CHAPTER 3

Changing international perspectives of activity patterns and obesity prevalence

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Changing demography

Major demographic factors exert an influence on the international profile of obesity. One of these is that populations in developing and developed countries are ageing, as Tables 1 and 2 demonstrate.

Table 1. Trends in life expectancy at birth, for different regions (both sexes combined) (a,b).

Region	1950–55	1980–85	2020–25
Northern America	69.0	74.6	79.7
Europe	65.3	73.2	79.1
Oceania	60.8	68.0	75.6
USSR	64.1	67.9	76.7
Latin America	51.2	64.5	72.8
Asia	41.1	59.3	72.8
Africa	38.0	49.9	65.2
Developed countries	65.7	72.3	78.7
Developing countries	41.0	57.6	70.4
World total	45.9	59.6	71.3

a. In years, medium variant used for projection.
b. Adapted from World Population Prospects, 1988. United Nations publication.[23]

There is a general appreciation that levels of physical activity decline with age and that body composition tends to alter in the direction of decreased lean mass and increased fat mass.[8,17,22,24,26,28] Indeed, the numbers of people so affected in developing countries already exceed those in developed countries.[23]

At the same time, as gross national product (GNP) increases, the macronutrient profile of the diet tends to increase in the direction of more fat, and with it, all age groups, from children to the elderly, are at greater risk of obesity. Figure 1 shows the prevalence of obesity in preschool children in many countries. At the top of the Figure most – not all – countries have low GNPs, while many of those at the foot of the Figure are richer or developing.

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Table 2. Elderly population, aged 60 years or more, in millions by region (1950, 1985, and projections for 2025) (a,b).

Region	Total Population 1985	Elderly Population					
		1950		1985		2025	
		n	%	n	%	n	%
Europe	492	51	12.9	88	17.8	138	27.0
Northern America	265	20	12.1	43	16.4	88	26.4
USSR	277	16	9.0	37	13.5	72	20.6
Oceania	25	1	11.3	3	12.3	7	18.5
Asia	2834	92	6.7	205	7.2	698	14.3
Latin America	404	9	5.3	27	6.8	97	12.7
Africa	557	12	5.4	27	4.9	101	6.4
Developed countries	1174	95	11.4	189	16.1	343	25.3
Developing countries	3680	106	6.3	243	6.6	858	12.1
World total	4854	201	8.0	432	8.9	1201	14.8

a. Medium variant used for projection.
b. Adapted from World Population Prospects, 1988. United Nations publication.[23]

Thus, even in parts of Africa and South America where the prevalence of protein energy malnutrition remains considerable, there is an increase in the prevalence of obesity.[6,15]

There is a particular problem for older women. In the first place, countries like Australia, through the 1980s, saw a substantial increase in obesity in middle-aged and post-menopausal women (Fig. 2).[20,21] Again, it is women who live longer than men in almost all areas of the world, so that most are surviving despite obesity. However, it can operate in later life to affect health outcomes. There is much discussion at present as to how related this is to age itself or to oestrogen deficiency, an enquiry is underway as to what extent hormone replacement therapy will influence this changing pattern.[30] Equally, there is interest in whether oestrogenic factors in foods whose intake is in decline in certain parts of the world, like Singapore, may be contributory to this change, or alternatively, provide an opportunity for prevention.[13,14,29]

Changing physical activity

Whilst the demographic changes, principally increases in all age groups, and in both genders, globally seems fairly clear, data to support a change in level are less direct than might be liked. Basically, enquiry of a socio-anthropological kind is required to see an overall relationship or connection between the phenomena of decreasing levels of physical activity and increasing obesity.[16,19] But the considered WHO view is that, with development, and change from rural to more industrialized and urbanized societies, there is less physical activity as a consequence of less demand for physical labour and more sedentary activity. For people to remain physically active there needs to be an increase in leisure time activity organized on an individual, community or societal basis. Indeed, it is interesting that the rise in formalized sport seems to have been particularly in evidence after the industrial revolution in countries like England.[7]

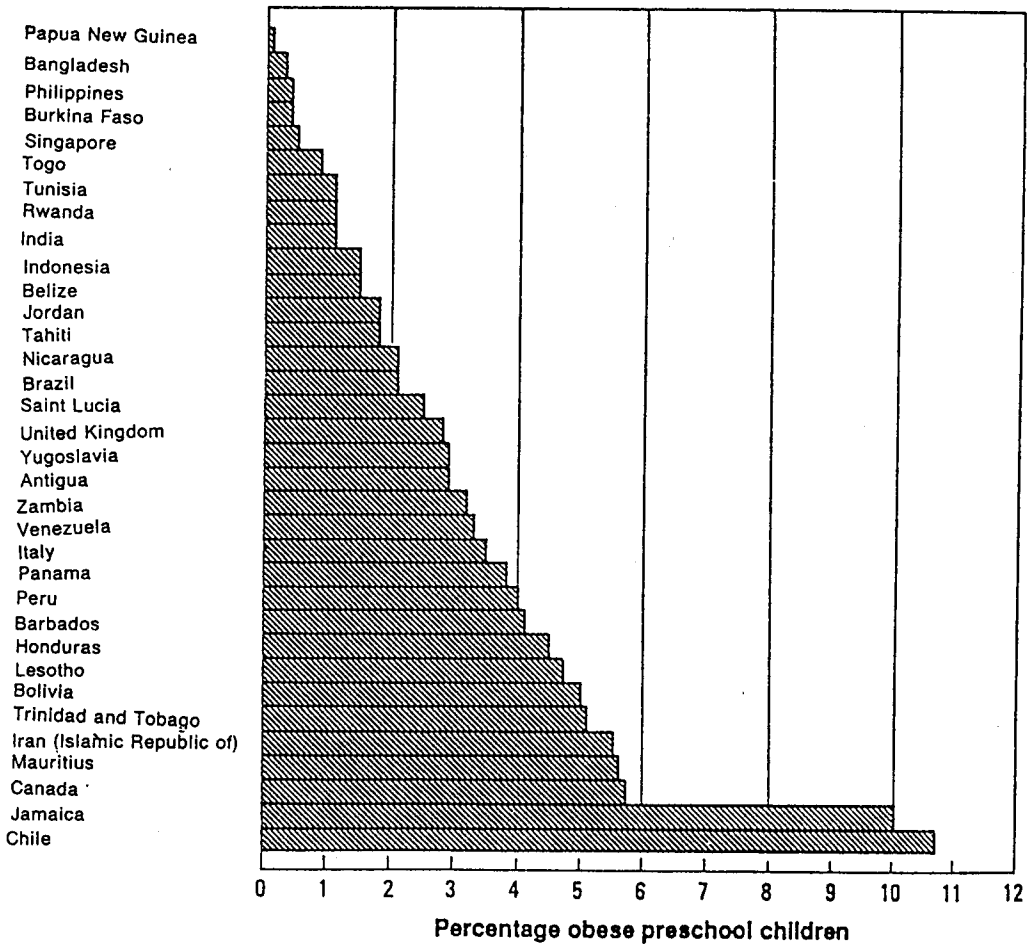


Figure 1. Prevalence of obesity in preschool children, defined as a weight more than two standard deviations above the reference median weight-for-height. From 'Diet, nutrition, and the prevention of chronic disease'.[23]

Changing fatness: total and distribution

Most attention has been paid to an increase in total fatness across communities, but the distribution of fatness is also changing.

There is particular concern that some groups, like the Chinese, express abdominal fatness early in the course of an increase in total body fatness. (Figs 3, 4) This may mean that the health significance of a given level of total fatness may differ from community to community, depending on the extent of abdominal fatness.[27] It is likely that, in these circumstances, the factors involved are a combination of genetic predisposition, gender, food intake and exercise. Indeed, it is becoming evident that the food determinants of total body fatness may not be the same as the food determinants of body fat distribution. (Table 3).

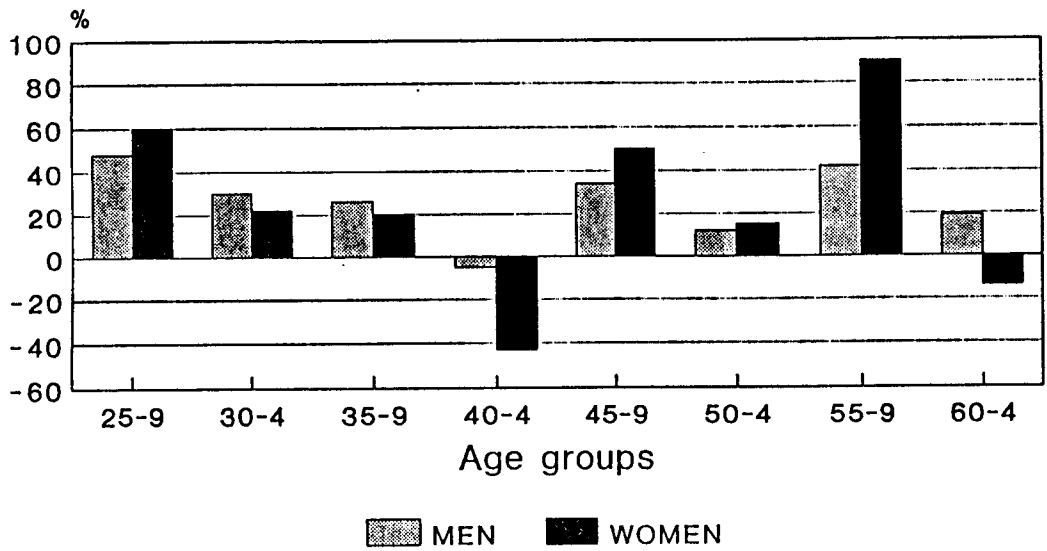


Figure 2. Obesity (BMI=Wt/Ht^2 > 30): percentage changes from 1983 to 1989 – men and women. NHF of Australia – Risk Factor Prevalence Surveys.

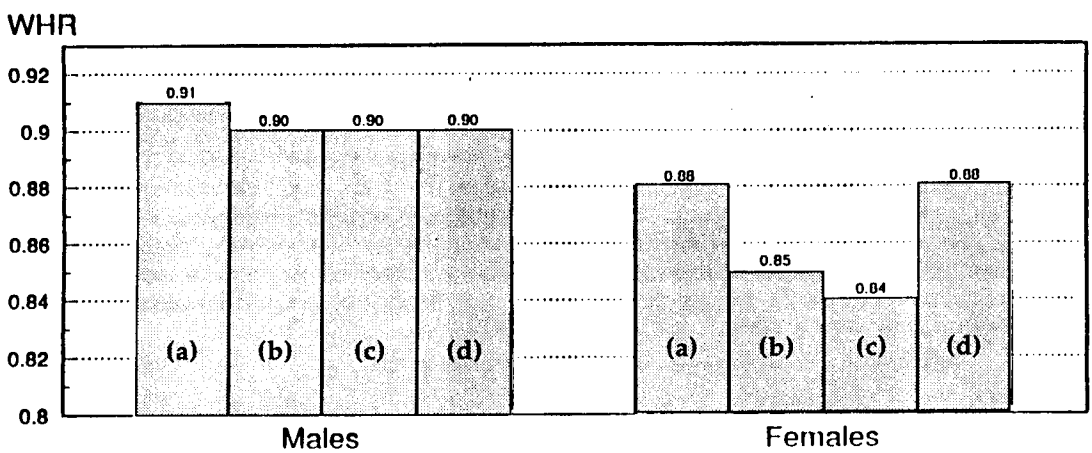
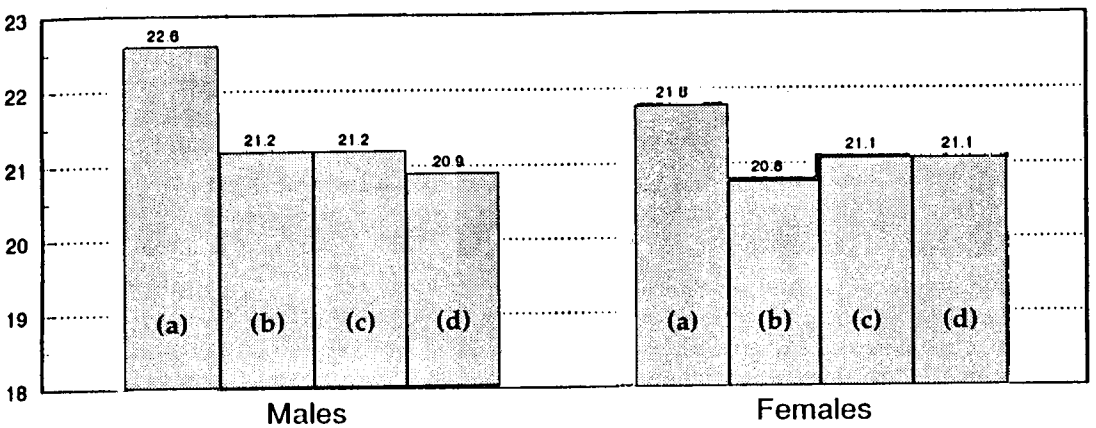


Figure 3. Chinese health study: mean waist-to-hip-ratio by gender by community.[27]

Cross-cultural relationships of energy balance

There have been few opportunities to make cross-cultural comparisons of all aspects of energy balance and how they relate to total body fatness and distribution, cross-culturally. One such study is that conducted by the International Union of Nutritional



(a) Melbourne; (b) Chauzou; (c) Meixian; (d) Sinhui

Figure 4. Chinese health study: BMI by gender by community.[27]

Table 3. Factors that were predictive of body fatness in food intake models, by gender (a). Data from Hage, 1992, cited in [25].

Risk factor	Food intake	
	Positive	Negative
BMI (body mass index)		
Men	citrus/apples, pears/bananas, light snacks, tropical fruit, poultry	mushrooms
Women	wine, nuts, potatoes	rice
WHR (waist-to-hip-ratio)		
Men	seaweed	citrus/apples/pears/bananas
Women	processed seafoods, melon, carrots	wine, pastry, biscuits

a. Taking into account the residual effect of WHR in the total fatness (BMI) model and the residual effect of BMI in the abdominal fatness (WHR) model.

Sciences Committee on Geriatric Nutrition,[28] known as the 'Food Habits in Later Life' study.

As can be seen from a comparison between elderly people of Anglo-Celtic ancestry in Melbourne, Greek ancestry in Spata, Greece, Swedes in Sweden and Japanese in

Okazaki, the men and women in Sweden with the highest energy intakes are the ones with the least degree of body fatness, excepting the Japanese, and abdominal fatness at that, and also the most physically active (Figs 5–8). This is an important understanding to obtain, since energy intake is often inappropriately considered a complete statement about energy balance, which it clearly is not. Those studies which have examined energy intake prospectively, as a predictor of coronary or total mortality, show it to be favourably determining of mortality.[5,9,10,12,18]

Changing disease patterns

When considering changing disease patterns towards chronic disease in both developed and developing countries, it is often seen somewhat simplistically as dependent partly on an increasing prevalence of obesity. But the underlying determinants of abdominal obesity in particular, including gender, food and physical activity, need to be appreciated in their own right.

The disease outcomes that may be prevented or whose course may be changed by addressing the underlying reversible factors of physical activity and food intake include cardio-vascular disease, diabetes and impaired glucose tolerance, osteoporosis, psychological disorder, and possibly certain neoplastic diseases (Fig. 9).

Implications

International comparison of the relationships between energy intake and expenditure and the expression of fatness and its abdominal distribution, creates an appreciation that higher levels of energy intake and physical activity are often associated with

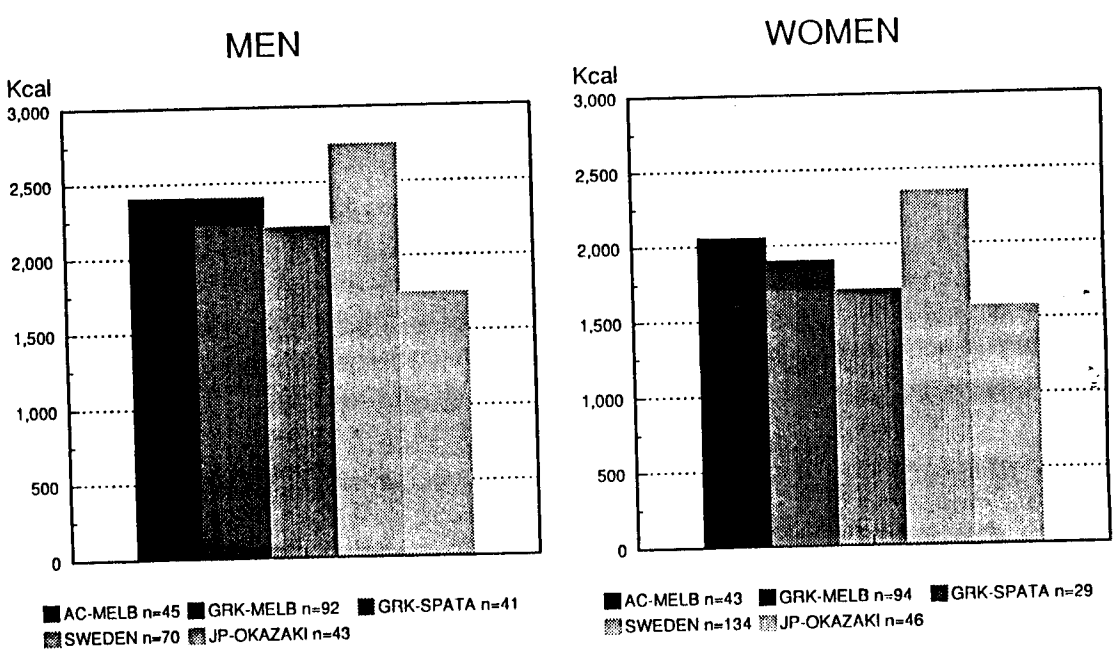


Figure 5. Mean energy intake by gender (>=70yr).

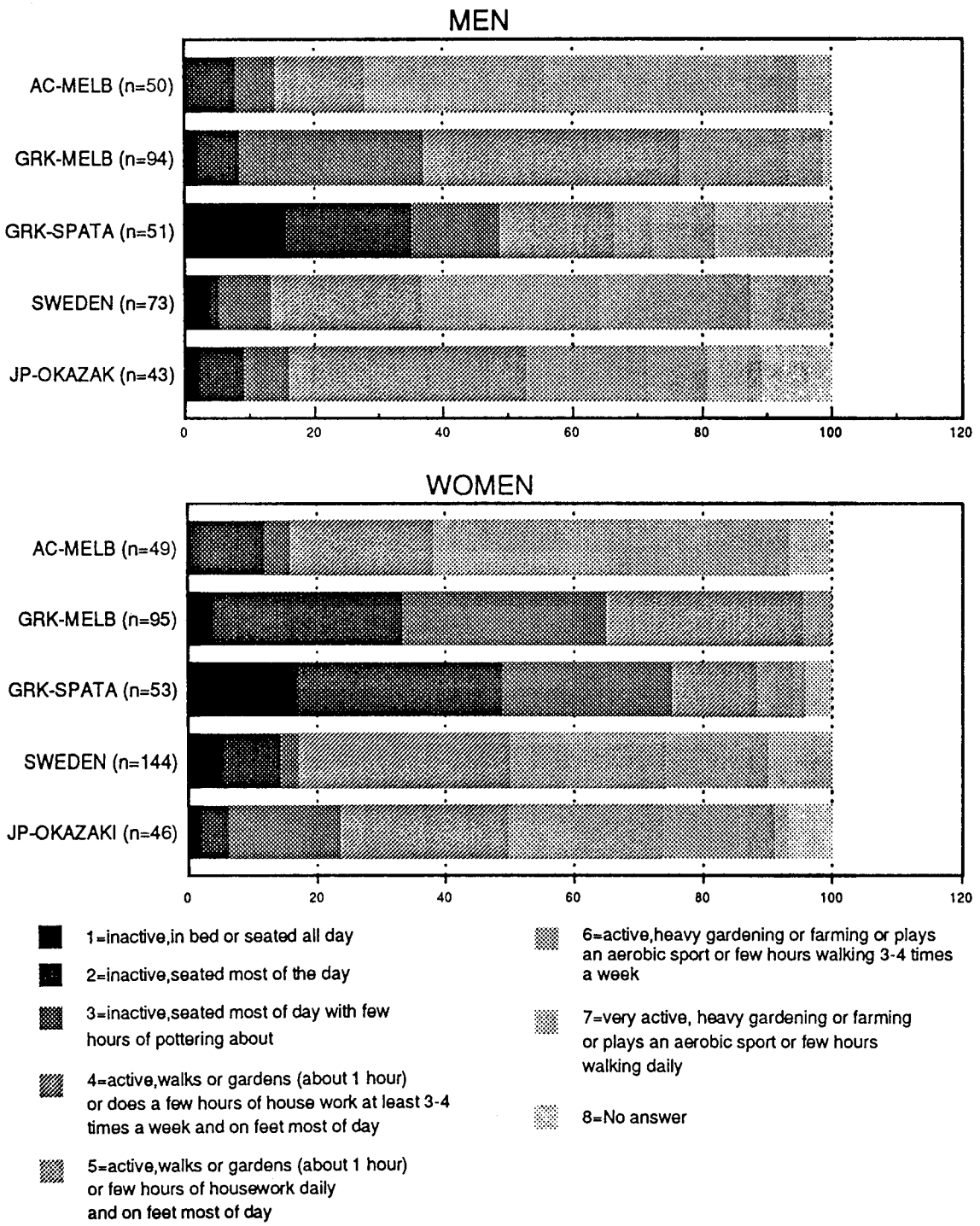
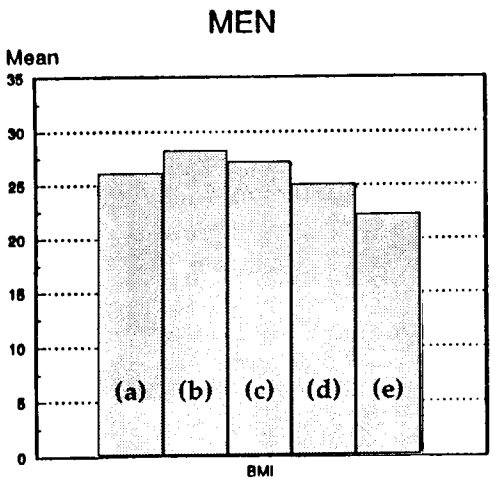
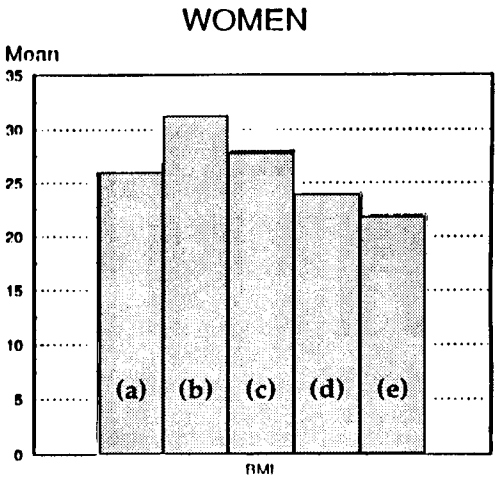


Figure 6. Percentage of exercise score by gender (>=70yr).

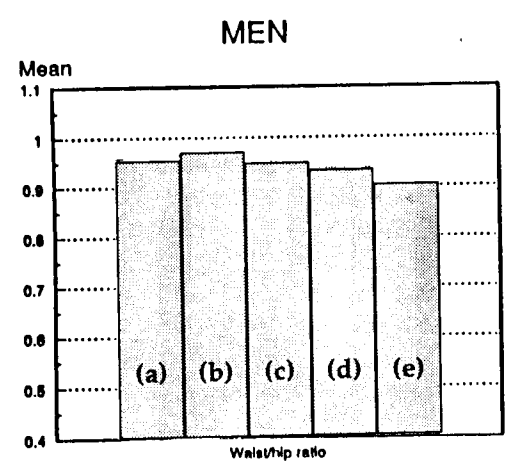


(a) AC-MELB n=45
(b) GRK-MELB n=92
(c) GRK-SPATA n=41
(d) SWEDEN n=70
(e) JP-OKAZAI n=43



(a) AC-MELB n=43
(b) GRK-MELB n=94
(c) GRK-SPATA n=29
(d) SWEDEN n=134
(e) JP-OKAZAKI n=46

Figure 7. BMI by gender (>=70 yr).



(a) AC-MELB n=45
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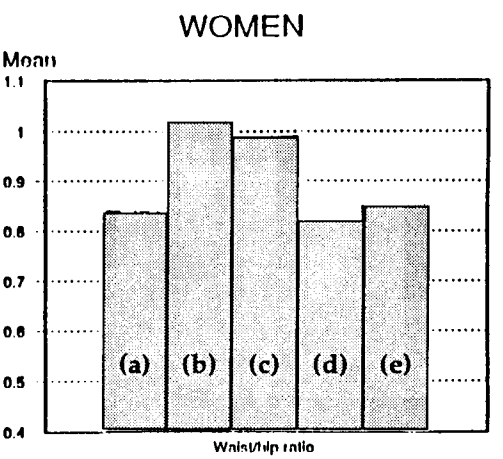

(a) AC-MELB n=43
(b) GRK-MELB n=94
(c) GRK-SPATA n=29
(d) SWEDEN n=134
(e) JP-OKAZAKI n=46

Figure 8. Mean waist-to-hip-ratio by gender (>=70yr). Waist measured at umbilicus. Hip circumference measured at maximum gluteal.

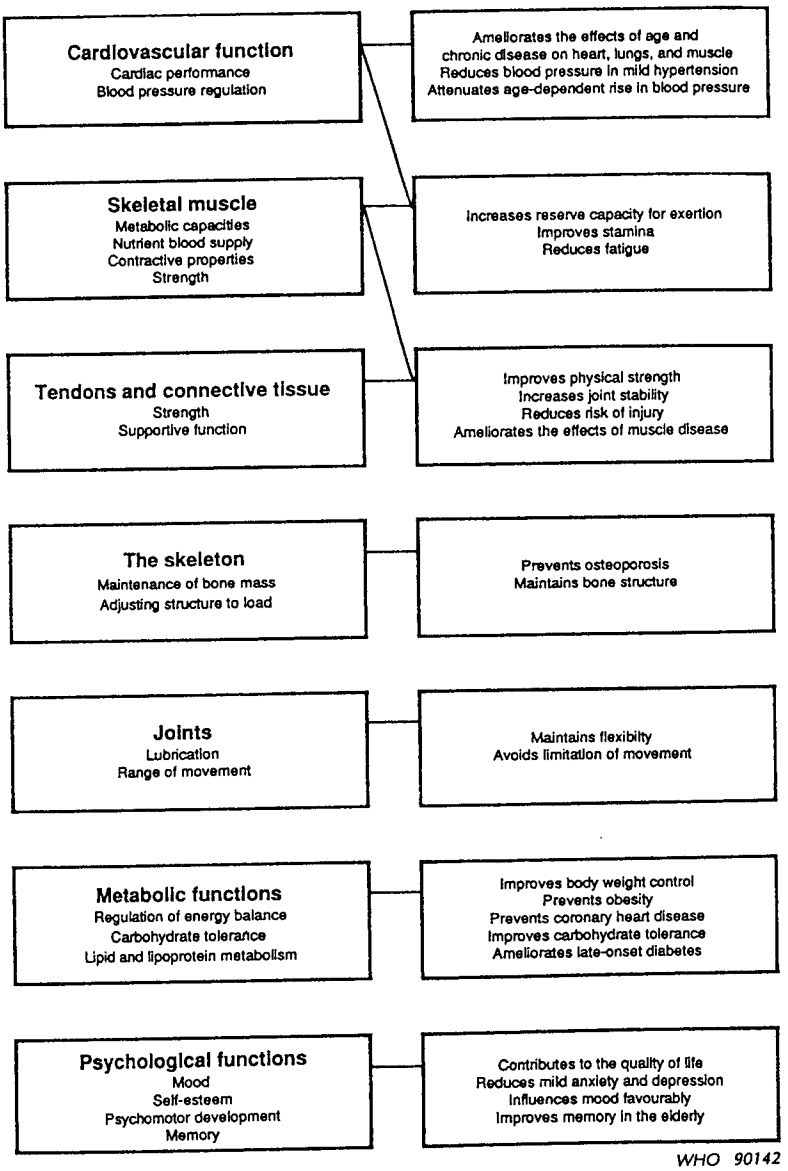

Figure 9. Physiological functions and capacities that improve with regular exercise (left) and the various diseases and conditions that are influenced favourably by these changes (right).[1]

Table 4. Causes of death in 1980 in developed and developing countries, and world total (a)

Cause of death	Percentage of deaths		
	Developed countries	Developing countries	World total
Diseases of the circulatory system	54	19	26
Neoplasms	19	5	8
Infectious and parasitic diseases	8	40	33
Injury and poisoning	6	5	5
Perinatal mortality	2	8	6
All other causes	12	23	21

lesser degrees of fatness and that opportunities for prevention of the problem should emphasize these considerations.

At the same time, comparable life expectancies may be seen, for example, in Scandinavia and Southern Europe and Japan, at altogether different levels of total body fatness. Whether or not the distribution of fatness, developing with age, is relatively more important for morbidity and mortality outcomes, is a particularly contemporary question. Intriguing is the possibility that the achievement of greater height might reduce the impact of this problem and may explain how early nutrition and fitness may contribute to later health. Again it is interesting that in ethnic groups who are more likely to have hip fatness or musculature, like the Greek communities studied by Kouris-Blazos and Wahlqvist,[28] more abdominal obesity may be seen for less adverse health outcomes. These groups, at least in later life, may also manage lesser levels of physical activity, for comparable health outcomes, than their counterparts with smaller hip circumferences.

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