

5. Risk factors for death and disability

Exposure to particular hazards, such as tobacco, alcohol, unsafe sex or poor sanitation, can significantly increase individuals' risks of developing disease. These hazards, or risk factors, are significant contributors to the total global disease burden and health policy makers need accurate information on their impact if they are to devise effective prevention strategies. Until now, however, there have been few attempts to measure the burdens of these risk factors, or to express them in a currency that can be compared directly with the burdens of individual diseases.

The GBD researchers have sought to overcome this problem. They have assessed, for the first time, the mortality and loss of healthy life that can be attributed to each of ten major risk factors in each region. These risk factors are: malnutrition; poor water supply, sanitation and personal/domestic hygiene; unsafe sex; tobacco use; alcohol use; occupation (that is, exposure to hazards through work); hypertension; physical inactivity; illicit drug use; and air pollution.

5.1 How the burden of risk factors was assessed

The burden of disease or injury in a population today that can be attributed to past exposure to a given risk factor is, essentially, an estimate of the burden that could have been averted in the population if that particular risk factor had been eliminated. More precisely, this is defined as the difference between the currently observed burden and the burden that would be observed if past levels of exposure had been equal to a specified, reference distribution of exposure. In general, to calculate this, it is necessary to know: (a) the relative risk at different levels of exposure for each cause of death and disability linked to the factor; (b) the distribution of different levels of exposure in the population; and (c) the burden of disease or injury due to each of the causes linked to the factor. Depending on the nature of the risk factor, the reference distribution against which relative risk is compared could be zero exposure for the whole population, a population distribution of exposure from low to high levels based on observed populations, or an arbitrary distribution. For this study, the researchers used, wherever possible, zero exposure as the reference, except for risk factors such as hypertension, where clearly no one can be said to be exposed to "zero" levels.

Unsafe sex was the third biggest risk factor for disease burden.

In young adult women in Sub-Saharan Africa, it accounts for an estimated 30 per cent of the total burden.

Table 5 Global burden of disease and injury attributable to selected risk factors, 1990

Risk factor	Deaths (thousands)	As % of total deaths	YLLs (thousands)	As % of total YLLs	YLDs (thousands)	As % of total YLDs	DALYs (thousands)	As % of total DALYs
Malnutrition	5 881	11.7	199 486	22.0	20 089	4.2	219 575	15.9
Poor water supply sanitation and personal and domestic hygiene	2 668	5.3	85 520	9.4	7 872	1.7	93 392	6.8
Unsafe sex	1 095	2.2	27 602	3.0	21 100	4.5	48 702	3.5
Tobacco	3 038	6.0	26 217	2.9	9 965	2.1	36 182	2.6
Alcohol	774	1.5	19 287	2.1	28 400	6.0	47 687	3.5
Occupation	1 129	2.2	22 493	2.5	15 394	3.3	37 887	2.7
Hypertension	2 918	5.8	17 665	1.9	1 411	0.3	19 076	1.4
Physical inactivity	1 991	3.9	11 353	1.3	2 300	0.5	13 653	1.0
Illicit drugs	100	0.2	2 634	0.3	5 834	1.2	8 467	0.6
Air pollution	568	1.1	5 625	0.6	1 630	0.3	7 254	0.5

Source: Authors' estimates are based on data and information contained in individual chapters of Volume IX of the *Global Burden of Disease and Injury Series*.

5.2 Results: the contributions of risk factors to global burden

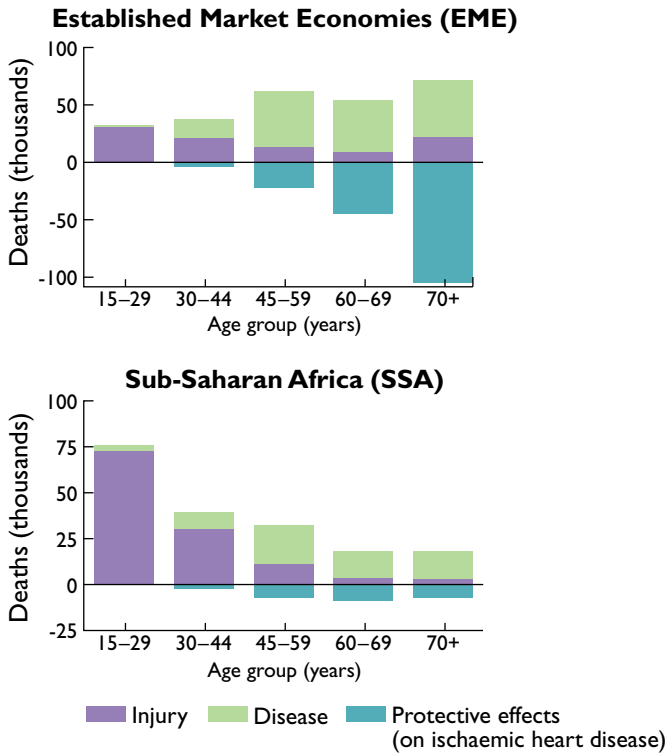
Of the ten risk factors studied, the most significant were malnutrition, poor water, sanitation and hygiene, unsafe sex, alcohol, tobacco and occupation. Together, these six hazards accounted for more than one-third of total disease burden worldwide in 1990 (see Table 5). Of the six, malnutrition and poor sanitation were the dominant hazards, responsible for almost a quarter of the global burden between them. Unsafe sex and alcohol each contributed approximately 3.5 per cent of the total disease burden, closely followed by tobacco and occupation hazards with just under 3 per cent each. These are comparable to the burdens caused by tuberculosis and measles.

Not surprisingly, the researchers found sharp inequalities between regions and between men and women in the burdens of most risk factors. For example, the ill-health consequences of unsafe sex—which include both infections and the complications of unwanted pregnancy—are borne disproportionately by women in all regions. In young adult women in Sub-Saharan Africa, unsafe sex accounts for almost one-third of the total disease burden.

Tobacco and alcohol currently cause their heaviest burdens in men in the developed regions. In these regions, the two together accounted for more than one-fifth of the total burden in 1990. However, the health burdens of smoking and drinking are far from being the exclusive preserve of the industrialized world. The recent rapid increase in tobacco use in Asia and other developing regions is expected to kill many more people in the coming decades than have so far died in the developed regions (see Section 6).

Figure 16 Male deaths attributable to, and averted by, alcohol use.

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The impact of alcohol varies between regions not only because of different levels of use in each population, but also because of differences in the age structure of those populations (Figure 16). Alcohol has consistently been shown to provide some protection against death from ischaemic heart disease, but to increase the risk of several other diseases, such as alcoholic psychoses, pancreatitis, some cancers and cirrhosis of the liver, as well as many injuries. Because of its protective effect against ischaemic heart disease, in populations where this condition is common and injuries and violence are rare, alcohol may prevent about as many deaths as it causes. In the Established Market Economies, for instance, this is probably the case. Nevertheless, alcohol causes a severe disease burden in these rich countries, because it causes so many injuries and premature deaths and thus results in large numbers of years lived with a disability and years of life lost.

In Sub-Saharan Africa, the picture is very different. There, ischaemic heart disease is relatively uncommon, so the protective effect of alcohol is far outweighed by its harmful effects in increasing the rates of death and disability from injuries. The contribution of alcohol to injuries is also

extremely high in Latin America and the Caribbean, where alcohol use accounts for almost 10 per cent of total disease and injury burden, a figure surpassed only in the developed regions. Ultimately, alcohol is estimated to have caused about three-quarters of a million more deaths in 1990 than it averted, with more than four-fifths of the excess deaths in the developing regions.

5.3 Some diseases are themselves powerful risk factors for other diseases

While assessments of the burdens of risk factors such as tobacco and alcohol can help to guide priorities, it is also useful to think about the impact of certain diseases as risk factors for other diseases. For example, diabetes mellitus strongly increases an individual's risk of developing ischaemic heart disease and stroke, while infection with hepatitis B virus increases the risk of developing liver cancer and cirrhosis of the liver. Traditional methods of assessing deaths by cause fail to capture these relationships. The GBD researchers have attempted to overcome this for a short list of well-studied conditions. They treated each condition as a risk factor and estimated how much of the total disease burden would be averted in each region's population if the condition were eliminated (Table 6). The most dramatic differences between directly coded and total burden are for diabetes and hepatitis B and hepatitis C.

Table 6. Total burden for major diseases, world, 1990

	<i>Deaths</i>			
	Both sexes (thousands)	Males (thousands)	Females (thousands)	Direct/ total
Chagas disease	49.2	28.0	21.2	0.39
Hepatitis B and hepatitis C	818.7	559.6	259.1	0.13
Diabetes mellitus	2 758.9	1 279.4	1 479.6	0.21
Cataracts	1 104.4	544.0	560.4	0.01
Glaucoma	330.5	141.4	189.1	0.02
Onchocerciasis	18.6	11.8	6.8	0.00
Trachoma	103.1	29.4	73.7	0.00
Unipolar major depression	786.2	456.4	329.9	0.00
Sexually transmitted diseases	413.3	183.0	230.3	0.56

	<i>DALYs</i>			
	Both sexes (millions)	Males (millions)	Females (millions)	Direct/ total
Chagas disease	1.6	0.9	0.7	0.40
Hepatitis B and hepatitis C	13.3	9.2	4.1	0.16
Diabetes mellitus	26.3	12.9	13.4	0.42
Cataracts	17.9	8.6	9.2	0.42
Glaucoma	5.8	2.3	3.5	0.44
Onchocerciasis	1.2	0.7	0.5	0.76
Trachoma	2.0	0.6	1.4	0.51
Unipolar major depression	69.8	28.3	41.5	0.73
Sexually transmitted diseases	25.3	9.1	16.2	0.74