

# Global burden of tuberculosis in the year 2000

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## 1. Introduction

Tuberculosis was the 7<sup>th</sup> leading cause of death and the 7<sup>th</sup> leading cause of disability-adjusted life years (DALYs) globally in 1990.<sup>1</sup> In the Version 1 estimates of the global burden of disease in 2000 reported in the World Health Report 2001, tuberculosis was the 8<sup>th</sup> leading causes of death and the 10<sup>th</sup> leading cause of DALYs.<sup>2</sup>

This draft paper summarises the data and methods used to produce the Version 2 estimates of tuberculosis burden for the year 2000. Detailed descriptions of the methods used to derive country-specific estimates of tuberculosis burden are available elsewhere.<sup>3,4</sup>

## 2. Case and sequelae definitions

Following conventions of the International Classification of Diseases, tuberculosis includes only cases among HIV sero-negative individuals. Deaths from tuberculosis in individuals who are HIV sero-positive are coded to HIV. For consistency, we adhere to the same convention for quantification of non-fatal component of burden as well.

**Table 1. Case and sequelae definitions for tuberculosis**

Cause category	GBD 2000 Code	ICD 9 codes	ICD 10 codes
Tuberculosis	W003	010-018,137	A15-A19,B90

Sequela	Definition
Cases, HIV sero-negative	Includes all forms of tuberculosis (i.e., sputum-positive pulmonary, sputum-negative pulmonary, and extra-pulmonary).

<sup>i</sup> Epidemiology and Burden of Disease, WHO (EIP/GPE/EBD)

### 3. Disability weights and health state descriptions

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

**Table 2. Disability weights**

Sequela/stage/severity level	Age group (years)				
	0-4	5-14	15-44	45-59	70+
Cases, HIV sero-negative	0.294	0.294	0.264	0.274	0.274

### 4. Epidemiological data

Starting in 1997, the World Health Organization began a study to develop country estimates of incidence, prevalence and mortality from tuberculosis. Data sources and methods used in that study have been described in detail elsewhere.<sup>3</sup> In brief, estimates of incidence were derived from case notifications adjusted by estimated case detection rates, prevalence data on active disease combined with estimates of average case durations, or estimates of infection risk multiplied by a scalar factor relating incidence of smear-positive pulmonary tuberculosis to annual risks of infection.

Since the original estimates for 1997 were completed, revised and updated estimates have been prepared.<sup>4</sup> The 1997 incidence estimates were updated based on notification trends for most countries outside the African region, by relationships between notification trends and adult HIV prevalence rates in a number of African countries, by new disease prevalence studies, and by revised estimates of case detection rates based on new assessments of the quality of surveillance systems. For details refer to Corbett et al.<sup>4</sup>

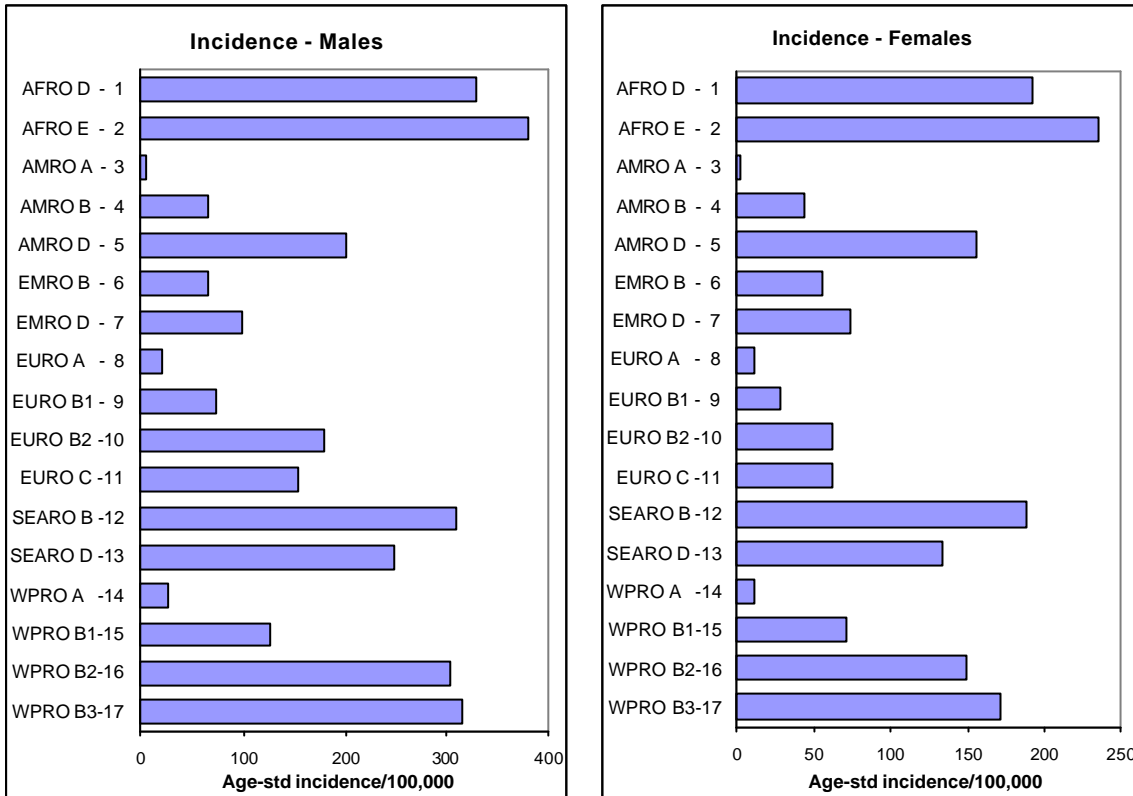
Annual reports on tuberculosis control have included further details on surveillance methods, case notifications and incidence estimates by country.<sup>5</sup>

## 5. Incidence, prevalence and mortality estimates for 2000

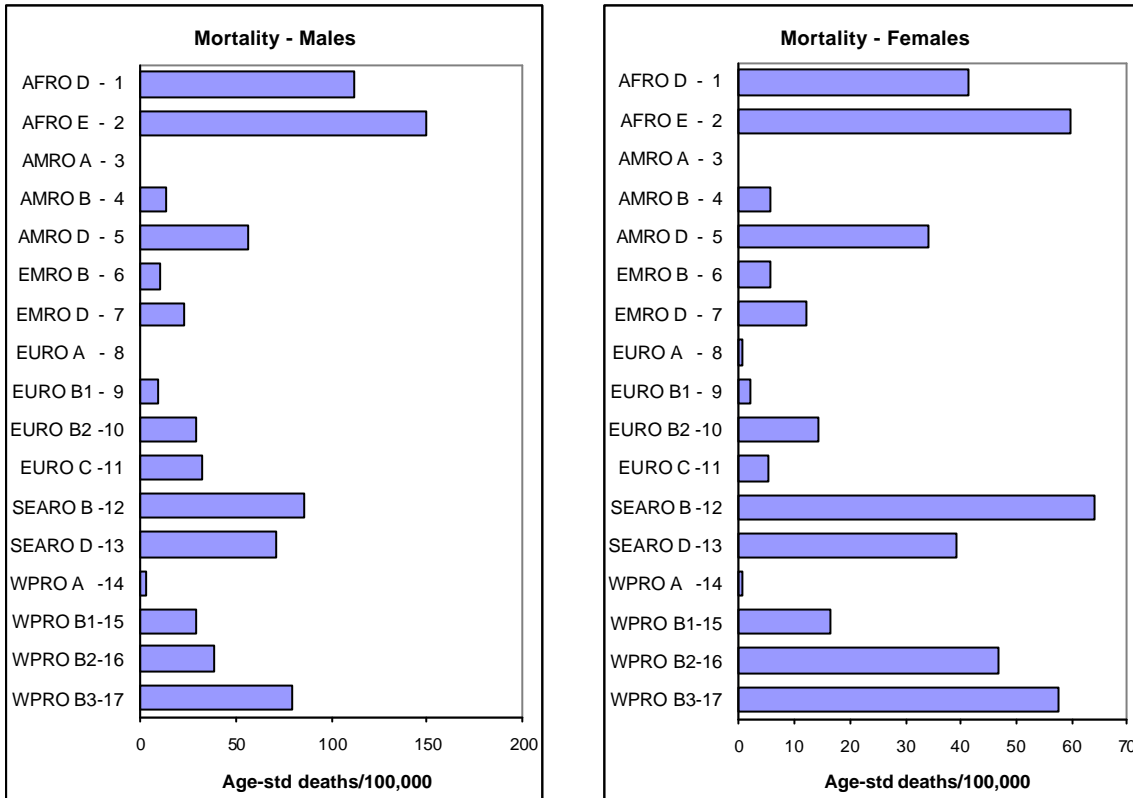
**Table 4. Age-standardized incidence, prevalence and mortality rate estimates for tuberculosis, WHO epidemiological subregions, 2000.**

Subregion	Age-std. Incidence/100,000		Age-std. prevalence/100,000		Age-std. mortality/100,000	
	Males	Females	Males	Females	Males	Females
AFRO D	327.8	192.8	609.7	358.6	111.4	41.2
AFRO E	379.8	235.2	543.2	336.4	148.9	59.7
AMRO A	5.8	2.9	4.4	2.2	0.4	0.2
AMRO B	66.1	44.7	95.9	64.8	13.8	5.5
AMRO D	201.0	156.3	243.2	189.1	56.5	34.1
EMRO B	65.2	55.1	90.6	76.6	9.6	5.8
EMRO D	99.1	73.3	133.7	98.9	22.3	12.3
EURO A	21.9	10.7	22.6	11.0	1.2	0.4
EURO B1	73.2	28.3	112.7	43.5	9.3	2.1
EURO B2	179.2	62.7	266.9	93.4	29.5	14.5
EURO C	153.5	62.7	231.7	94.6	32.3	5.3
SEARO B	308.8	189.0	741.0	453.6	85.5	64.2
SEARO D	248.8	133.6	617.0	331.4	71.4	39.3
WPRO A	26.5	10.8	35.0	14.3	3.2	0.9
WPRO B1	125.9	71.5	239.2	135.8	28.8	16.4
WPRO B2	303.2	149.2	460.9	226.8	37.8	46.7
WPRO B3	314.3	171.7	807.7	441.2	79.1	57.8
<b>World</b>	<b>162.8</b>	<b>96.1</b>	<b>326.4</b>	<b>190.9</b>	<b>39.9</b>	<b>21.5</b>

- Age-standardized to World Standard Population (3).



**Figure 1. Age-standardized tuberculosis incidence rate estimates, WHO epidemiological subregions, by sex, 2000.**



**Figure 2. Age-standardized tuberculosis mortality rate estimates, WHO epidemiological subregions, by sex, 2000.**

## 6. Global burden of tuberculosis in 2000

General methods used for the estimation of the global burden of disease are given elsewhere.<sup>7</sup> The tables and graphs below summarise the global burden of tuberculosis estimates for the GBD 2000 and compare them with the tuberculosis estimates from the GBD 1990.<sup>1</sup>

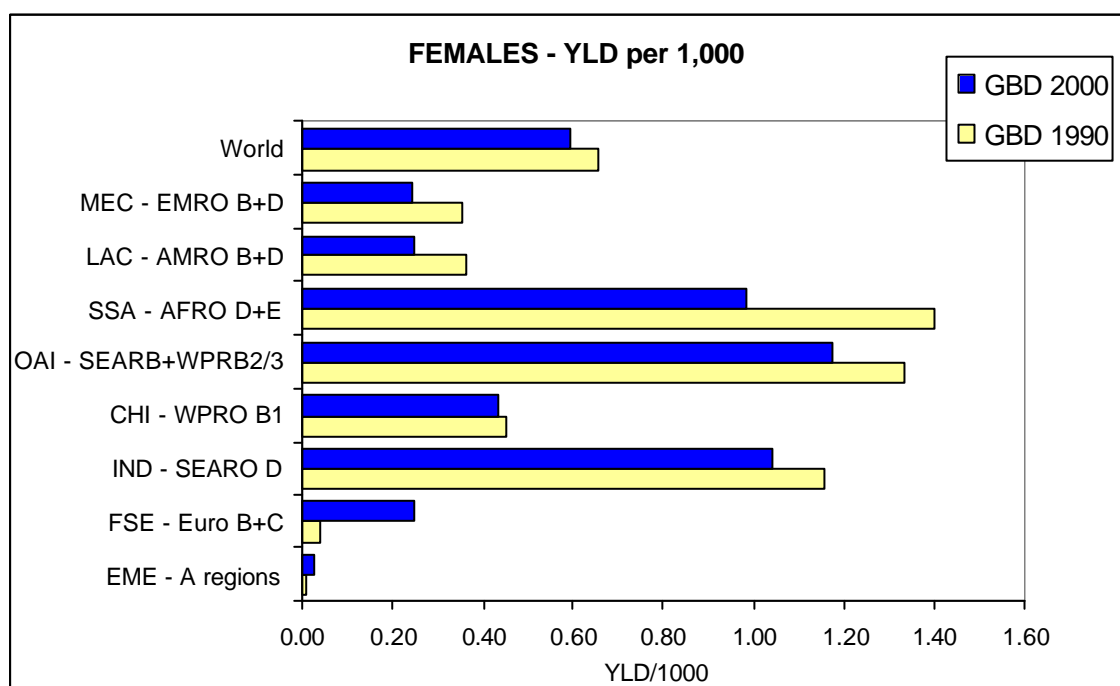
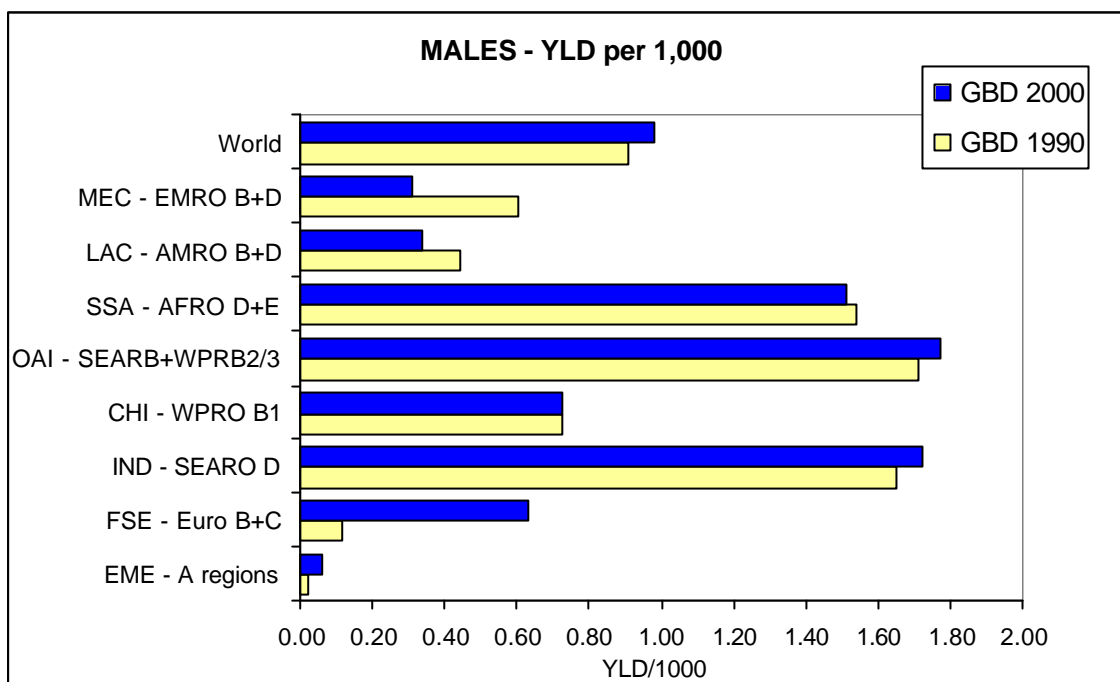
**Table 6. Global total YLD, YLL and DALY estimates for tuberculosis, 1990 and 2000.**

	<i>Males</i>	<i>Females</i>	<i>Persons</i>
<b>YLD('000)</b>			
<i>GBD1990</i>	1,166	794	1,960
<i>GBD2000</i>	1,048	613	1,660
<b>YLL('000)</b>			
<i>GBD1990</i>	19,334	14,971	34,304
<i>GBD2000</i>	18,846	12,173	31,019
<b>DALY('000)</b>			
<i>GBD1990</i>	2,407	1,714	4,122
<i>GBD2000</i>	2,983	1,789	4,773

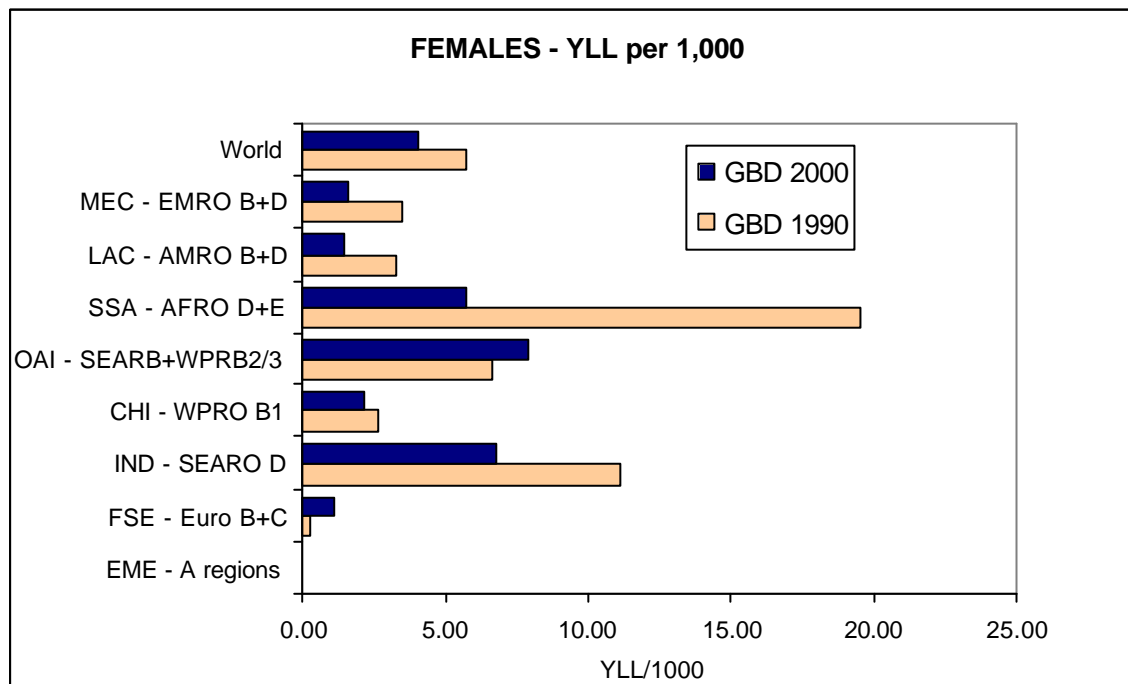
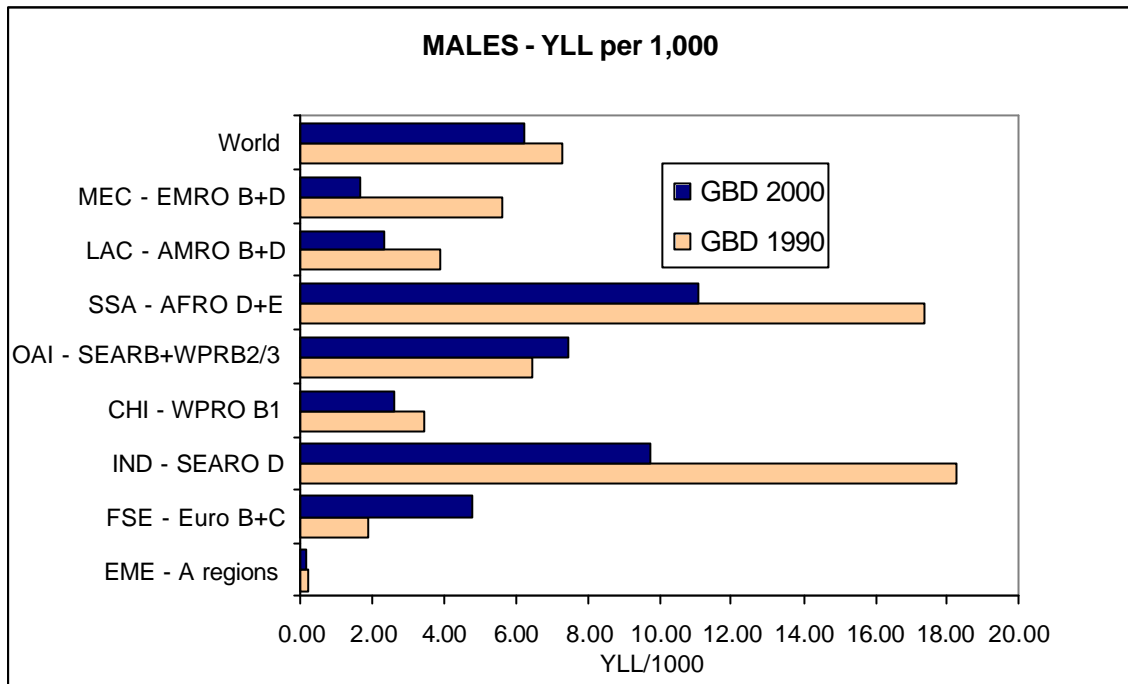
**Table 7. YLD, YLL and DALY estimates for tuberculosis, WHO epidemiological subregions, 2000.**

<b>Subregion</b>	<b>YLD/100,000</b>		<b>YLL/100,000</b>		<b>YLD</b>	<b>YLL</b>	<b>DALY</b>
	<b>Males</b>	<b>Females</b>	<b>Males</b>	<b>Females</b>	<b>('000)</b>	<b>('000)</b>	<b>('000)</b>
AFRO D	157.7	101.1	1579.8	797.9	432	3,963	4,395
AFRO E	144.7	95.4	2200.6	1141.2	405	5,629	6,034
AMRO A	1.4	0.7	4.9	3.5	3	13	16
AMRO B	27.0	19.3	160.0	82.1	102	534	636
AMRO D	75.9	61.1	676.4	537.7	49	433	482
EMRO B	22.9	19.1	102.0	107.9	29	146	176
EMRO D	38.6	29.9	231.4	222.1	47	313	360
EURO A	7.4	3.4	14.3	5.8	22	41	63
EURO B1	37.1	14.4	163.9	40.1	43	168	211
EURO B2	68.6	26.9	526.9	294.7	24	209	233
EURO C	80.6	31.1	696.9	121.9	134	962	1,096
SEARO B	200.2	135.8	876.5	801.0	663	3,309	3,971
SEARO D	172.3	104.2	969.7	676.8	1,878	11,161	13,040
WPRO A	11.9	4.8	30.0	11.1	12	31	43
WPRO B1	72.2	43.5	260.0	214.7	791	3,232	4,023
WPRO B2	113.8	67.4	376.9	771.1	128	818	947

WPRO B3	180.1	112.3	734.0	935.7	10	57	67
<b>World</b>	<b>98.0</b>	<b>59.6</b>	<b>619.1</b>	<b>405.7</b>	<b>4,773</b>	<b>31,019</b>	<b>35,791</b>



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



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

## 7. Uncertainty analysis

General methods for uncertainty analysis of estimates for the Global Burden of Disease 2000 are outlined elsewhere.<sup>6</sup> Uncertainty analysis for tuberculosis estimates has not yet been completed.

## 8. 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.

## Acknowledgements

The country-specific estimates of tuberculosis incidence and mortality that were the basis for the burden calculations described here were prepared by C. Dye, C. Watt and colleagues in the Communicable Diseases Department at WHO.

## 9. References

- (1) Murray CJL, Lopez AD. *The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020*. Cambridge: Harvard University Press, 1996.
- (2) *World Health Report 2001. Mental Health: New Understanding, New Hope*. Geneva: World Health Organization, 2001.
- (3) Dye C, Scheele S, Dolin P, Pathania V, Raviglione MC. Global burden of tuberculosis: estimated incidence, prevalence and mortality by country. *JAMA* 2002; 282:677-686.
- (4) Corbett EL, Watt CJ, Walker N et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. (*in preparation*) 2002.
- (5) *Global Tuberculosis Control: Surveillance, Planning and Financing*. Geneva: World Health Organization, 2002.
- (6) Salomon JA, Mathers CD, Murray CJL, Ferguson BD. *Methods for life expectancy and healthy life expectancy uncertainty analysis (GPE Discussion Paper No. 10)*. Geneva: World Health Organization, 2001.
- (7) Mathers CD, Stein C, Tomijima N, Ma Fat D, Rao C, Inoue M, Lopez AD, Murray CJL. (2002). *Global Burden of Disease 2000: Version 2 methods and results*. Geneva, World Health Organization (GPE Discussion Paper No. 50).