared for - as determinants of improved survival. In north-western Europe too it is likely that similar factors were important. Infant mortality declined in rural, economically undeveloped but literate Sweden before it declined in more economically advanced but less literate countries such as Britain. This association with literacy again implies changes in lifestyle consequent on a reorientation from traditional to cosmopolitan knowledge systems.

Changes in domestic mode of life have also been manifested by profound changes in attitudes and practices relating to personal cleanliness. Such changes were facilitated by state action to improve water supplies and remove sewage and by enhanced consumption opportunities - for example for soap and for cotton clothing. But such changes were also the result of relentless campaigns to change behaviour and the social norms that supported that behaviour. At the time these campaigns for cleanliness were felt to be coercive and were resisted. An editorialist of *The Times* of London expressed great relief in 1854 when Edwin Chadwick, an ardent sanitary reformer, was dismissed from the Board of Health: "We would rather take our chance of cholera and the rest than be bullied into cleanliness."

Now that historically stringent norms regarding personal cleanliness have become generally accepted, they are no longer experienced as coercive - except perhaps by children when they are being pressured into them.

The point of this discussion has been to emphasize that diets rich in animal fat, or cigarettes, or motor cars, are not the first products of economic development to have been loaded with adverse potential for health. Living in cities created health penalties too, by

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[3]Davis K. Cities and mortality. In: Proceedings of the International Population Conference, 1973. Liege: International Union for the Scientific Study of Population, 1973: 259-81.

[4]McKeown T. The modern rise of population. London: Arnold, 1976.

increasing the transmissibility of infection. Over time these penalties have been successfully avoided by a range of "structural" (sanitation), behavioural and normative countermeasures.

The idea of "changing lifestyles" to "promote health" thus entails much that is only apparently new. Before attempting to clarify further what is truly new it is helpful to look at the factors responsible for the rise of noncommunicable diseases. It is understood that most diseases, especially the sexually transmitted diseases, and now AIDS, have a greater or lesser "lifestyle" component. However this paper focuses only on the major noncommunicable diseases.

Noncommunicable diseases and modernization

Not all noncommunicable diseases tend to increase with modernization: some tend to decrease. Typical changes in the frequency of particular noncommunicable diseases with modernization are set out in Table 2.

Table 2. Noncommunicable diseases (and injuries) that typically show major changes in frequency with socioeconomic modernization

Category of noncommunicable disease	Typically fall with modernization	Typically rise with modernization	Variable relation to modernization
Cardiovascular diseases		Ischaemic heart disease	Stroke*
Cancer	Stomach Cervix Mouth and tongue	Lung Breast Colon Rectum Pancreas	
Respiratory disease		Chronic obstructive lung disease	
Gastro-intestinal disease			Liver cirrhosis Peptic ulcer
Metabolic disorders		Non-insulin dependent diabetes mellitus	
Injuries		transport injuries	suicide

*The observed trend in mortality in Western countries in this century is generally strongly downwards. (The recent rises in several Eastern European countries are an exception.) Whether mortality from stroke rose in the early phases of modernization is not clear.

Source: J. Powles, 1991.

Table 2 may help clarify why the magnitude of the net increase in noncommunicable diseases with modernization can be so variable. For example, in populations with a previously high incidence of stroke (Japan, China) the decline in stroke mortality can easily exceed the increase in ischaemic heart disease mortality - especially if the latter is weak or non-existent. Thus net mortality from cardiovascular disease declines. Similarly within the broad category of cancer, the magnitude of the decline in sites such as stomach and cervix may still be sufficient to exceed the increase in sites such as lung and breast, leaving a net decline in cancer.

For the noncommunicable diseases typically or variably associated with modernization, the major apparent contributory elements of lifestyle can be seen in Table 3.

Table 3. Major contributory elements of lifestyle to the noncommunicable diseases

Elements of lifestyle	Intermediate health outcomes	Final health outcomes
Activity:		
Use of mechanical power instead of muscular exertion; Insufficient compensatory exercise; Insufficient compensatory control of food intake	obesity	non-insulin dependent diabetes mellitus
Diet:		
Increased animal fat and sugar (especially in the absence of increased fruit and vegetable intake)	raised blood cholesterol concentration	heart attack
Drug use:		
Tobacco		chronic obstructive lung disease
Alcohol chronic exposure acute heavy drinking	hypertension	liver cirrhosis injuries from car smashes

Source: J. Powles, 1991.

There is extensive interaction between the factors identified in the first two columns and the frequency of outcomes in column 3. The trend in alcohol consumption with modernization is highly variable. In countries of European culture there has tended to be a long-term decline, partly reversed in the first 20 to 30 years after the Second World War.[5]

(1) Cardiovascular disease

For women, in all regions apart from Eastern Europe, there have been substantial reductions in cardiovascular mortality at least since 1952. For men, again excepting Eastern Europe, favourable trends generally date from around 1970. These data are encouraging in that they make clear that rising affluence is not necessarily associated with a continuing increase in the total burden of cardiovascular disease. One could even speculate that the rise in heart disease, which is not in any case universal (see Japan), is associated with the "first fruits" of affluence. The "second fruits", in the phase of mature industrialism, are associated with its reduction. Precisely which of these "second fruits" might be operating to reduce mortality is far from clear. The leading candidates are a reduction in smoking prevalence in men and the move to a lighter, more varied diet with less animal and more vegetable fat and more green, yellow and leafy vegetables and fruit - together with more effective case management.

(2) Cancer

Trends in cancer mortality have generally been less favourable than the trends for cardiovascular diseases. For males in many countries, the massive rise in lung cancer has carried aggregate cancer mortality up with it and it is only now beginning to turn around and decrease. For females, breast cancer is also often showing an upward trend. In European populations malignant melanoma is also rising. The aggregate burden of all other cancers appears to be roughly constant.

(3) Injury

Automation brings with it a decrease in obligatory muscular exertion and an increase in the risk of fatal injury, especially when combined with excessive alcohol consumption. The absolute numbers killed in car smashes may not appear high but they are disproportionately young lives that are lost and on a measuring scale of "person-years of life lost", car smash fatalities can rank relatively high.

In many jurisdictions dramatic reductions have been achieved in mortality in relation to the number of vehicles on the road. In the state of Victoria, Australia, this rate was reduced by two thirds in the two decades from the early 1960s. During this period a vast array of countermeasures were implemented with the support of an informed public: pre-licence education, tighter regulation of driving licences (including demerit systems), drink-driving laws (including random breath testing), control of speeding, compulsory wearing of seat belts, regulation of motor-cyclists, vehicle design requirements and roadworthiness checks, improvements to road environments and better case management of injuries.

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[5] See especially Spring J. and Buss D. Three centuries of alcohol in the British diet. *Nature* 1977; 270: 567-572.

Table 4 shows the differing levels of deaths in relation to the number of vehicles. This suggests that although modernization typically brings increasing exposure to motor vehicles, the risk of death in relation to that exposure may be dramatically reduced through the deployment of a vast array of intensive countermeasures.

Table 4. Risk of death from car smashes in selected countries of the Western Pacific Region[6]

Country	Deaths from car smashes (per year, 1980s)	
	Per 10 000 vehicles	Per 100 000 population
Australia	3.4	18.6
Fiji	18.5	11.5
Papua New Guinea	60.0	9.0
Solomon Islands (Guadalcanal)	18.5	20.7
Tonga (Tongatapu island)	17.7	14.4

Factors contributing to declines in mortality

Some similarities in the factors contributing to the declines in mortality from infections and in mortality from noncommunicable diseases are set out in Table 5.

[6]Ryan G. Prevention and control of traffic accidents, Fiji. Consultant report to Western Pacific Region of WHO. 1990: (ICP/APR/001;RS/90/0043).

Table 5. Similarities in influences on secular declines in mortality from infections and from noncommunicable diseases

	Secular fall in mortality from infections (all countries - most complete in industrialized countries)	**Secular fall in mortality from noncommunicable diseases (and injury)** (industrialized countries, since around 1970 - except Eastern Europe)
1. Role of change in mode of life, including consumption patterns, at household and personal levels ("lifestyle")	Primary importance of behaviour within household: implied by strength of association with maternal literacy; no other plausible explanation for decline in airborne infection (not directly influenced by 2 below)	Decline in smoking (men), dietary change (more fruit and vegetables, less animal fat)
2. Role of centrally directed environmental change	Water supplies and sewerage (declines in food and waterborne infections); vector control (declines in malaria etc.)	Controls on tobacco marketing (including tax); smoke-free workplaces; road and work safety measures
3. Role of specific preventive measures applied to individuals	Mass immunization (decline in vaccine-preventable deaths)	Professional advice on smoking cessation etc.
4. Role of case management	Chemotherapy (tuberculosis since 1950)	Anti-hypertensive medication - accelerated decline in stroke mortality (e.g. Australian males since 1970); treatment of heart attack
5. Changes in single elements of lifestyle may have multiple health benefits	Example: improved childhood nutrition reduces risk of wide range of infections	Example: reduced smoking reduces risk of wide range of noncommunicable diseases (heart attack, lung cancer, chronic lung disease)

Source: J. Powles, 1991.

4. LIFESTYLE CHANGES

4.1 Introduction

The incidence of most diseases that show major temporal and cross-cultural variation is strongly influenced by mode of living ("lifestyle"). Furthermore, the category of "noncommunicable diseases" does not in itself distinguish between those that tend to increase and those that tend to decrease with socioeconomic modernization. It is desirable to be more specific: the concern here is with those elements of modern "lifestyles" that are associated with those noncommunicable diseases that typically increase with modernization. The most important of these noncommunicable diseases include ischaemic heart disease, non-insulin-dependent diabetes, chronic obstructive lung disease, cancers of the lung, colon, rectum, pancreas, breast and, it is convenient to add, transport injuries. The relevant elements of lifestyle have already been identified in section 3. Here it is helpful to note the way in which these elements of lifestyle differ in character from those associated with variation in the impact of traditional killers. Some of these differences are set out in Table 6.

The reason why these conditions pose such a difficult public health challenge is apparent: the pathogenic elements of lifestyle are typically among those things enjoyed as the "first fruits of affluence". Furthermore, their adverse effects on health are often much delayed. For the young man becoming dependent on tobacco, the likely ultimate cost to his health, even if intellectually understood, must seem remote. The same is mostly true for the consequences of high-fat diets and physical inactivity. It is only in the case of acute drinking to excess of alcohol where the ill-effects are typically prompt: here the problem is partly the propensity of young males to "take risks". This may be contrasted with the prudent behaviour of mothers of young children who comprise the prime target for infection prevention.

Diet and activity

There is a clear tendency for the prevalence of obesity to rise with national income although it is certainly no longer confined to the industrialized world. The decrease in obligatory muscular exertion during daily life plus the increased availability of attractive foods are the major causes. As the resumption of a laborious mode of life is universally rejected, the only solution for many is voluntarily to restrict food intake.

In the United States, where mean Body Mass Indices (BMI) for adult men are above 25 (a widely accepted limit of the "healthy range"), daily energy intakes per kilogram body weight average about 130 kilojoules. This level of energy turnover is about 25% lower than in China (170 kJ/kg/day) where mean BMIs are at the lower end of the "healthy range". In Britain it is possible to compare energy intakes obtained from 7 day weighed food intake records in the 1930s with similar surveys done in the 1970s. These show substantial declines in energy turnover per kilogram body weight - most marked for adult males, but also notable for adult females and schoolchildren, and similar findings are apparent from Australian studies.

Obesity as a public health problem is thus largely an "exercise deficiency syndrome". Many people in industrialized countries still prefer to control it just by reducing energy intakes and without increasing expenditures - even though the health effects may be less favourable.

Table 6. Differences in influences on secular declines in mortality from infections and from noncommunicable diseases

	Secular fall in mortality from infections (all countries - most complete in industrialized countries)	**Secular fall in mortality from noncommunicable diseases (and injury)** (industrialized countries since around 1970 - except Eastern Europe)
1. Stimulus to change lifestyle	relatively immediate: risk of sickness and death of children	relatively remote: full health costs of past lifestyle may not yet be apparent
2. Latency between determinant lifestyle and health outcomes	relatively short (up to a couple of years)	relatively long (up to several decades)
3. Directness and promptness of health benefits from changed lifestyle	relatively high (improved health/ less sickness of children)	lower: full health benefits may be delayed for decades and not be readily identifiable
4. Relation of health-enhancing lifestyle to "modernity"	"positive": "modern" care and feeding of children; "modern" standards of personal and domestic cleanliness, use of modern medicine	"ambiguous/negative": involves deprivation of "first fruits" of affluence - tobacco, animal products and sugar in diet, alcohol, use of machines to avoid muscular exertion
5. Priority target for health advice	Mothers	All ages, with some emphasis on men
6. Strength of scientific evidence on relationship between lifestyle and health outcome	High	Moderate (evidence typically stronger for links between intermediate outcomes (e.g. blood cholesterol, blood pressure, body fatness) and final outcomes); inferences about the identity and relative importance of elements of lifestyle somewhat weaker
7. Importance of management of acute episodes of illness	Important	Generally less important (except for injury)

Source: J. Powles, 1991.

Within the Western Pacific Region, obesity is most prevalent in the island states of the Pacific, but is becoming a problem in the affluent young of other countries.

The changes in dietary composition that have accompanied modernization within the Western Pacific have been highly variable. A recent WHO study group on diet, nutrition and prevention of chronic diseases concluded "that repeated and consistent findings of an association between specific dietary factors and a disease suggest that such associations are real and indicative of a cause-and-effect relationship".[7] In many parts of the world, even modest increases in prosperity have been accompanied by major changes in dietary patterns and a dramatic increase in the incidence of diet-related disease. However the changes have not always been negative.

In poor agrarian populations (for instance in China) whose past diet was based on few foods, was low in protein and had micronutrient deficiencies, development has brought increased food variety, increased high quality protein and increased supplies of micronutrients. At the same time there has probably been a decrease in the salted and pickled foods and coarse grains associated with oesophageal and stomach cancers.

These changes have been associated with marked improvements in child health, a rapid increase in stature and, almost certainly, with a net decline in age-adjusted noncommunicable disease rates. It may be too early to get excited about warning the Chinese of the dangers of diets high in animal fat, especially as the diet is currently so low in animal fat and the experience of the very much richer Japanese is so reassuring. Nevertheless, even here, recent data suggest a worrying trend in some urban areas of China.

At the other extreme are some Pacific island populations whose traditional diet was sufficient in fish protein and in micronutrients from a variety of plant sources and who have since replaced this with a diet of store foods of much increased animal fat content, but sometimes with decreased micronutrients such as vitamin A. These changes in diet composition have been associated with markedly adverse trends in net mortality from noncommunicable diseases.

In between these two extremes lie the populations of countries such as Malaysia and the Philippines, especially their urban components.

Drug use

Tobacco:

Of all the elements of "modern lifestyles", the smoking of manufactured cigarettes is the one that will bring in its train the greatest amount of avoidable illness and premature death from noncommunicable diseases in the Western Pacific Region.

The prevalence of smoking is high, especially among males, in most countries of the Region. Among 15 Pacific populations the prevalence of smoking in males ranged from 38 to 88% with a median of 62%: for females the range was 4 to 74% with a median of 29%. There were relatively few heavy smokers however, with a median of 13% of males and 4% of females reporting smoking 20 or more cigarettes per day.

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[7] WHO. Diet, nutrition and the prevention of chronic diseases. Technical Report Series, No. 797. 1990:1-203.

A national survey on smoking in China in 1983 found a prevalence of 77% for males and 12% for females. Mean daily consumption was 6.9 cigarettes per man and 0.5 per woman. "National cigarette production was increasing during the early 1980s (from 600 billion in 1978 to 1400 billion in 1987) and appears likely to continue to increase."[8] Nevertheless, approximately a quarter of the countries legislating for smoke-free public places in the last ten years are from the Western Pacific Region. They include Australia, Hong Kong, Macao, Malaysia, New Zealand, Papua New Guinea, the Republic of Korea, Singapore and Viet Nam. The Civil Aviation Authority of China has received a WHO Tobacco or Health medal for its smoke-free policy.

There has been a major decline in the prevalence of smoking in several countries in the Region. In Australian males since the late 1940s the prevalence fell from around 70% to below 30%. There has also been a recent decline in the prevalence of smoking in women. Singapore and Japan have also shown recent declines. There is thus proof within the Region that smoking rates can be lowered.

A large proportion of the deaths attributable to smoking are deaths from cardiovascular disease, and the risk factors for cardiovascular disease multiply with each other to determine overall mortality risk. This means that the absolute amount by which smoking increases the risk of premature death depends on the background risk of cardiovascular disease. Thus if smoking doubles a relatively low background risk of cardiovascular disease in Japan or China, it will exact a smaller penalty than it would by doubling a much higher risk in Western populations. In the light of the massive health damage attributable to smoking from noncardiovascular causes as well, this point merely serves as a minor qualifier to the seriousness of the smoking problem in the Region.

Alcohol:

The way in which alcohol is used varies markedly between cultures. In some cultures drinking is usual with meals but little is drunk apart from meals; average consumption per day may appear quite high but there is little overt intoxication. In other cultures, drinking may be concentrated in one section of the population (typically young adult males) and among this group it may be concentrated in time - for example drinking bouts at weekends: a not uncommon pattern in some countries of the Western Pacific Region. Consumption per day, when averaged over the whole population, may not appear high but drunkenness may be noticeable among a section of the population.

The health effects of alcohol are also complex. It can cause harm in the short term via intoxication, or in the long term by causing or contributing to chronic diseases such as liver cirrhosis. The magnitude of the harmful effects associated with intoxication (such as traffic injuries) is clearly dependent both on whether alcohol is commonly consumed in a way likely to impair judgement ("peak drinking" - say 5 or more drinks in a drinking session) and on the activities engaged in when judgement is impaired. The *net* long term effect of alcohol on noncommunicable diseases is difficult to estimate because it appears that moderate use provides protection against what is, in many populations, the commonest cause of death, ischaemic heart disease. In Australia it has been estimated that the deaths from heart attack that are prevented by alcohol offset, to a significant extent, the deaths caused from liver cirrhosis and other diseases.

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[8]Peto R. General reflections on principles and purposes: indirect and direct purposes of the present monograph. In: Chen J., Campbell T., Li J., Peto R (eds). Diet, lifestyle and mortality in China. A study of the characteristics of 65 Chinese counties. Oxford/Ithaca/Beijing: Oxford University Press/Cornell University Press/People's Medical Publishing House, 1990. p 73.

A final complication is that the intoxication-related deaths attributable to alcohol (principally from car smashes and suicide) tend to occur in young persons, with each death accounting for the loss of many more potential "life-years" than deaths from chronic disease occurring in middle to late life.

The combined effect of all these considerations is generally to increase the salience of the intoxication-related problems associated with alcohol. Even in Australia, which is by no means at the extreme "peak drinking" end of the spectrum of drinking patterns, it has been estimated that injury (including suicide) accounts for around 80% of the net person-years of life lost attributable to alcohol.

The implication of all this for measures of the extent of "exposure" to risks from alcohol in the Region is that data on the average amount consumed per day need to be combined with information on how this is consumed.

It is clear from reports from Pacific Island nations and from Papua New Guinea, that there are severe intoxication-related problems in those countries, notwithstanding mean alcohol consumption levels that may not be high by international standards. Consumption levels are generally low in China, though they vary substantially by area. Japan is interesting as a culture in which intoxication is not uncommon but is not generally associated with violent or risk-taking behaviour.

5. PUBLIC HEALTH AND CHANGING LIFESTYLES

"Changing lifestyles" and health promotion in rich countries

The experience of industrialized countries, including the more recently industrialized, such as Malaysia and Singapore, is important for developing countries because it has shown that it is possible to contain and in some cases reduce the "health costs of affluence". The biggest gains have come from the decline in cardiovascular diseases. The rate of injuries from car smashes has been reduced in the face of rapidly increasing use of motor vehicles. There has been least success with cancer. But the main cause of the failure - the rise of lung cancer - is known and is being successfully contained in several countries.

It would be very helpful to know which of the efforts directed towards the protection of health have worked and which have not, but for many of the "preventive programme/lifestyle change/health outcome" linkages this is probably largely unknowable: formal preventive programmes are but one group of influences on lifestyle and the health outcome is typically diffused in time.

For example, cigarette smoking among men in several Western countries took 50 years to reach its peak prevalence (around 70%) at the end of the 1940s and has taken a further 40 years to decline to below 30% - a reduction in prevalence of around 1% per year. Thus during this phase of reducing smoking prevalence, the worthwhile effect of an additional anti-smoking measure, say a 50% increase in the background rate of reduction (from 1% to 1.5%) will be difficult to detect. (It would take 10 years to produce a 5% advantage in smoking prevalence over a control population.) Similar declines have also occurred at a highly accelerated rate, though from a less high initial prevalence, in Singapore.

The effect of measures to promote dietary change appear to be even more difficult to detect, though few observers doubt that a concern to protect health has contributed to substantial changes in dietary practices in many Western populations over the last 20 or 30 years. Such change has been most apparent in upper socioeconomic groups.

The one area where these linkages may be more readily established, because of the specificity of the countermeasures and the promptness of the response, is the control of injury from car smashes. For example in Victoria, Australia there was a 20% reduction in fatalities in the year following the introduction of compulsory seat-belt wearing. In this area there are clear and specific lessons to be learnt from the experience of industrialized countries.

The sequence and content of political action to promote lifestyle change

Although government responsibility may be thought of in terms of mounting formal preventive programmes, such programmes may often come after a period of "political preparation" and "constituency building". Thus smoking rates appear to have responded first to mass media reports of scientific findings of adverse health effects. These initial media stories were reinforced by authoritative summaries from official and professional bodies. Formal mass-directed anti-smoking programmes only gathered momentum after a constituency (mostly élite) had been created for them. As the constituency was consolidated it became possible to take ever stronger action to reduce smoking - including the combination of "structural" and educational measures now referred to as "health promotion". These "structural" measures have typically been strengthened with time: increased tax, restrictions on advertising, restrictions on sale to minors, smoke-free working and leisure environments.

Changing lifestyles and health promotion

It has already been noted that the public health problems associated with modernization vary considerably within the Region. Likewise priorities for action vary (Table 7). The control of tobacco smoking deserves priority throughout the Region. The control of injury, especially from car smashes, is also a widespread need. The need to promote changes in diet and activity to reduce chronic disease risk is variable. It is greatest in certain island states and, probably, smallest in the East Asian countries where the intake of animal fat shows little sign of rising to levels associated with high rates of ischaemic heart disease. The need to reduce damage from alcohol is also variable but apparently greatest in Oceania.

The need to promote changes in diet and activity is urgent both in countries in transition and in those where noncommunicable disease prevalence is actually declining. In the latter, obesity remains a problem and in the former it may be possible to avoid some of the dietary transitions that have been so detrimental in the industrialized countries.

Overcoming the attractions of tobacco smoking to populations in the early stages of affluence, the dependence-creating power of tobacco, the entrenchment of economic interests supporting tobacco smoking and the remoteness of the harmful effects on health present a difficult public health task, but one for which there is experience of relative success in the Region.

In Victoria, Australia, the Anti-Cancer Council has, for at least 20 years, deliberately set out to "politicize" the smoking issue. It has been able to use its considerable prestige among health professionals and its extensive public support to help create a constituency for ever stronger measures against tobacco: including the 1987 Tobacco Act. This Act curtailed advertising and imposed an additional tax on tobacco, the proceeds of which go to a "Health Promotion Foundation". This yields over 20 million Australian dollars per year and may well be a useful prototype.

Table 7. The variability of public health needs in the Western Pacific Region

	Group I East Asia	Group II Most Pacific countries	Group III Mainly other East Asian countries	Group IV Australia, New Zealand
Overall magnitude and trend in burden of noncommunicable diseases and injuries	Moderate and not increasing*	Moderate to high and rising*	Intermediate between groups I and II; e.g. with evidence of NCD rise among elite groups	Moderate to high but decreasing
Appropriate priorities for lifestyle change				
Smoking	high	high	high	moderate
Diet/exercise	low	high	moderate	high
Drunkenness/injuries	moderate	high	moderate	moderate

*After allowance for changing age-structure

Malaysia and Singapore have been emphasizing health education programmes and preventive medicine in recognition of the fact that the major causes of death are now associated with unhealthy lifestyles, particularly among young executives. Fiji is preparing a preventive programme through its noncommunicable diseases task force. Malaysia has already launched an ambitious six-year, 3.8 million dollar healthy lifestyle campaign based on the theme of "Choose health". Each year, the campaign will focus on one of the following six priority areas: cardiovascular disease, cancer, sexually transmitted diseases including AIDS, diabetes, the childhood diseases, and food poisoning.

6. CONCLUSIONS: THE INESCAPABLE CHALLENGE

1. "Lifestyles", as socially sustained modes of living viewed in their material aspect, are major determinants of most diseases that vary markedly across cultures and through time - not just of those noncommunicable diseases that typically increase with socioeconomic modernization.

2. Earlier phases of socioeconomic development have brought with them adverse as well as beneficial effects on health. Living in cities, for example, greatly increased the transmissibility of infection and was, in past centuries associated with extremely high mortality. Effective countermeasures have been devised to make living in cities compatible with good health, although new social pathologies have become apparent in the larger metropolises.

3. Earlier adverse trends in the noncommunicable diseases that have typically increased with socioeconomic modernization have been either reversed (heart attack, injuries) or contained (lung cancer) in most industrialized countries in the last two decades. This shows that such health costs are not a price that must inevitably be paid for the other benefits of modernization.

4. Because of their more rapid movement through the "demographic" and "epidemiological" transitions, most developing countries will not have the luxury of dealing with "traditional" and "modern" health problems sequentially. As several writers have pointed out, for the remainder of this century they will be dealing with both simultaneously. There are already more deaths occurring annually from noncommunicable diseases in the developing countries than in the developed. By early next century, noncommunicable diseases will account for more than half of all deaths in "developing" countries.

5. The "lifestyle diseases" associated with socioeconomic modernization share characteristics that make them particularly difficult public health challenges. The elements of lifestyle that contribute to them are not "discredited traditions" (as is often the case with childhood infections) but rather the "first fruits of affluence", that previously poor populations look forward to enjoying. Furthermore, the connection between the behaviours involved and the health effects is often much more remote than the connections between child care and survival.

6. If public health professionals and officials are to accept their professional and political responsibilities, they have no alternative but to rise to the challenge posed by the "new killers". Not to do so is to leave the populations, of whose health they are the guardians, destined for more death and suffering than they need to be.

7. Because of the difficulties inherent in changing the elements of lifestyle, major efforts may be required first to contain adverse trends and then to encourage favourable ones. Typically, this will require "structural" measures in combination with education and persuasion ("health promotion"). Because it is not always possible to be sure which measures have been most effective in countries that have, relatively speaking "succeeded", all measures that are affordable, culturally appropriate and likely to be effective should be deployed and, wherever possible, evaluated.

8. Attention needs to be paid to the political processes underlying successful measures to change lifestyles. In early stages, where lifestyle trends are adverse, the first task may be to build constituencies for action. This will include documenting and publicizing the likely health impact of the elements of lifestyle involved. For this, appropriate data are naturally a requisite: affordable and adequate data systems in support of noncommunicable disease prevention are needed just as they are for the prevention of childhood killers.

9. Public health administrations within the Region should demonstrate their desire to contribute to the solution of these problems by giving higher priority to obtaining data relevant to the prevention of noncommunicable diseases. The WPRO databank publication on "socioeconomic and health indicators" does not yet include data on smoking, alcohol use, diet composition, obesity or injuries.

10. Like learning to live healthily in cities, learning to avoid the potential health penalties of modernization is likely to be a transition rather than a process that continues indefinitely. Once new and hygienically appropriate norms (lifestyles) are established they should mostly be self-sustaining. Although transformations of lifestyle may be experienced as coercive at the time (as with the promotion of personal cleanliness in Western countries), once in place they become part of normal life, leaving the citizens of a modernized world free to enjoy its benefits with a minimum of its health costs.

ANNEX

WESTERN PACIFIC REGION: COUNTRIES, POPULATIONS, LIFE EXPECTANCY AND INDEX OF NONCOMMUNICABLE DISEASE MORTALITY

	Country	Population[1] (in thousands)	Life expectancy[2]	Index of non-communicable disease mortality[3]
1	American Samoa	37	51.7	5
2	Australia	16 800	76.3	5
3	Brunei Darussalam	241	71.4	5
4	China	1 111 910	68.9	3
5	Cook Islands	17	67.0	4
6	Cambodia	6 780	43.5	...
7	Fiji	727	63.0	3
8	French Polynesia	189	67.8	3
9	Guam	124	72.3	5
10	Hong Kong	5 761	77.2	4
11	Japan	122 026	78.4	4
12	Kiribati	66	53.0	3
13	Lao People's Democratic Republic	3 900	45.0	...
14	Macao	448	79.1	4
15	Malaysia	16 958	70.5	4
16	Mariana Islands, Northern	38	50.0	5
17	Marshall Islands	43	65.7	4
18	Micronesia, Federated States of	96	NA	5
19	Nauru	7	NA	3
20	New Caledonia	160	68.0	3
21	New Zealand	3 290	74.4	3
22	Niue	3	NA	...
23	Palau	14	60.0	3
24	Papua New Guinea	3 580	49.6	0
25	Philippines	60 097	64.3	3
26	Republic of Korea	42 380	70.9	3
27	Samoa	161	64.0	3
28	Singapore	2 685	74.0	4
29	Solomon Islands	306	60.0	0
30	Tokelau	2	NA	...
31	Tonga	96	63.0	3
32	Tuvalu	8	58.5	3
33	Vanuatu	150	60.2	1
34	Viet Nam	64 227	64.0	...
35	Wallis and Futuna	12	NA	...

[1]Figures mostly for 1988. Source: World Health Organization Regional Office for the Western Pacific, Western Pacific data bank on socioeconomic and health indicators. Manila: WHO Western Pacific Regional Office, September 1990 (WHO/WPR/HIN) p. 1.

[2]Source: As above, p. 3, where only sex-specific values are given in the table a simple average of the 2 has been used.

[3]The number out of the 5 leading causes of death that are chronic noncommunicable diseases or injury (including suicide). The categories used vary by country and the score is partly dependent on the classification used. "Respiratory diseases" and "digestive diseases", are presumed to be predominantly due to infective causes unless further specified (e.g. "chronic obstructive pulmonary disease"). "Liver disease" is presumed to be non-infective in origin. The ellipsis (...) signifies less than 5 causes listed or list confined to infective sources. (Source: As above, pp. 20-29.)