Global burden of cancer in the year 2000: Version 1 estimates

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1. Introduction

Cancer was estimated to account for about 7 million deaths (12% of all deaths) worldwide in 2000 *(1)*, only preceded by cardiovascular diseases (30 % of all deaths), and by infectious and parasitic diseases (19%). Cancer was also estimated to account for almost 6% of the entire global burden of disease in that same year *(1)*. More than 70% of all cancer deaths occurred in low- and middle-income countries and, although the risk of developing/dying from it is still higher in the developed regions of the world, the control of communicable diseases as well as the ageing of the population in developing countries, point to an increasing burden of cancer worldwide. In fact, Pisani et al *(2)* have projected a 30% increase in the number of cancer deaths in developed countries, and more than twice this amount (71%), in developing countries, between 1990 and 2010, due to demographic changes alone. Rising incidence will only add to this burden.

Table 1. Definitions of malignant neoplasm categories used in the GBD 2000.

		ICD-9 code	ICD-9 BTL code	ICD-10 code
U060	**Malignant neoplasms**	**140-208**	**B08-B14**	**C00-C97**
U061	1. Mouth and oropharynx cancers	140-149	B08	C00-C14
U062	2. Oesophagus cancer	150	B090	C15
U063	3. Stomach cancer	151	B091	C16
U064	4. Colon and rectum cancers	153, 154	B093, B094	C18-C21
U065	5. Liver cancer	155	B095	C22
U066	6. Pancreas cancer	157	B096	C25
U067	7. Trachea, bronchus and lung cancers	162	B101	C33-C34
U068	8. Melanoma and other skin cancers	172-173	B111, B112	C43-C44
U069	9. Breast cancer	174	B113	C50
U070	10. Cervix uteri cancer	180	B120	C53
U071	11. Corpus uteri cancer	179, 182	B122	C54-C55
U072	12. Ovary cancer	183	B123	C56
U073	13. Prostate cancer	185	B124	C61
U074	14. Bladder cancer	188	B126	C67
U075	15. Lymphomas and multiple myeloma	200-203	B14 [minus B141]	C81-C90, C96
U076	16. Leukaemia	204-208	B141	C91-C95
U077	Other malignant neoplasms *	152, 156, 158-161, 163-171, 175, 181, 184,	B092,B099.B100,B109, B110,B119,B121,B1	C17, C23, C24, C26-C32, C37-C41, C45-C49, C51, C52, C57-C60, C62-C66,

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186-187, 189-195	25, B129, B13	C68-C80, C97

NOTE: Garbage codes 196—199 (for ill-defined sites) redistributed across specific sites.

In GPE Discussion Paper 13, Mathers and co-authors outlined an approach to measuring cancer mortality and incidence based on existing sources *(3)*. This approach is summarized in Sections 2 and 3. Section 4 summarizes the methods and data used for the estimation of the non-fatal burden of cancer in the Version 1 estimates for the Global Burden of Disease 2000 project (GBD 2000) as published in the World Health Report 2001 *(1)*. Section 5 provides a brief overview of the resulting estimates of global cancer burden. These methods will be further revised to take into account new information on survival, incidence and long-term sequelae for the World Health Report 2002.

2. Cancer mortality burden in the year 2000

The Global Burden of Disease 2000 project has estimated total global cancer mortality as part of its detailed analysis of all-cause mortality levels, and cause of death distributions, for 191 WHO Member States *(3, 4)*. The International Agency for Research on Cancer (IARC) has also estimated global cancer mortality for the year 2000 in the Globocan 2000 database *(5)*. The GBD 2000 estimate for global cancer deaths is 11% higher than the Globocan 2000 estimates, and is substantially higher for Africa and South East Asia (India in particular). Globocan 2000 estimates *(5)* for global cancer mortality are based on vital registration data, where available, and for other regions, on mortality estimates derived from survival models using estimates of cancer incidence derived from available cancer registry data in each region.

It is quite likely that cancer registry data in these regions systematically underestimates both incidence and mortality. The GBD 2000 deals with this problem by estimating total cancer mortality for each Member State which starts with an analysis of the overall mortality envelope, in order to ensure that the cause-specific estimates add to the total all cause mortality by age and sex, and that there is not systematic underestimation or double counting of deaths. For countries and regions where information on the distribution of cancer deaths is not available, a similar approach has been taken to that used in Globocan 2000, of using available incidence distributions by site, together with estimates of site-specific survival, to estimate the distribution of cancer deaths by site *(3)*. It is also possible that the GBD 2000 methods result in an overestimate of total cancer deaths in some regions, and work is underway to obtain better data from these regions in order to check the validity of these estimates, and where appropriate, to improve them.

The GBD 2000 classification of malignant neoplasms by site of primary tumour as shown in Table 1. For regions where detailed data on the distribution of cancer deaths by site is not available, Mathers et al. *(3)* have used incidence estimates (drawn to a large extent from the comprehensive estimates undertaken for Globocan 2000 supplemented by some other incidence studies) together with cancer survival data from all regions of the world to construct a detailed model to estimate cancer survival in different parts of the world as a key input to estimate the distribution of cancer deaths by site. These distributions were then used, where necessary, to distribute total cancer deaths to various sites. The use of the survival model to estimate cancer incidence is described in more detail elsewhere *(3)*.

The site-specific distributions of cancer mortality were estimated directly from vital registration data for countries in the A regions (Amro A, Euro A and Wpro A) and for countries in Euro B and Euro C. Vital registration data for Amro B did not include codes to identify pancreas and ovary cancer. For these two cancers in Amro B, and for all sites in the other regions of the world, we used the estimated incidence distribution by site for each region (described above) in the survival model to calculate the mortality distribution by site for the year 2000. This distribution was then used to disagreggate the estimated total cancer deaths by age and sex for each region.

Table 2. GBD 2000 Version 1 estimated cancer deaths[a] by site and WHO region, and comparison with GLOBOCAN 2000 total cancer deaths by region

	GBD 2000 estimated cancer deaths ('000)							%total cancer
Site	**AFRO**	**AMRO**	**EMRO**	**EURO**	**SEARO**	**WPRO**	**World**	**deaths**
Mouth and oropharynx cancers	33	23	22	52	169	40	340	4.9
Oesophagus cancer	26	30	13	55	71	217	413	6.0
Stomach cancer	36	71	18	186	64	370	744	10.7
Colon and rectum cancers	25	105	12	237	55	144	579	8.4
Liver cancer	63	32	11	67	52	400	626	9.0
Pancreas cancer	8	48	3	93	16	46	214	3.1
Trachea, bronchus and lung cancers	23	232	31	373	153	401	1,213	17.5
Melanoma and other skin cancers[b]	9	18	2	28	3	5	65	0.9
Breast cancer	38	87	16	155	104	59	459	6.6
Cervix uteri cancer	59	29	19	29	116	35	288	4.2
Corpus uteri cancer[c]	3	20	1	35	4	13	76	1.1
Ovary cancer	10	23	4	48	24	20	128	1.9
Prostate cancer	44	74	6	94	21	19	258	3.7
Bladder cancer	14	23	11	65	21	23	157	2.3
Lymphomas and multiple myeloma	38	65	17	76	54	41	291	4.2
Leukaemia	20	48	16	60	50	71	265	3.8
Other sites	83	145	39	231	125	192	814	11.8
Total GBD 2000	**533**	**1,074**	**242**	**1,882**	**1,103**	**2,096**	**6,930**	**100.0**
Total GLOBOCAN 2000	**278**	**1,089**	**253**	**1,811**	**831**	**1,954**	**6,216**	
% difference (GBD – GLOBOCAN)	***92***	***-1***	***-4***	***4***	***33***	***7***	***11***	

a Globocan estimates have been adjusted to exclude Karposi's sarcoma deaths and the proportion of NHL due to HIV/AIDS and to redistribute a proportion of 'Other and unknown' sites to known sites using same algorithm as for GBD mortality estimates *(3)*.

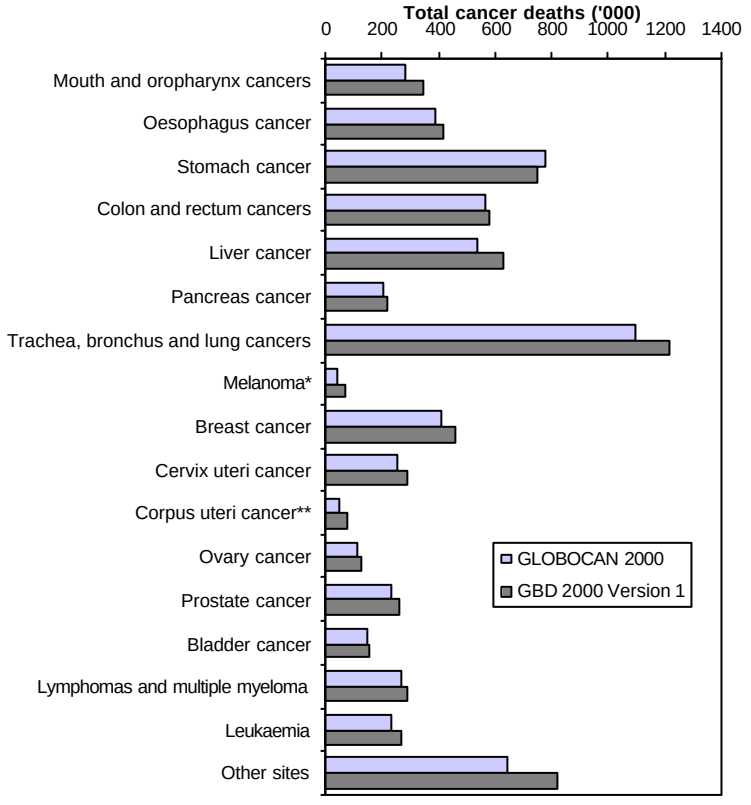


Figure 1. Estimated total cancer deaths by site, GBD 2000 and Globocan 2000.

Figure 1 compares the global mortality estimates by site for GBD 2000 Version 1 and Globocan 2000. Table 2 shows the resulting estimate cancer deaths by site and WHO region for Version 1 of the GBD 2000 *(4)*. More detailed estimates of cancer mortality by age, sex, site and region are available at the WHO website www.who.int/evidence (select the link to burden of disease, then the GBD 2000 Version 1 results).

3. Cancer incidence estimates for the year 2000

The cancer survival model was also used to calculate incidence to mortality ratios by age and sex for each cancer site in all regions of the world for the year 2000. These incidence to mortality ratios were then applied to the mortality estimates in order to estimate cancer incidence by age and sex for each site and region *(3)*.

As shown in Table 2, the resulting GBD 2000 global incidence estimate for all sites is almost identical to that from Globocan 2000. However, there are some differences across regions, with the GBD 2000 estimates being higher for AFRO and SEARO, reflecting the higher mortality estimates, and somewhat lower for AMRO and EMRO. The estimates for these two regions are being reviewed in more detail as part of the revision of the cancer burden estimates for Version 2 of the GBD 2000.

Table 2. GBD 2000 Version 1 estimated cancer incidence[a] by site and WHO region, and comparison with GLOBOCAN 2000 total cancer incidence by region

	GBD 2000 estimated cancer incidence ('000)							
Site	**AFRO**	**AMRO**	**EMRO**	**EURO**	**SEARO**	**WPRO**	**World**	**%total cancer incidence**
Mouth and oropharynx cancers	41	33	30	94	221	65	485	4.7
Oesophagus cancer	27	32	14	58	75	229	434	4.2
Stomach cancer	38	79	20	220	73	470	900	8.7
Colon and rectum cancers	35	160	19	377	84	242	917	8.9
Liver cancer	63	33	12	70	55	418	651	6.3
Pancreas cancer	8	49	3	97	17	48	222	2.2
Trachea, bronchus and lung cancers	22	255	31	399	163	431	1,302	12.7
Melanoma and other skin cancers[b]	13	69	3	83	5	23	197	1.9
Breast cancer	55	234	29	367	179	138	1,002	9.7
Cervix uteri cancer	104	64	38	57	267	74	604	5.9
Corpus uteri cancer[c]	10	105	8	129	18	56	327	3.2
Ovary cancer	16	39	8	70	47	37	217	2.1
Prostate cancer	57	177	9	192	29	40	505	4.9
Bladder cancer	20	58	19	168	30	47	341	3.3
Lymphomas and multiple myeloma	54	104	28	119	83	63	452	4.4
Leukaemia	25	70	22	79	72	99	367	3.6
Other sites	129	264	71	380	204	316	1,364	13.3
Total GBD 2000	**719**	**1,825**	**363**	**2,959**	**1,624**	**2,795**	**10,286**	**100.0**

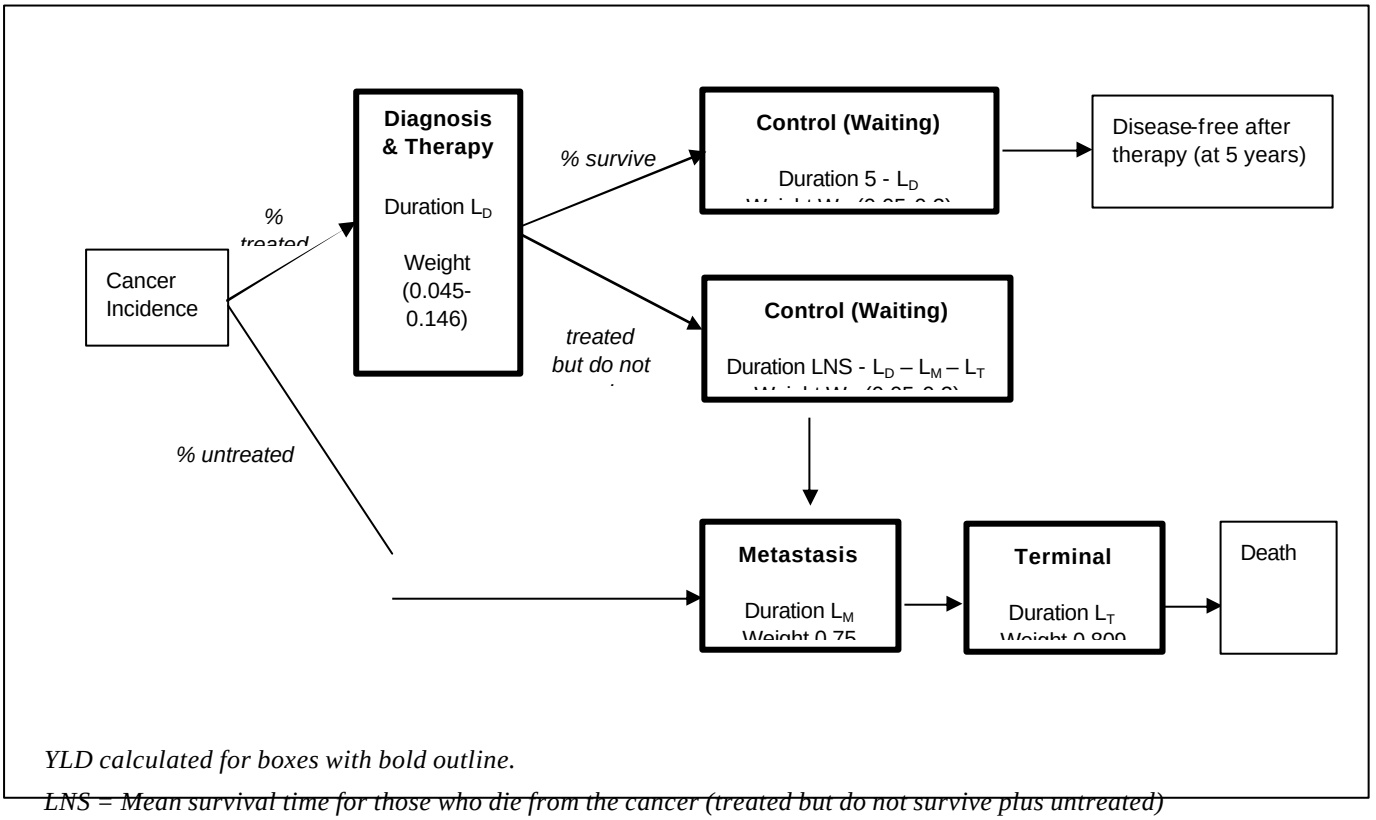
Total GLOBOCAN 2000	**504**	**2,208**	**401**	**2,958**	**1,259**	**2,704**	**10,032**	**100.0**
% difference (GBD – GLOBOCAN)	***43***	***-17***	***-9***	***0***	***29***	***3***	***3***	

a Globocan estimates have been adjusted to exclude Karposi's sarcoma incidence and the proportion of NHL due to HIV/AIDS and to redistribute a proportion of 'Other and unknown' sites to known sites using same algorithm as for GBD mortality estimates *(3)*.

4. Disease model

The basis of YLD estimation for cancer is the calculation of the age-sex specific cure rate and the age–sex specific average time to death for those not cured. Those who are cured of the cancer are assumed to have negligible disability after an initial treatment and remission period. For those who die, the survival time to death is assumed to follow a Weibull distribution, so that the mean survival time is estimated by fitting this distribution to available survival data.

We developed a revised generic model for each cancer site based on the cancer stages and sequelae for which the Dutch study estimated disability weights *(6)*. The general form of the model is shown in Figure 2.



YLD calculated for boxes with bold outline.

LNS = Mean survival time for those who die from the cancer (treated but do not survive plus untreated)

Figure 2. Disease model for estimating cancer YLD

We model cancer in terms of the incidence and survival. We model three pathways for an incident case:

A. Those who do not die from the cancer (%survive) will undergo a period of disability for primary diagnosis and therapy, and a period of disability for the state after intentionally curative primary therapy (control period) before the person is considered "cured". We arbitrarily set the total duration of therapy plus control to 5 years for all sites. For some sites, we also take into account permanent sequelae for 5-year survivors (see Table 3). People who die from other causes during this period are all included in this group even if they would otherwise have died from cancer (since

they do not experience the disability of the terminal stages). To allow for background mortality, the average 5 year duration is adjusted by the probability of surviving 5 years: $(1-q_x)$.

B. Those who die from the cancer (%treat - %survive) will undergo a period of disability for primary diagnosis and therapy, a period of disability for the control period, a preterminal phase, with dissemination of the disease (metastasis), and a general 1 month terminal phase.

C. Those who are untreated (100-%treated) will experience a period of disability for the dissemination and terminal stages only.

We estimate the proportion of incident cases in each path as follows:

%survive = per cent of incident cases who do not die from the cancer (estimated by relative survival ratio at 10 years)

%treated estimated either (a) from expert opinion or (b) from %survive as follows: $\%treated = \%survive * (\%treated/\%survive)_{A\ regions}$

%treated and do not survive = %treated - % survive

LNS = Mean survival time for those who die from the cancer. Estimated by fitting Weibull distribution to relative survival ratios at 1, 3, 5, 10 years.
If $LNS < L_D + L_M + L_T$ then revise $L_D = Max(0, LNS - L_M - L_T)$

Table 3. Disease stages/sequelae for cancer YLD estimation

Site/Stage/sequela	Case Definition
All sites	
Diagnosis and primary therapy	Chemotherapy, radiotherapy, surgery
Control/Waiting	Clinical observation during control/remission phase
Preterminal (metastasis)	Metastatic dissemination of the disease
Terminal	Terminal stage prior to death
Colorectal cancer - stoma	Colorectal cancer survivor (5 years or more) with stoma
Breast cancer - mastectomy	Breast cancer survivor (5 years or more) with mastectomy
Female reproductive cancer - infertility	Five year survivor for cervix, uterus and ovary cancer with infertility
Male genitourinary cancer – impotence and incontinence	Five year male survivor for prostate and bladder cancer with impotence and/or incontinence

Disability weights from the Global Burden of Disease Study *(7)* distinguish between treated and untreated cancer but do not address issues of disease stage or severity. Pending revision of the GBD 2000 weights using data from the WHO Household Survey program *(8)*, provisional disability weights (Tables 4 and 5) have been used to the treatment and control/waiting stages, and the long-term sequelae, based on valuations from the Netherlands study and the Australian Burden of Disease Study *(6, 9)*. These provisional weights will be revised for the Version 2 estimates.

Table 4. Provisional disability weights for cancer stages

	Diagnosis and primary therapy	Control/Waiting	Preterminal (metastasis)	Terminal
1. Mouth and oropharynx cancers	0.090	0.09	0.75	0.809
2. Oesophagus cancer	0.200	0.20	0.75	0.809
3. Stomach cancer	0.200	0.20	0.75	0.809
4. Colon and rectum cancers	0.200	0.20	0.75	0.809
5. Liver cancer	0.200	0.20	0.75	0.809
6. Pancreas cancer	0.200	0.20	0.75	0.809
7. Trachea, bronchus and lung cancers	0.146	0.15	0.75	0.809
8. Melanoma and other skin cancers	0.045	0.05	0.75	0.809
9. Breast cancer	0.086	0.09	0.75	0.809
10. Cervix uteri cancer	0.075	0.08	0.75	0.809
11. Corpus uteri cancer	0.096	0.10	0.75	0.809
12. Ovary cancer	0.097	0.10	0.75	0.809
13. Prostate cancer	0.134	0.13	0.75	0.809
14. Bladder cancer	0.087	0.09	0.75	0.809
15. Lymphomas and multiple myeloma	0.057	0.06	0.75	0.809
16. Leukaemia	0.093	0.09	0.75	0.809

Table 5. Provisional disability weights for long-term sequelae of certain cancers

Long-term sequela	Provisional disability weight
Colorectal cancer - stoma	0.21
Breast cancer - mastectomy	0.09
Female reproductive cancer - infertility	0.18
Male genitourinary cancer – impotence and incontinence	0.20

5. Survival analysis

We are using four sources of data on population-based survival:

1. The EUROCARE II project *(10)* providing figures from 14 West European cancer registries (for incidence cohorts in years around 1985-89) and 3 in eastern Europe (Poland, Slovakia, Estonia).
2. The SEER programme covering 10% of the US population *(11)*.
3. The Cancer Survival in Developing Countries project by IARC *(12)*, which provides cancer survival data for populations of China, the Philippines, Thailand, India and Cuba.
4. Specific recent national estimates of cancer survival as published *(13-15)*.

Survivorship functions are estimated from relative survival data by fitting a Weibull survival distribution function. To allow for a proportion who are cured and never die from the cancer, we modify the usual Weibull model as follows:

$$S(t) = a + (1-a)\exp\left(-(lt)^g\right)$$

where a is the proportion who never die from the cancer, l is the location parameter ($1/l$ is the time at which 50% of those will die have died) and g is the shape parameter (see Figure 3). The mean survival time for those who die is given by

$$\hat{t}_M = \frac{1}{l}\Gamma\left(\frac{g+1}{g}\right)$$

where Γ denotes the Gamma function.

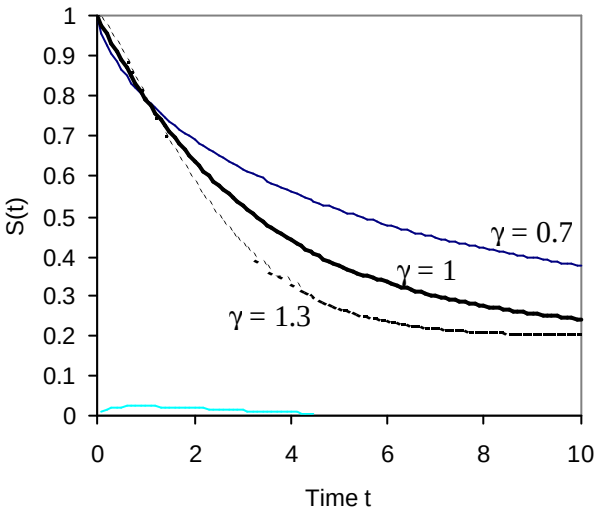


Figure 3. Examples of Weibull distribution for survival with a = 0.2 (proportion who survive) and l =0.3 (50% of deaths have occurred at time t = -ln(0.5)/0.3 = 2.3 years.

We use the 10 year relative survival S_{10} as an estimate of the proportion who never die from the cancer. This is an approximation to avoid the need for iterative solution of an equation which cannot be solved analytically. Empirical test suggest that this does not introduce significant error in the mean survival time estimates, but in future revision of these estimates, methods for obtaining exact solutions will be further explored.

For survival data sets where S_{10} is not available, we estimate it from S_5 using the latest SEER data from the USA on the ratio of 10 to 5 year survival by site, age and sex as follows:

$$S_{10} = S_5 \times \left(\frac{S_{10}}{S_5}\right)_{SEER}$$

We use 1, 3 and 5 year relative survival rates to fit the Weibull distribution as follows:

$$s_1 = \frac{S_1 - S_{10}}{1 - S_{10}}$$

$$s_3 = \frac{S_3 - S_{10}}{1 - S_{10}}$$

$$g = ln\left(\frac{ln\, s_3}{ln\, s_1}\right) \Big/ ln\, 3$$

$$l = [-ln\, s_1]^{1/g}$$

To check the goodness of fit of the survival curve, we compute S_5 using these parameters, and compare with the observed S_5. We then calculate the mean duration to death for those who die from the cancer using the formula given above.

There are substantial variations in relative 5-year survival (all ages) for some sites; these variations are even larger, and fluctuate substantially with age, when the age-sex specific survival estimates are examined. In some cases, survival rates are higher than those reported for developed countries. This may reflect incomplete follow-up and case finding in some instances, and also the effects of random variation with small numbers of cases. To deal with these issues, and to ensure that site-specific cancer incidence and mortality estimates vary smoothly and appropriately across age groups, and to ensure that all available evidence, including historical trends in survival in developed countries, is taken into account, we used the age-period-cohort survival model to estimate smoothed relative survival by site, age and sex for all regions of the world *(3)*.

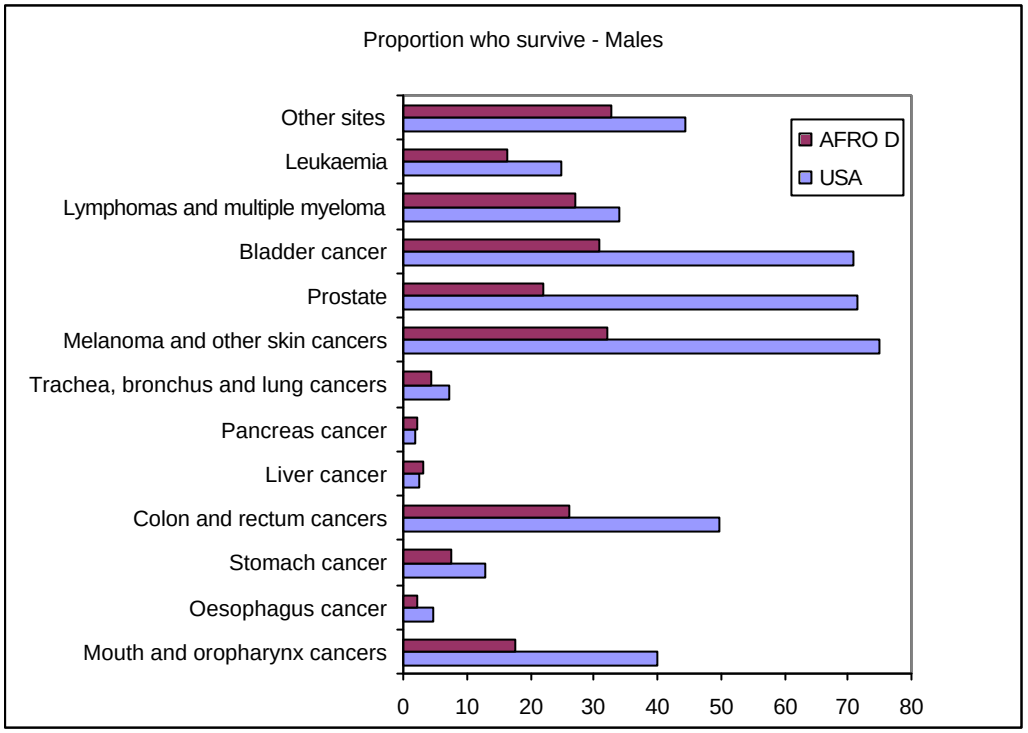
The main advantage of this approach to estimating regional survival distributions by cancer site for developing regions is that it correctly estimates survival and smooths it in regions where good data are provided, and it ensures that regional survival estimates are consistent with trends in survival across all regions, where the numbers for some cancer sites are small and, consequently, 'noisy' for that region. Figure 3 illustrates the resulting average survival rates for the USA and AFRO D for males and females. These rates have been averaged for all incident cancers across all age groups for each site. Figure 4 similarly illustrates the resulting average duration (time from incidence to death) for people who die from each type of cancer in the USA and AFRO D.

6. Global burden of cancer in 2000

General methods used for the estimation of the global burden of disease are given elsewhere *(4)*. The tables and graphs below summarise the Version 1 estimates of the global cancer burden for the GBD 2000 and compare them with the similar estimates from the GBD 1990 *(7)*.

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

	Males	*Females*	*Persons*
YLD('000)			
GBD1990	3,189	2,488	5,677
GBD2000	1,672	2,682	4,354
YLL('000)			
GBD1990	36,083	28,753	64,837
GBD2000	40,536	33,618	74,154
DALY('000)			
GBD1990	39,272	31,241	70,513
GBD2000	42,208	36,300	78,508



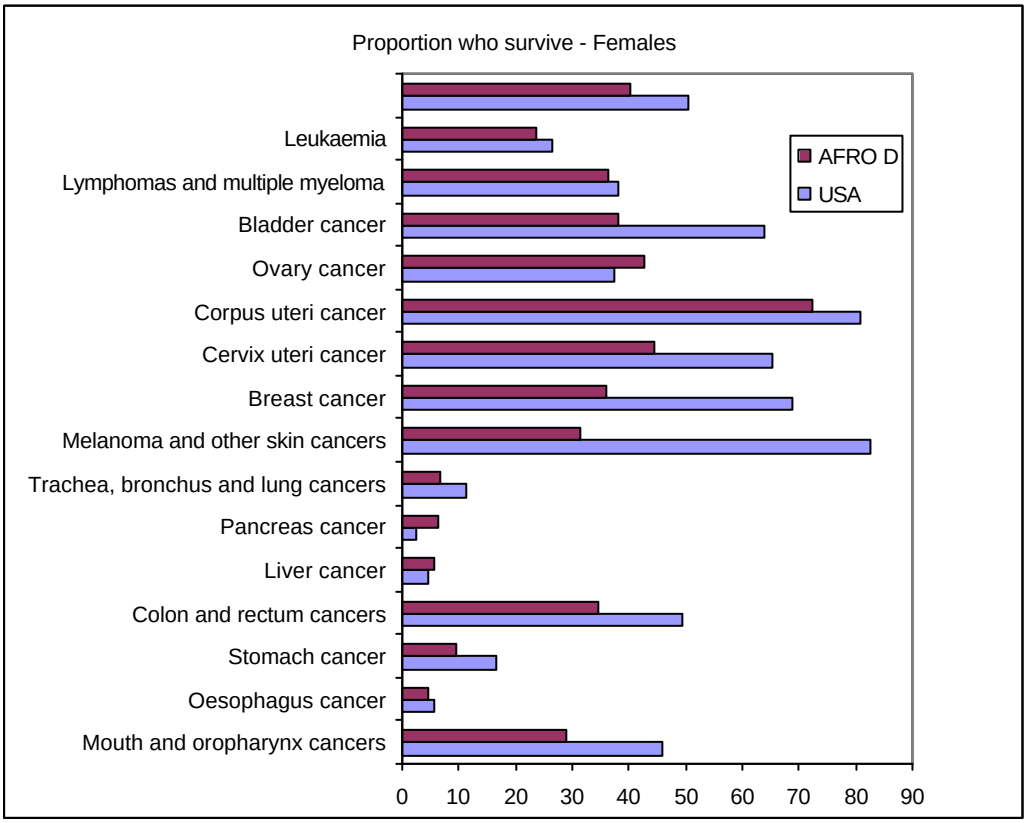


Figure 4. Comparison of estimated 5 year survival rates (per cent) for USA and AFRO D

Table 7: CancerYLD by cause, sex and WHO subregions, Version 1 global estimates for 2000

Cause	Global total						AFRO		AMRO		
	Both sexes		Males		Females		D	E	A	B	D
	(000)	*%*	*(000)*	*%*	*(000)*	*%*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Population (000)	*6,045,172*		*3,045,372*		*2,999,800*		*294,099*	*345,533*	*325,186*	*430,951*	*71,235*
A. Malignant neoplasms	4,354	0.8	1,672	0.6	2,682	**1.0**	108	163	557	248	36
1. Mouth and oropharynx cancers	249	0.0	172	0.1	77	0.0	8	14	9	7	1
2. Oesophagus cancer	78	0.0	50	0.0	27	0.0	1	3	4	2	0
3. Stomach cancer	243	0.0	149	0.1	94	0.0	4	5	6	11	3
4. Colon and rectum cancers	695	0.1	375	0.1	320	0.1	9	11	105	29	2
5. Liver cancer	112	0.0	73	0.0	39	0.0	5	6	3	2	1
6. Pancreas cancer	50	0.0	27	0.0	23	0.0	1	1	7	3	0
7. Trachea/bronchus/lung cancers	316	0.1	226	0.1	91	0.0	2	3	52	12	1
8. Melanoma & other skin cancers	43	0.0	23	0.0	20	0.0	1	2	13	2	0
9. Breast cancer	852	0.2	0	0.0	852	0.3	16	26	155	45	4
10. Cervix uteri cancer	506	0.1	0	0.0	506	0.2	25	47	15	26	8
11. Corpus uteri cancer	288	0.1	0	0.0	288	0.1	3	5	29	62	10
12. Ovary cancer	160	0.0	0	0.0	160	0.1	5	8	15	8	1
13. Prostate cancer	232	0.0	232	0.1	0	0.0	9	8	68	14	1
14. Bladder cancer	232	0.0	178	0.1	54	0.0	7	7	32	6	1
15. Lymphomas/multiple myeloma	165	0.0	96	0.0	69	0.0	9	10	28	9	1
16. Leukaemia	134	0.0	72	0.0	62	0.0	3	5	15	10	2

Table 7 (continued): Cancer YLD by cause, sex and WHO subregions[a], Version 1 global estimates for 2000

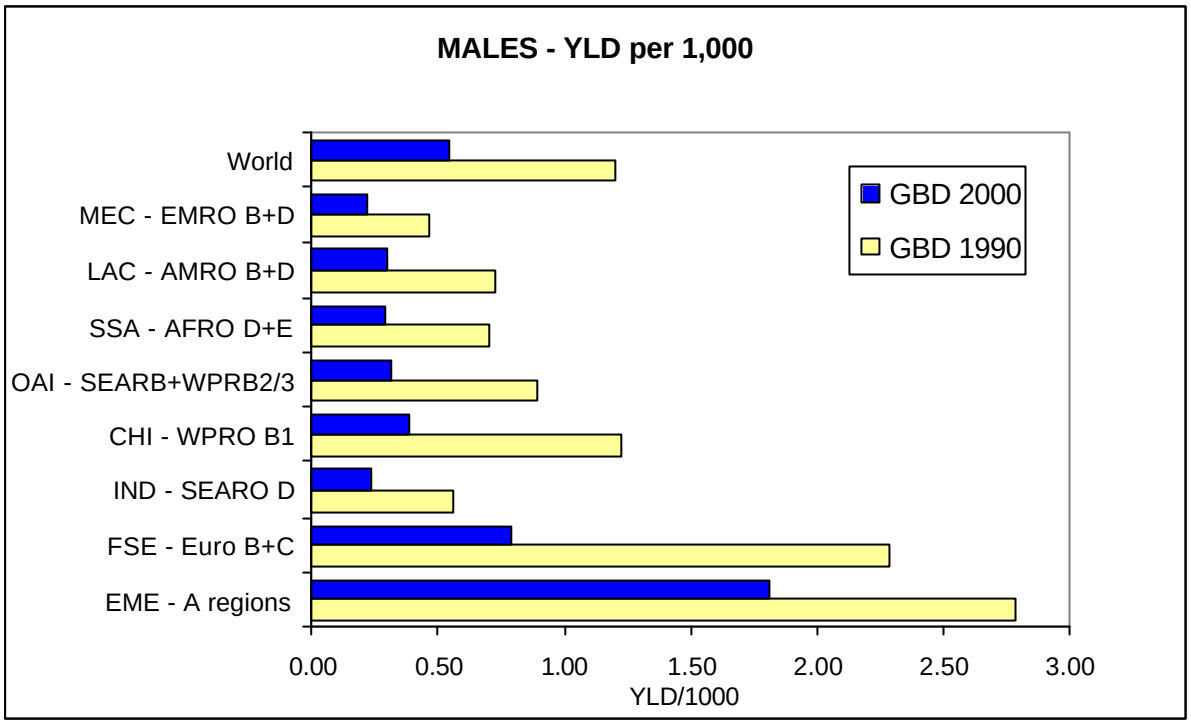
Cause[b]	EMRO		EURO			SEARO		WPRO	
	B	D	A	B	C	B	D	A	B
	(000)	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Population (000)	*139,071*	*342,584*	*411,910*	*218,473*	*243,192*	*293,821*	*1,241,813*	*154,358*	*1,532,946*
A. Malignant neoplasms	49	122	840	180	308	173	603	301	665
1. Mouth and oropharynx cancers	2	13	34	6	12	13	94	7	29
2. Oesophagus cancer	1	2	8	2	3	1	12	5	34
3. Stomach cancer	3	3	24	9	23	3	13	55	83
4. Colon and rectum cancers	6	8	208	27	48	26	34	86	95
5. Liver cancer	1	1	6	1	3	4	5	10	64
6. Pancreas cancer	0	1	11	3	7	1	3	5	7
7. Trachea/bronchus/lung cancers	3	6	56	17	28	9	28	16	84
8. Melanoma & other skin cancers	0	0	13	2	3	0	1	4	1
9. Breast cancer	9	19	206	40	66	46	95	52	72
10. Cervix uteri cancer	8	35	14	12	15	28	211	5	55
11. Corpus uteri cancer	5	2	36	26	39	9	11	8	43
12. Ovary cancer	1	6	19	6	15	12	32	6	25
13. Prostate cancer	1	2	77	7	12	3	6	19	4
14. Bladder cancer	3	11	79	12	21	5	15	13	19
15. Lymphomas/multiple myeloma	3	7	31	5	8	7	22	8	16
16. Leukaemia	3	5	18	4	6	6	20	4	34

Table 8: CancerDALYs by cause, sex and WHO subregions, Version 1 global estimates for 2000

	Global total						AFRO		AMRO		
	Both sexes		Males		Females		D	E	A	B	D
Cause	*(000)*	*%*	*(000)*	*%*	*(000)*	*%*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Population (000)	*6,045,172*		*3,045,372*		*2,999,800*		*294,099*	*345,533*	*325,186*	*430,951*	*71,235*
A Malignant neoplasms	78,508	5.3	42,208	5.5	36,300	5.1	2,741	3,942	5,624	4,320	628
1. Mouth and oropharynx cancers	4,379	0.3	3,152	0.4	1,227	0.2	124	297	110	119	16
2. Oesophagus cancer	4,096	0.3	2,721	0.4	1,375	0.2	56	237	133	127	7
3. Stomach cancer	7,326	0.5	4,565	0.6	2,761	0.4	198	211	143	386	96
4. Colon and rectum cancers	5,659	0.4	3,074	0.4	2,585	0.4	132	171	617	260	26
5. Liver cancer	7,948	0.5	5,600	0.7	2,348	0.3	402	519	126	140	35
6. Pancreas cancer	1,867	0.1	1,064	0.1	803	0.1	31	53	242	114	11
7. Trachea/bronchus/lung cancers	11,418	0.8	8,303	1.1	3,115	0.4	98	157	1,443	481	27
8. Melanoma & other skin cancers	690	0.0	387	0.1	303	0.0	35	60	133	54	5
9. Breast cancer	6,386	0.4	4	0.0	6,382	0.9	182	315	686	392	41
10. Cervix uteri cancer	4,649	0.3	0	0.0	4,649	0.7	273	515	98	273	83
11. Corpus uteri cancer	993	0.1	0	0.0	993	0.1	13	21	93	174	27
12. Ovary cancer	1,651	0.1	0	0.0	1,651	0.2	44	95	149	85	13
13. Prostate cancer	1,526	0.1	1,526	0.2	0	0.0	144	124	255	147	19
14. Bladder cancer	1,329	0.1	998	0.1	331	0.0	69	64	116	50	5
15. Lymphomas/multiple myeloma	3,994	0.3	2,569	0.3	1,424	0.2	317	366	396	224	41
16. Leukaemia	5,147	0.3	2,835	0.4	2,312	0.3	131	234	254	382	87

Table 8 (continued): Cancer DALYs by cause, sex and WHO subregions[a], Version 1 global estimates for 2000

	EMRO		EURO			SEARO		WPRO	
	B	D	A	B	C	B	D	A	B
Cause[b]	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Population (000)	*139,071*	*342,584*	*411,910*	*218,473*	*243,192*	*293,821*	*1,241,813*	*154,358*	*1,532,946*
A Malignant neoplasms	1,086	2,514	8,659	3,278	5,706	3,160	12,398	2,820	21,633
1. Mouth and oropharynx cancers	30	277	291	107	217	259	1,978	59	495
2. Oesophagus cancer	36	114	233	107	150	34	804	96	1,960
3. Stomach cancer	108	103	475	323	800	99	669	452	3,264
4. Colon and rectum cancers	60	115	1,082	283	606	287	442	397	1,181
5. Liver cancer	48	91	272	87	187	333	369	291	5,048
6. Pancreas cancer	16	19	365	113	289	53	134	143	282
7. Trachea/bronchus/lung cancers	121	211	1,665	604	1,093	369	1,223	430	3,495
8. Melanoma & other skin cancers	10	19	146	43	92	11	29	27	27
9. Breast cancer	80	191	1,013	297	558	454	1,220	194	763
10. Cervix uteri cancer	70	235	106	124	169	262	1,888	34	519
11. Corpus uteri cancer	14	12	144	89	160	29	35	33	149
12. Ovary cancer	9	61	234	70	200	118	281	58	233
13. Prostate cancer	15	28	376	61	106	40	94	63	54
14. Bladder cancer	22	100	273	87	166	48	134	41	152
15. Lymphomas/multiple myeloma	94	271	445	136	186	230	720	115	454
16. Leukaemia	154	246	334	163	197	265	1,004	97	1,600



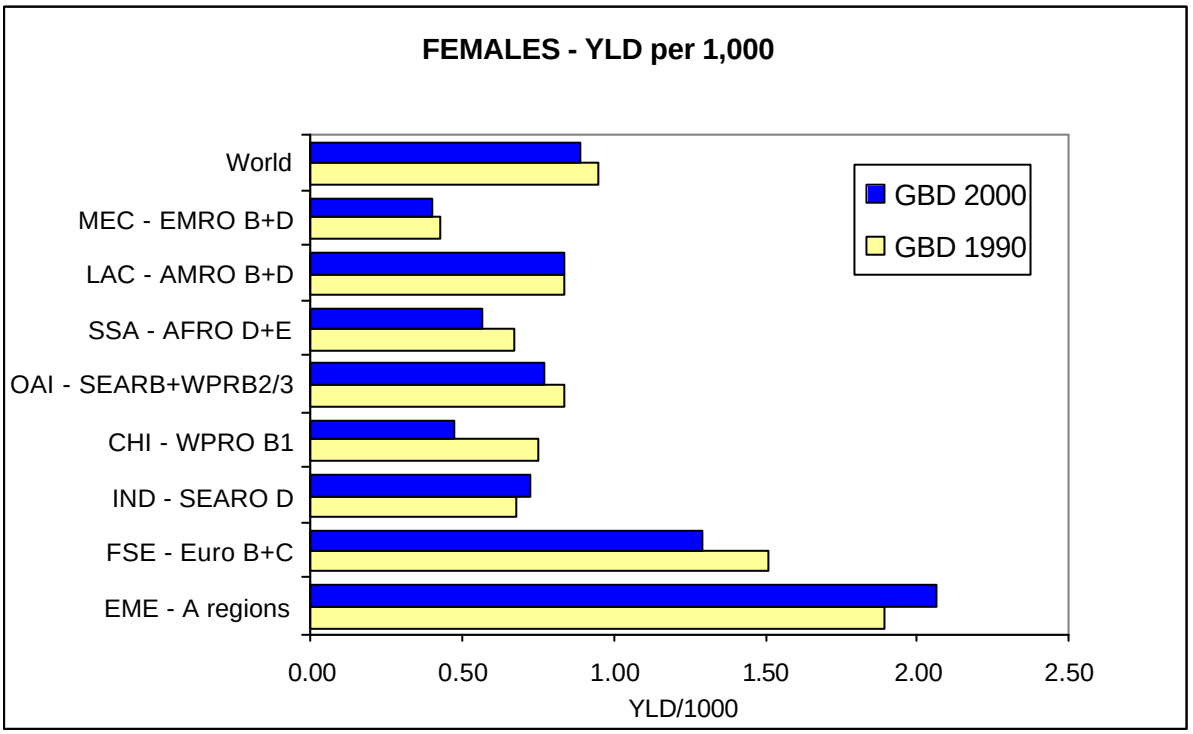


Figure 5. Total YLD rates, by sex, broad regions, 1990 and 2000.

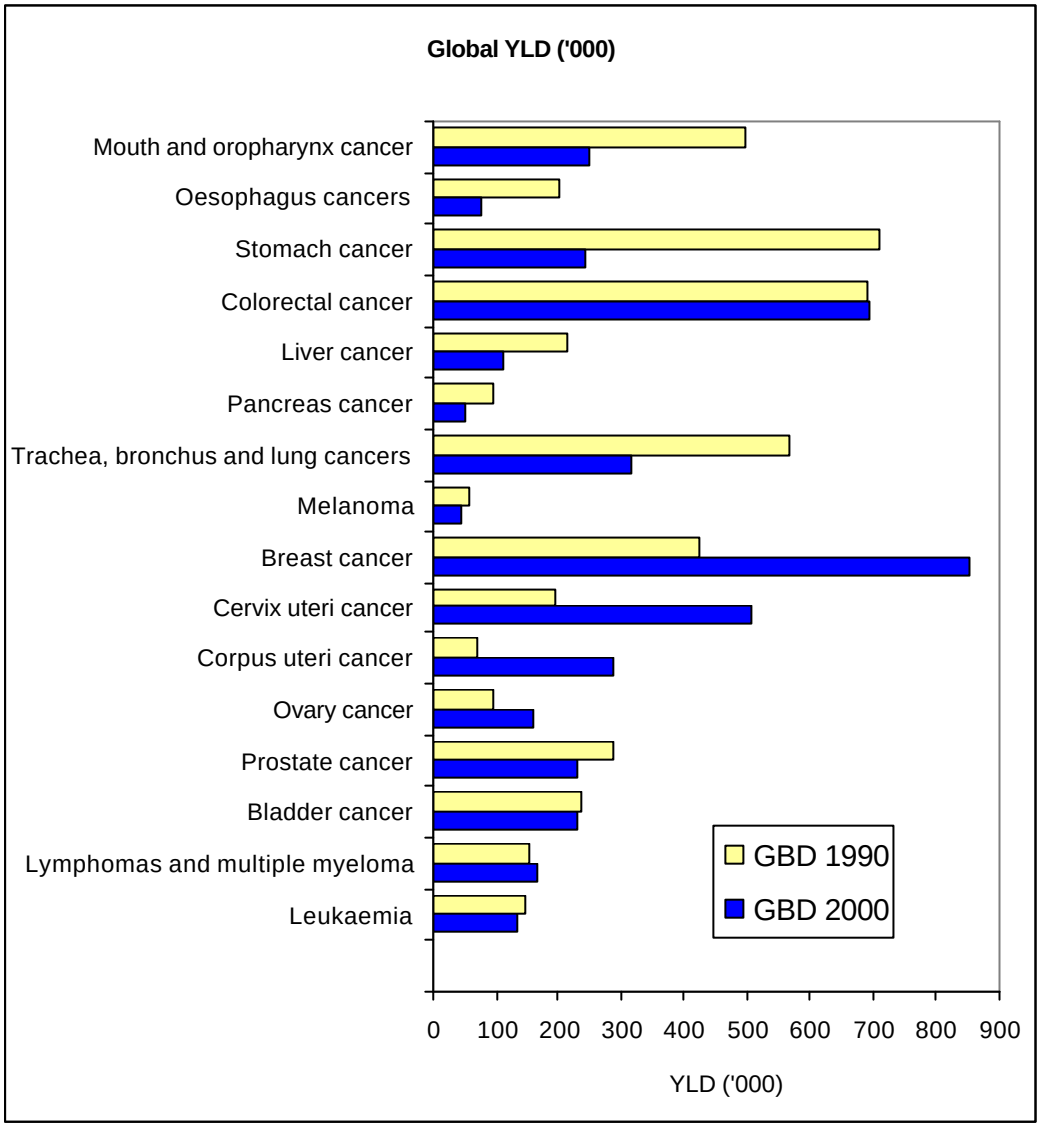
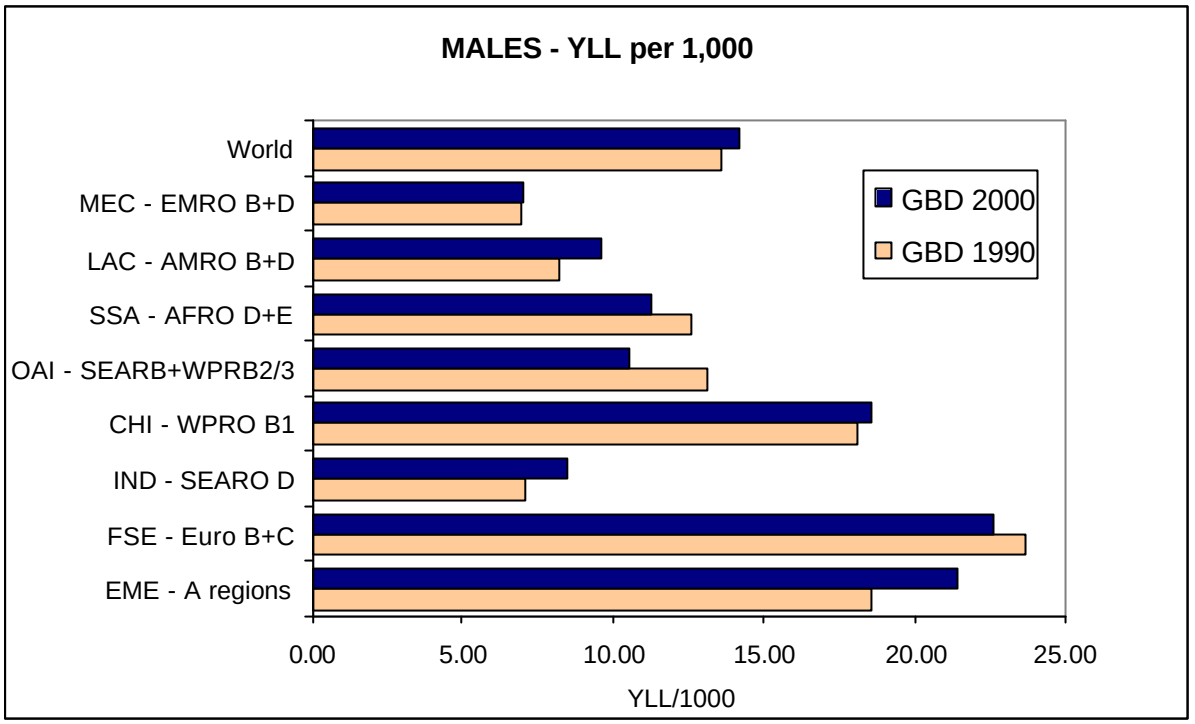


Figure 6. Total YLD by site, 1990 and 2000.



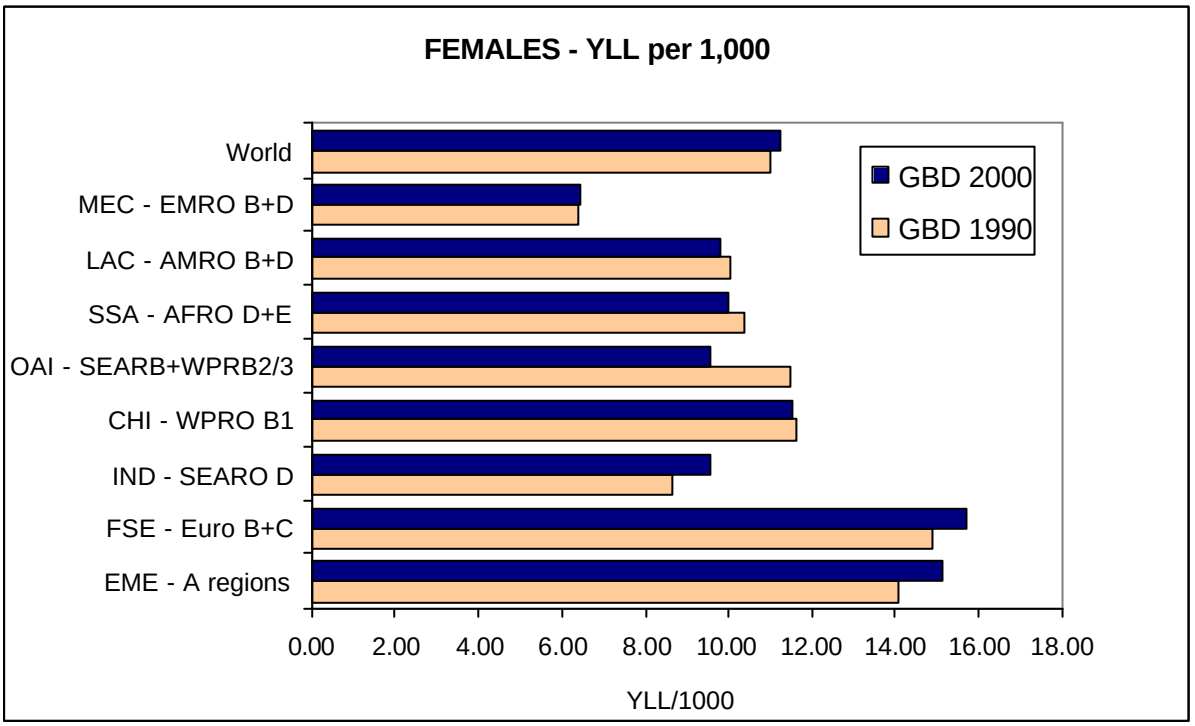


Figure 7. Total YLL rates, by sex, broad regions, 1990 and 2000.

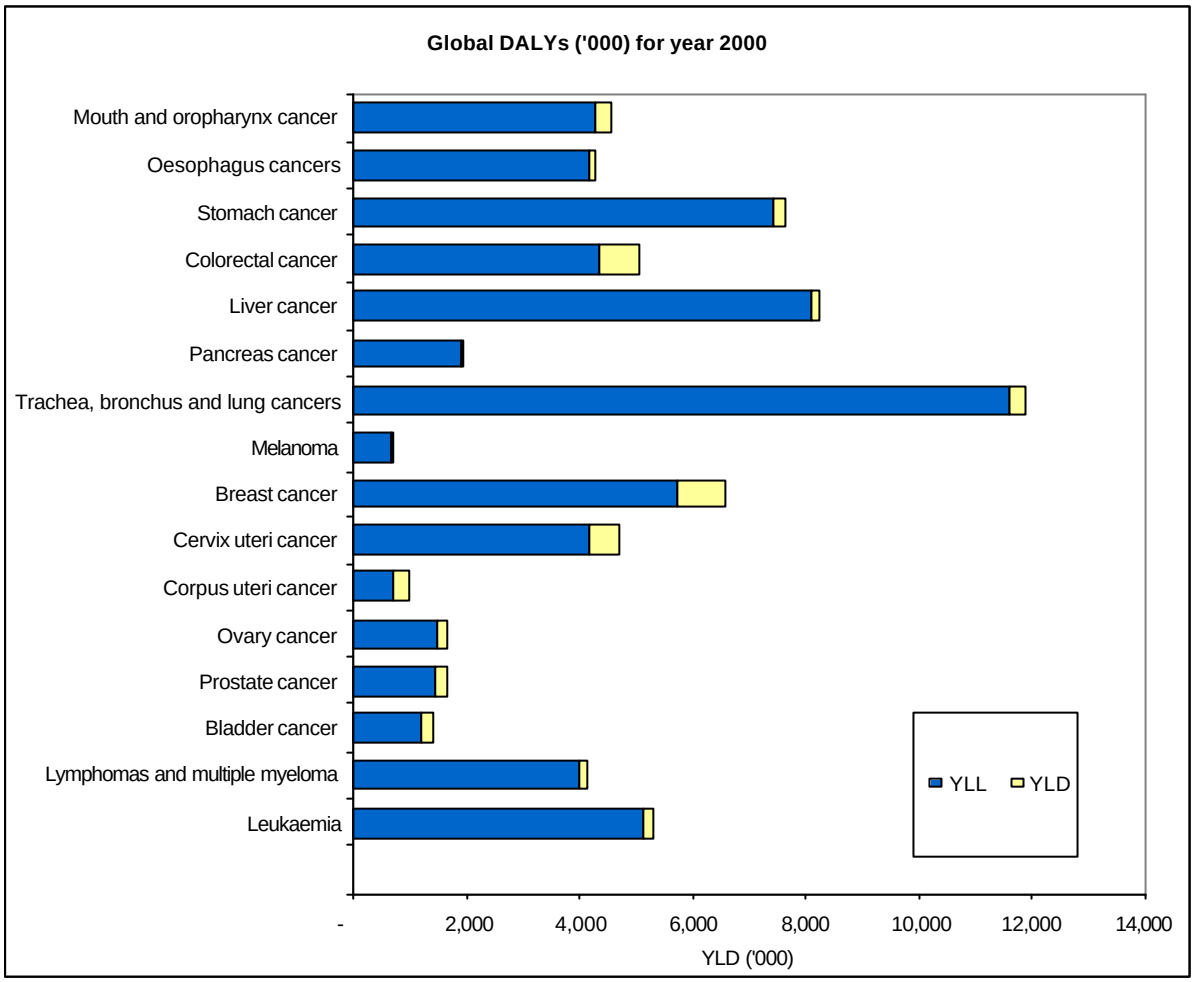


Figure 8. Total global YLL, YLD and DALYs by site, Version 1 estimates, GBD 2000.

7. Uncertainty analysis

General methods for uncertainty analysis of estimates for the Global Burden of Disease 2000 are outlined elsewhere *(17)*. Uncertainty analysis for cancer estimates has not yet been completed.

8. Conclusions

These are version 1 estimates for the GBD 2000. Over the next six months, these estimates will be extensively revised to build on additional data and revised disability weights.

We welcome comments and criticisms of these draft estimates, and information on additional sources of data and evidence. Please contact Colin Mathers (EBD/GPE) on email mathersc@who.ch.

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