Table 1. Prevalence of infection by the tubercle bacillus according to closeness of contact. Data from a study in the Netherlands. Data from Rouillon *et al.* (1976).

Microscopical status of source case sputum	% subjects infected among contacts of source case		
	At home ($n = 858$)	Near relative or friend ($n = 4207$)	Colleague at work ($n = 3931$)
Smear positive	20.2	3.7	0.3
Smear negative	1.1	0.2	0.0

should be tested at yearly intervals in order to determine the number of persons who actually convert from negative to positive in a given year. This approach is, however, usually impractical and indirect estimates of the annual infection rate are arrived at by testing a group of similar age range, such as military recruits, or even a population of mixed ages, provided the average age is known. Owing to serious methodological problems, such estimates must be interpreted with caution (Rieder, 1995).

The Global Burden of Tuberculosis

As the annual risk of a tuberculin-positive person developing active tuberculosis is about 0.2%, data on the annual infection rate from many countries can be used, subject to the methodological problems discussed above, to calculate the total number of new cases of tuberculosis developing from the infected pool each year. According to the WHO, the numbers of new cases in 1990 and 1995 were 7.5 million and 8.8 million respectively and the numbers are predicted to rise to 10.2 million by the year 2000, a 37% increase from the 1990 estimate (Dolin *et al.* 1994; Raviglione and Nunn, 1977). Some authorities, such as Enarson and Rouillon (1998), regard the WHO figures for incidence and deaths as an overestimate. Using modified methods, the WHO estimate for 1997 was

Table 2. The global toll of tuberculosis in 1997. Adapted from the World Health Organization (1998).

Region	Persons infected	Incidence (New cases)	Prevalence	Deaths
Africa	293,000,000	1,650,000	3,586,000	,770,000
Americas	237,000,000	448,000	988,000	160,000
Eastern Mediterranean	161,000,000	427,000	1,035,000	173,000
Europe	205,000,000	342,000	710,000	118,000
South-East Asia	704,000,000	2,800,000	6,553,000	1,095,000
Western Pacific	610,000,000	1,583,000	3,429,000	591,000
Total	2,210,000,000	7,250,000	16,301,000	2,907,000

slightly lower, at 7.3 million (World Health Organization, 1998). The geographical distribution of the patients in 1997 is shown in Table 2.

Being a very chronic disease with a clinical course often lasting well over a year, except in the case of the minority of patients who have access to good diagnostic facilities and adequately-supervised therapy, the number of people with active tuberculosis at a given time (the *point prevalence*) is about double the annual incidence of new cases and may therefore be as high as 16 million (World Health Organization, 1998). Roughly half of these patients have open or infectious pulmonary tuberculosis and may transmit the infection to others. If the average number of persons infected by one infectious patient (the *contagion parameter*) and the annual rate of infection are known, the number of infectious cases in a community may be calculated. In practice, the contagion parameter is not easily estimated and, depending on the region and socio-economic factors such as overcrowding, may vary from two to 20.

In most countries of the world, tuberculosis ranks high among the major causes of illness and death, as shown in Table 3 which lists the ten leading causes of mortality worldwide. Infectious diseases are, collectively, the commonest cause of mortality in the world today, accounting for around one third of all deaths. Infectious diseases are relatively well controlled in the industrialised nations, but 'lifestyle plagues' such as

Table 3. The leading causes of mortality worldwide. Data from World Health Organization, Annual Report, 1997.

Disease	Number of deaths annually (millions)
Coronary heart disease	7.2
Cancer (all types)	6.3
Cerebrovascular (stroke)	4.6
Acute lower respiratory tract infection	3.9
Tuberculosis	3.0
Chronic obstructive pulmonary disease	2.9
Diarrhoea (including dysentery)	2.5
Malaria	2.1
HIV/AIDS	1.5
Hepatitis B	1.2

cancer, heart disease, stroke and chronic lung disease, resulting largely from smoking, poor diet and stress, are an increasing cause of morbidity and mortality. The WHO has predicted that the developing world will experience an increase in such conditions in addition to their burden of infectious disease. Tuberculosis is estimated to be responsible for between 2.2 and three million deaths annually, including at least 100,000 children in whom — after malaria, acute respiratory and gastrointestinal disease — it is a leading cause of mortality. Amongst infectious agents, tuberculosis is the single most important cause of adult death, killing more people than AIDS, malaria and other tropical diseases together, and is the cause of 7% of all adult deaths and 26% of *preventable* adult deaths. The impact of tuberculosis can also be assessed by calculating the number of years of healthy life that are lost. This is expressed as disability-adjusted life years (DALY). Of all DALYs lost as a result of disease worldwide, tuberculosis accounts for 7% among women, and 8.4% among men, in those aged between 15 to 49 years (Raviglione and Luelmo, 1997).