measures. Thus, the incidence of initial single drug resistance declined from over 30% in 1980 to 15% in 1990 in South Korea and from 15% in 1981 to 6.3% in 1985 in Algeria (Vareldzis *et al.*, 1994). The impact of control measures on the incidence of multidrug resistance remains to be determined.

Bovine Tuberculosis and Implications for Human Health

It is generally forgotten nowadays that one of the most effective control measures ever undertaken for any bacterial disease was the virtual eradication of cattle tuberculosis in most developed countries (Moda *et al.*, 1996). Indeed, human tuberculosis caused by *M. bovis* (the bovine tubercle bacillus) in countries where such control measures have been applied successfully is extremely rare. In South-East England, *M. bovis* is responsible for less than 1% of all bacteriologically-confirmed cases of tuberculosis. Almost all patients were born before 1960, the year in which the bovine tuberculosis eradication programme was completed, and developed the disease as a result of late endogenous reactivation (Grange and Yates, 1994). The situation in the USA and most other European countries is very similar. There have been a few reports of human-to-cattle transmission of tuberculosis caused by *M. bovis* in Europe and there is limited and anecdotal evidence for human-to-human transmission but, as a general rule, this disease poses a minor and diminishing health problem in the developed world. Of more concern is the infection of cattle from wildlife reservoirs such as the badger in the UK and Ireland and the opossum in New Zealand (O'Reilly and Daborn, 1995). There have, however, been a few reports of the occurrence of tuberculosis due to *M. bovis* in younger HIV-infected persons, including a small but explosive epidemic of cases due to exposure to a source case in a hospital (Bouvet *et al.*, 1993).

Data on the incidence of cattle tuberculosis in countries in which little or no attempt to control the disease has been made are limited, although the disease is known to exist in 94 of 136 tropical countries

(Cosivi *et al.*, 1995). Information on the impact of such a disease on human health is even more limited, principally because few laboratories isolate tubercle bacilli and even fewer have the facilities or incentive to distinguish between the human and bovine types. Human tuberculosis due to *M. bovis* certainly occurs in the developing world, but few detailed epidemiological studies have been conducted (Cosivi *et al.*, 1998). There is a theoretical possibility that a high incidence of HIV infection could render communities more susceptible to the development of this form of tuberculosis after exposure to infectious cattle and that it might increase the risk of human-to-human transmission (Daborn *et al.*, 1996). Thus, further epidemiological studies on this form of tuberculosis in humans and a consideration of the cost effectiveness of programmes to eradicate it from cattle are required.

Comparison of the Problems of Tuberculosis Control Facing Industrialised and Developing Countries

The burden of tuberculosis is principally borne by developing nations where 95% of all cases of this disease and 98% of deaths due to it, occur.

Developing countries are faced with an enormous burden of disease of which tuberculosis, though one of the most prevalent, is nevertheless just one of many issues competing for very limited financial resources. In Uganda, for example, US$2.50 is spent annually per head of the population on health whereas US$30 is spent on paying interest on loans from the wealthier nations. In many countries, patients must pay for treatment and meet other expenses, such as travel to the health centre. Although the costs are small by Western standards, they may be very burdensome to poor people (Bevan, 1997). Successful tuberculosis control programmes based on subsidised directly observed therapy have been conducted in China and Bangladesh and a further one is in progress in India, but all are dependent on loans from the World Bank, thereby adding to the burden of international debt.