Global burden of leprosy in the year 2000

1. Introduction

Leprosy is an infectious disease caused by *Mycobacterium leprae* and has been known to mankind for thousands of years. The disease which often starts as with a painless patch is fully curable with antibiotic treatment, but may result in severe deformities and mutilations if left untreated.

There have been great strides in eliminating leprosy worldwide. Between 1985 and 2000 the global prevalence of leprosy was reduced by 86% (1), and more than 10 million patients had been cured by multi-drug therapy (MDT) by the end of 1999.

2. Case and sequelae definitions

The case definition and sequelae used for leprosy are given in Table 1 below.

Table 1. Case and sequelae definitions for leprosy

Cause category	GBD 2000 Code	ICD 9 codes	ICD 10 codes
Leprosy	U028	030	A30

Sequela	Definition
Cases	WHO case definition: Person showing clinical signs of leprosy, with or without bacteriological confirmation of the diagnosis, and requiring chemotherapy
Disabling leprosy	Grade 1 and 2 of World Health Organization grades of disability for leprosy

3. Disease model

Years lived with disability (YLDs) were calculated for the boxes shaded in grey.

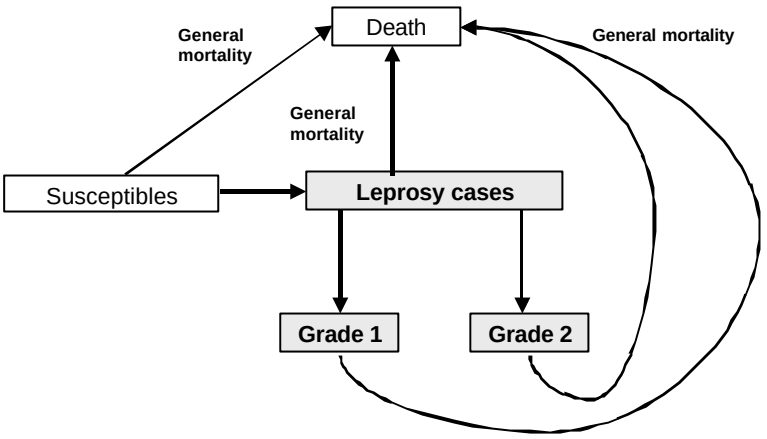


Figure 1. Leprosy disease model.

Table 2. Disease model assumptions

Definitions	As above
Incidence/Prevalence	Number of registered and new cases from WER, 14 July 2000, No 28 (1)
Case fatality	Mortality was considered negligible (RR = 1.0)
Other assumptions	Correction factors for under-reporting were used according to region (Source: Dr D Daumerie, Leprosy Control programme, (2)) as follows:
	AFRO D&E: 1.2; China: 1.25; India: 1.2;
Data	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).

4. Disability weights and health state descriptions

Disability weights from the Global Burden of Disease 1990 study have been used.

Table 3. Disability weights

Sequela/stage/severity level	Disability weight	Health state description
Cases	**0.000**	Person showing clinical signs of leprosy, with or without bacteriological confirmation of the diagnosis, and requiring chemotherapy
Disabling leprosy	**0.153**	Grade 1: Anaesthesia on hands and feet without visible deformity and/or eye problems without severe impairment of vision (vision 6/60 or better, i.e. able to count fingers at 6 metres).
		Grade 2: Visible deformity or damage to hand and feet, and/or

	severe visual impairment (vision worse than 6/60, ie. unable to count fingers at 6 metres)

5. Epidemiological data

Epidemiological data from the WHO Action Programme for the Elimination of Leprosy (LEP) (1) were used to estimate the incidence of leprosy for each country in the world. In the calculation of YLDs it was assumed that the duration of leprosy is on average 5 years, while Grade 1 and 2 (see table above) disabilities were thought to be life-long. It was assumed that mortality from leprosy was negligible.

A similar approach to estimating the burden of leprosy was chosen for the GBD 1990 (2) using registered cases of leprosy, in addition to information provided by WHO consultants and random sample population surveys.

Definitions of regions and other analysis categories used in the GBD 2000 project are given by Murray et al. (3).

Table 4. Data sources and assumptions - summary

AFRO D	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2). with correction factor of 1.2
AFRO E	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2). with correction factor of 1.2
AMRO A	
AMRO B	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).
AMRO D	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).
EMRO B	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).
EMRO D	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).
EURO A	
EURO B1	
EURO B2	
EURO C	
SEARO B	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).
SEARO D	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2). with correction factor of 1.2 for India
WPRO A	
WPRO B1	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2). with correction factor of 1.25 for China
WPRO B2	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).

WPRO B3	Weekly Epidemiological Record, 14 July 2000, No 28, pp 225-31. (also under: http://www.who.int/lep/disease/wer7528.pdf2).

6. Incidence, prevalence and mortality estimates for 2000

Table 5. Age-standardized incidence, prevalence and mortality rate estimates for WHO epidemiological subregions, 2000.

	Age-std. Incidence/100,000		Age-std. prevalence/100,000		Age-std. mortality/100,000	
Subregion	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
AFRO D	12.7	12.9	74.4	74.2	0.0	0.0
AFRO E	12.7	12.9	74.3	74.1	0.0	0.0
AMRO A	0.3	0.3	1.1	1.2	**0.0**	**0.0**
AMRO B	15.0	15.1	81.0	79.4	0.2	0.1
AMRO D	15.0	15.1	81.0	79.3	0.2	0.0
EMRO B	2.9	2.9	13.9	13.9	0.0	0.0
EMRO D	2.9	2.9	13.9	13.9	0.1	0.0
EURO A	0.3	0.3	1.2	1.2	0.0	0.0
EURO B1	0.2	0.2	0.9	0.9	0.0	0.0
EURO B2	2.9	2.9	13.9	13.9	0.1	0.1
EURO C	0.2	0.2	0.9	0.9	0.0	0.0
SEA RO B	14.4	14.4	78.8	78.2	0.3	0.1
SEARO D	31.1	31.3	143.6	143.6	0.3	0.0
WPRO A	0.3	0.3	1.2	1.2	0.0	**0.0**
WPRO B1	0.8	0.8	2.2	2.2	**0.0**	**0.0**
WPRO B2	14.4	14.4	78.7	78.0	0.2	0.1
WPRO B3	14.4	14.4	78.7	78.1	0.0	0.0
World	11.3	11.3			0.1	0.0

- Age-standardized to World Standard Population (4).

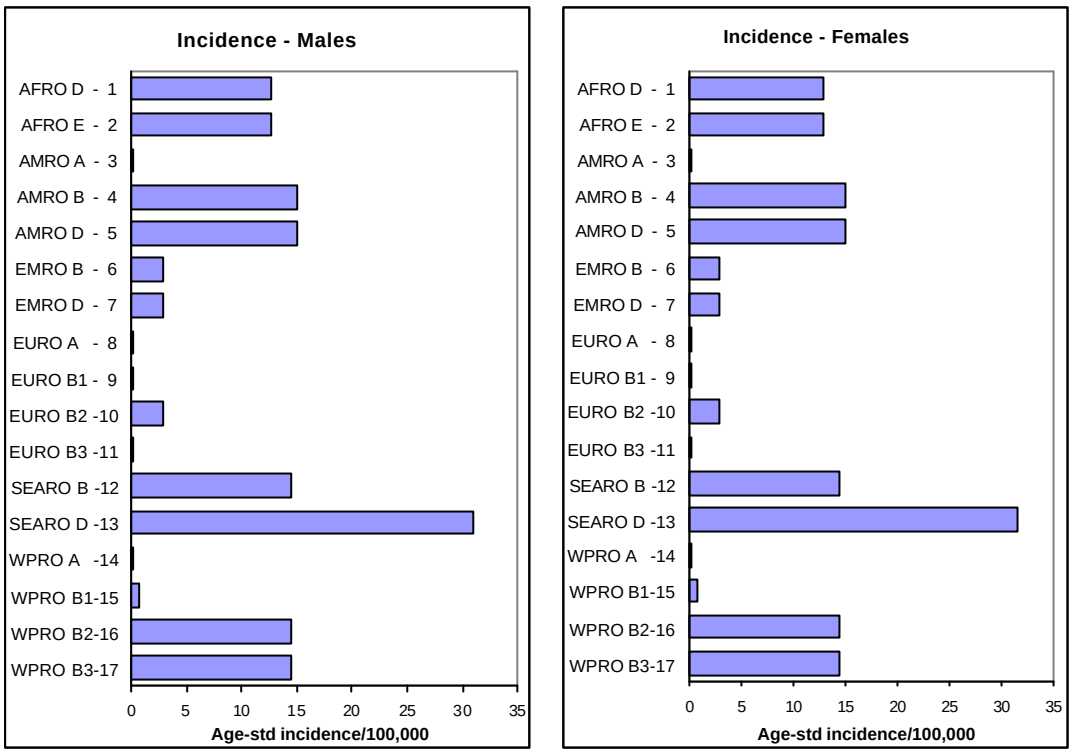


Figure 2. Age-standardized leprosy incidence rate estimates, WHO epidemiological subregions, by sex, 2000.

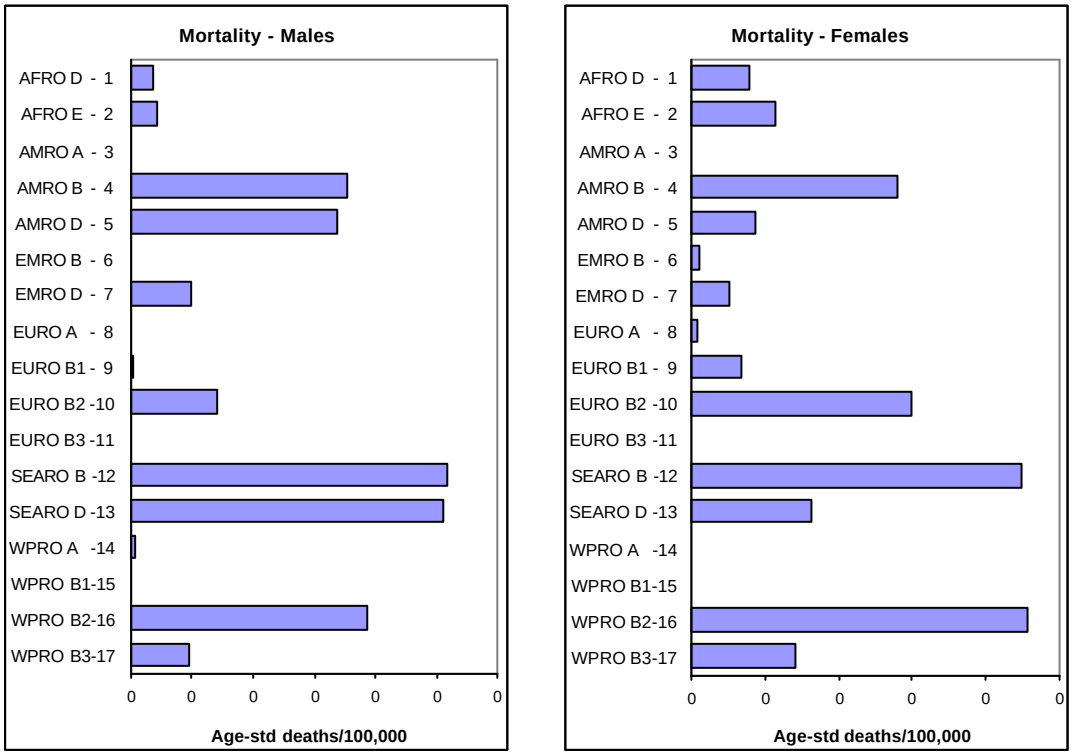


Figure 3. Age-standardized leprosy mortality rate estimates, WHO epidemiological subregions, by sex, 2000.

7. Global burden of leprosy in 2000

General methods used for the estimation of the global burden of disease are given elsewhere (3). The tables and graphs below summarise the global burden of leprosy estimates for the GBD 2000 and compare them with the leprosy estimates from the GBD 1990 (5).

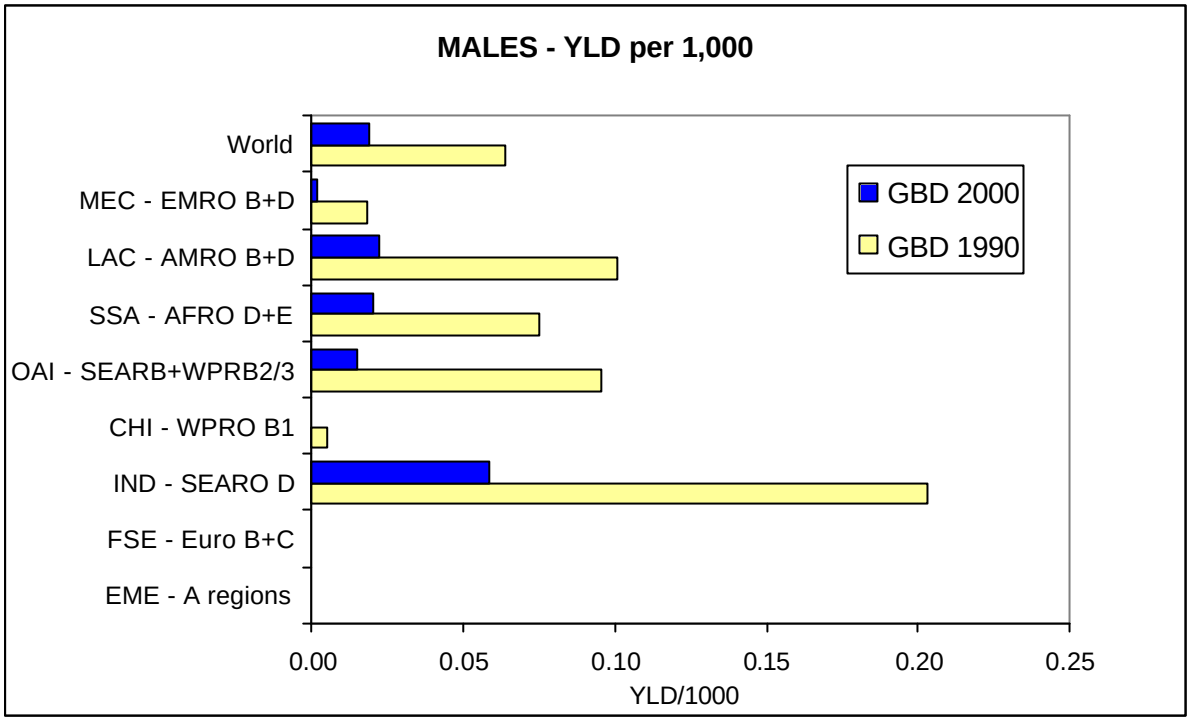
Table 6. Global total YLD, YLL and DALY estimates, 1990 and 2000.

	Males	*Females*	*Persons*
YLD('000)			
GBD1990	171	166	337
GBD2000	58	56	114
YLL('000)			
GBD1990	23	21	44
GBD2000	19	9	27
DALY('000)			
GBD1990	194	187	381
GBD2000	77	65	141

Table 7. YLD, YLL and DALY estimates for WHO epidemiological subregions, 2000.

	YLD/100,000		YLL/100,000		YLD	YLL	DALY
Subregion	**Males**	**Females**	**Males**	**Females**	**('000)**	**('000)**	**('000)**
AFRO D	2.42	2.44	0.28	0.48	**8**	1	**9**
AFRO E	1.67	1.69	0.42	0.70	**6**	2	**8**
AMRO A	0.00	0.00	**0.00**	**0.00**	**0**	0	**0**
AMRO B	2.59	2.60	1.48	0.56	**11**	4	**16**
AMRO D	0.11	0.11	0.79	0.01	**0**	0	**0**
EMRO B	0.02	0.02	0.00	0.00	**0**	0	**0**
EMRO D	0.33	0.33	0.45	0.26	**0**	0	**1**
EURO A	0.00	0.00	0.01	0.02	**0**	0	**0**
EURO B1	0.00	0.00	0.07	0.05	**0**	0	**0**
EURO B2	**0.00**	**0.00**	0.79	0.36	**0**	0	**0**
EURO C	0.00	0.00	0.05	0.00	**0**	0	**0**
SEARO B	1.05	1.04	1.64	0.90	**4**	5	**9**
SEARO D	5.84	5.87	1.41	0.43	**79**	13	**92**
WPRO A	0.01	0.01	0.10	**0.00**	**0**	0	**0**
WPRO B1	0.06	0.06	**0.00**	**0.00**	**1**	0	**1**
WPRO B2	2.82	2.77	1.24	1.23	**4**	2	**6**
WPRO B3	**0.00**	**0.00**	0.35	0.61	**0**	0	**0**

World	1.90	1.86	0.64	0.30	**114**	27	**141**



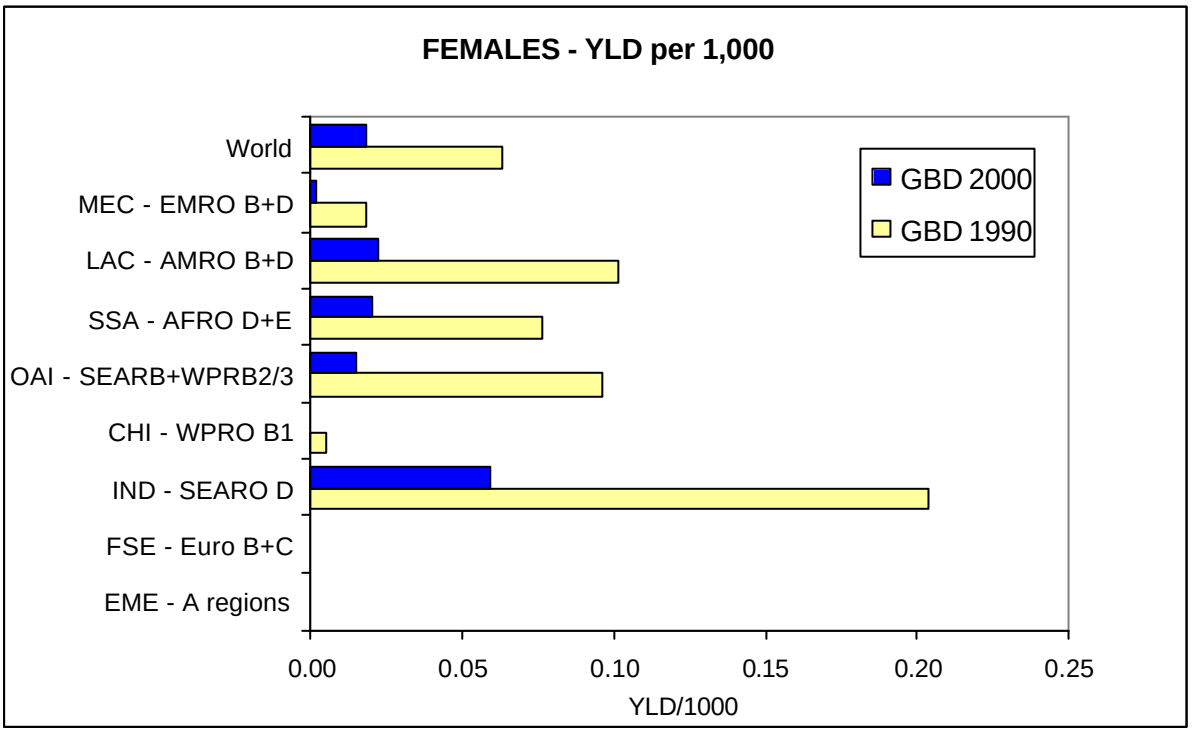
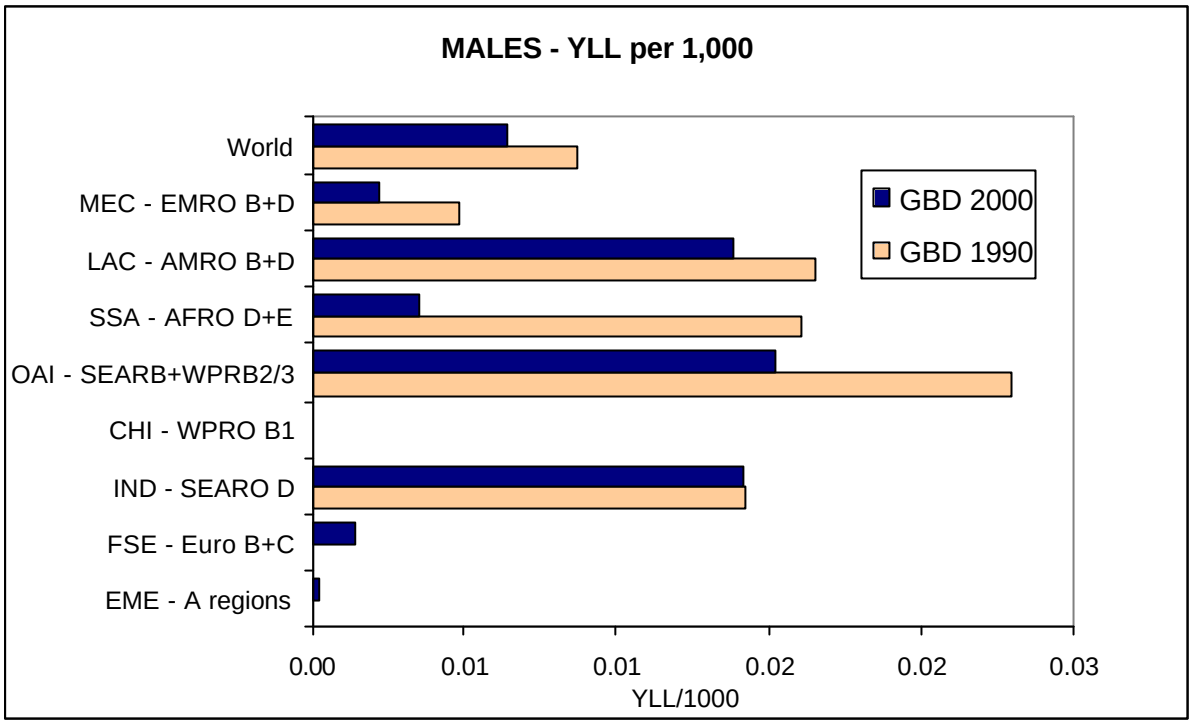


Figure 4. Total YLD rates, by sex, broad regions, 1990 and 2000.



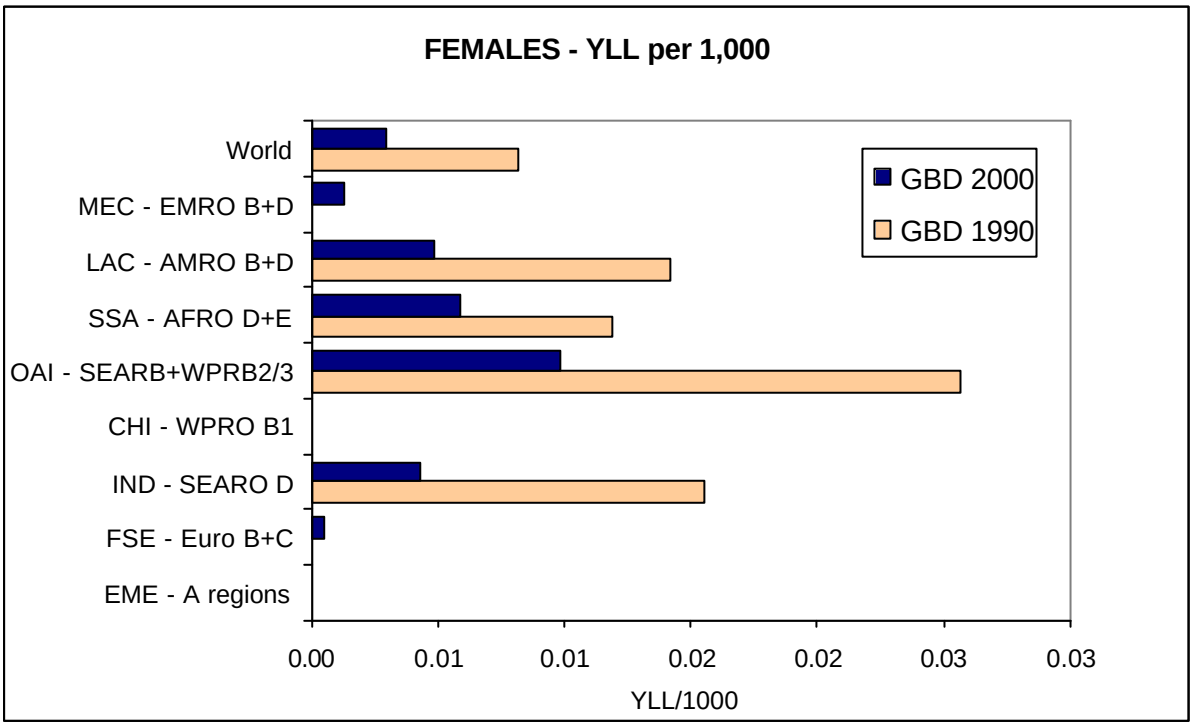


Figure 5. Total YLL rates, by sex, broad regions, 1990 and 2000.

8. Uncertainty analysis

General methods for uncertainty analysis of estimates for the Global Burden of Disease 2000 are outlined elsewhere (6). Uncertainty analysis for leprosy estimates has not yet been completed.

9. Conclusions

These are version 2 estimates for the GBD 2000. Apart from the uncertainty analysis, updating estimates to reflect revisions of mortality estimates and any new or revised epidemiological data or evidence, it is not intended to undertake any major addition revision of these estimates.

We welcome comments and criticisms of these draft estimates, and information on additional sources of data and evidence. Please contact Claudia Stein (EBD/GPE) on email steinc@who.int.

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10. References

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