

# **Mortality Attributable to Diabetes : Estimates for the Year 2010**

Gojka Roglic<sup>1</sup>, Nigel Unwin<sup>2</sup>

<sup>1</sup>Department of Chronic Diseases and Health Promotion  
World Health Organization, Geneva, Switzerland

<sup>2</sup>Institute of Health and Society, Newcastle University, Newcastle upon Tyne, UK



## Abstract

Country and global health statistics underestimate the number of excess deaths due to diabetes. The aim of the study was to provide a more accurate estimate of the number of deaths attributable to diabetes for the year 2010. A computerized disease model was used to obtain the estimates. The baseline input data included the population structure, estimates of diabetes prevalence, estimates of underlying mortality and estimates of the relative risk of death for people with diabetes compared to people without diabetes.

The total number of excess deaths attributable to diabetes worldwide was estimated to be 3.96 million in the age group 20-79 years, which is 6.8% of global [all ages] mortality. Excess mortality attributable to diabetes accounted for 6% of all deaths in adults in the African Region, to 15.7% in the North America and Caribbean Region. Beyond 49 years of age diabetes constituted a higher proportion of all deaths in females than in males in all regions, reaching over 25% of all deaths in some regions and age groups.

These estimates indicate that diabetes is a considerable cause of premature mortality, a situation that is likely to worsen, particularly in low and middle income countries as diabetes prevalence increases. Investments in primary and secondary prevention are urgently required to reduce this burden.



## Introduction

Mortality is an important measure of population health and is often used to assign priorities in health interventions. Estimating mortality due to diabetes has been challenging because more than a third of countries of the world have no reliable data available on mortality and also because existing routine health statistics have been shown to underestimate mortality from diabetes [1]. The latter is largely because persons with diabetes most frequently die of cardiovascular disease or renal failure, rather than a complication specific to diabetes [2]. Cause specific mortality statistics are based on the underlying cause of death recorded on the death certificate. In cases of cardiovascular disease death in particular diabetes is frequently not mentioned at all, or if it is, it is not specified as the underlying cause of death [3]. The problem of assessing the true mortality contribution of a disease is not unique to diabetes. Complex and resource-demanding methods that combine vital registration, results of population-monitoring laboratories and epidemiologic studies, have been developed for estimating mortality attributable to some conditions deemed to be of public health importance (AIDS, tuberculosis), but equivalent methods have not been developed for diabetes [4].

To provide a more realistic estimate of the burden of mortality attributable to diabetes than is available from routine sources of health statistics, a modelling approach has been used recently for the years 2000 and 2007 [5;6]. This study uses similar methodology to estimate the number of deaths attributable to diabetes in the year 2010.



## Methods

The number of deaths attributable to diabetes was calculated using the following input data:

- 1) Expected number of all deaths in the year 2010, applying the age- and sex-specific death rate for the year 2007, as 2007 is the latest year for which WHO life tables are available
- 2) Country-specific diabetes prevalence by age and sex for the year 2010 (see the background paper 'Diabetes and Impaired Glucose Tolerance').
- 3) Age and sex-specific relative risks of death for persons with diabetes, compared to their non-diabetic peers in the same population. These were obtained from published studies conducted in USA [7] and Taiwan [8], or as personal communication of non-published data from the DECODE Study that studied European populations and the DECODA Study that studied Asian populations [9;10]. The criteria for the selection of these studies were that they were large population-based cohort studies and that they provided the number of deaths among individuals with and without diabetes by sex and age group.

Table 1 shows the age specific relative risks of mortality in people with diabetes compared to those without from the different studies. The table also indicates which study results were used for different International Diabetes Federation (IDF) regions.

DisMod II, a software programme developed for the Global Burden of Disease 2000 Study [11], was used to calculate the number of deaths attributable to diabetes in persons 20-79 years old, i.e. the number of deaths among those with diabetes over and above deaths expected according to underlying mortality rates. DisMod II smoothes out the age-specific relative risks of death available from the different studies and calculates what proportion of all deaths is attributable to diabetes using Miettinen's formula for the population-attributable fraction [12].

Cohort studies estimate the true population relative risk of dying with some uncertainty, and measures of precision, such as confidence intervals, around the estimates were not available for all of the studies used in the calculations of the number of deaths. In order to reflect the uncertainty in the relative risk estimates, sensitivity analyses were conducted assuming that the true relative risks were 20% lower and 20% higher than those found in each cohort study.



## Results

The numbers of excess deaths due to diabetes are presented by IDF Regions in Table 2. It is predicted that almost 4 million deaths in 2010 could be attributed to diabetes, which is 6.8% of global (all ages) all-cause mortality. In all regions, bar one, roughly 10% or more of deaths in the age group 20 to 79 were attributable to diabetes, with the highest proportion (15.7%) being in North America, reflecting both a high prevalence of diabetes and a relatively elderly population. Africa is the region with the lowest proportion of deaths attributable to diabetes in adults. But even here diabetes accounted for over 1 in 20 deaths, representing over a third of a million deaths in 2010.

Table 3 shows the number of deaths attributable to diabetes if the relative risks of dying are assumed to be 20% lower and 20% higher than what was estimated in the cohort studies. With these assumptions the global number of deaths attributable to diabetes ranges from 2.6 to 5.2 million. If the relative risk is 20% lower, 4.5% of total mortality can be attributed to diabetes, ranging from 3.9% in the African Region, to 10.1% in the South-East Asian Region. If the relative risk of dying is 20% higher, 9.2% of total mortality can be attributed to diabetes, ranging from 7.9% in the African Region to 21% in the North America and Caribbean Region.

The highest number of deaths attributable to diabetes is expected to occur in countries with large populations - 1,008,000 deaths in India, 575,000 in China, 231,000 in The United States of America and 182,000 in The Russian Federation. The number of deaths is also higher in women than in men, and diabetes makes for a higher proportion of all deaths in women than in men, reaching up to a quarter of all deaths in middle-aged women in some regions (Tables 4a and 4b).

## Discussion

While there has been a documented decline in the morbidity and mortality of some chronic noncommunicable diseases in some countries [13], no such decline has been reported for diabetes. Wherever measured, the prevalence seems to be increasing. Although some developed countries have documented an improved survival of persons with diabetes, the increased prevalence is most likely due to increased incidence rather than improved survival [14].

Comparing these estimates of mortality attributable to diabetes to those for the year 2007 [6], obtained by using the same relative risks of dying but different diabetes prevalence estimates and all-cause mortality rates, the number of deaths attributable to diabetes has increased by 5.5%. This increase is on account of a 29% increase in the number of deaths due to diabetes in the North America and Caribbean Region, a 12% increase in the South-East Asian Region and an 11% increase in the Western Pacific Region. These increases can be explained by an increase in diabetes prevalence in some highly populated countries in each region (USA, India, Indonesia), particularly in females. In the other regions, the number of deaths attributable to diabetes has remained similar to the estimates for the year 2007.

The consistently higher contribution of diabetes to total mortality in women is partly explained by higher relative risks of mortality in women with diabetes compared to women without diabetes than found in men, in most regions and age groups (Table 1). This in part reflects that overall mortality in men is higher than in women. In addition, in the oldest age group there tend to be more women with diabetes than men, and the numbers of deaths attributable to diabetes in women are therefore higher in most regions (Tables 4a and 4b).



The reliability of these estimates rests on several assumptions, as discussed below.

#### *Accuracy of diabetes prevalence estimates*

The prevalence of diabetes by country was used in the calculation of the proportion of deaths attributable to diabetes. There are many countries that have never conducted a survey to determine the prevalence of diabetes. Therefore, many country-specific estimates were calculated by extrapolation of data from countries judged to be “similar”. This judgment of similarity is not based on strict methodology and thus might not be replicated by other researchers undertaking a similar task.

#### *Relative risk of dying*

The number of large, population-based follow-up studies to compare the mortality experience of people with diabetes to those without is very small. Therefore, unpublished data from large studies were also used. It is uncertain whether the relative risks of death observed in the selected studies are appropriate for extrapolation to countries or populations for which there are no data.

Available follow-up studies are consistent in reporting a higher risk of dying for persons with diabetes compared to those without, the relative risk decreasing with age. However, the accuracy of the obtained relative risks of dying is questionable, particularly when data are analysed by age and sex subgroups thus reducing the sample size.

#### *All-cause mortality rates*

The expected number of deaths due to all causes was calculated using the mortality rate for the year 2007, as these were available from the World Health Organization mortality statistics. The assumption that 2007 mortality rates are similar to what they will be in 2010 is probably tenable, as mortality rates are unlikely to substantially change in the short period 2007-2010. However, some countries had a considerable discrepancy between the expected number of all deaths, and consequently diabetes deaths, for the year 2007 and 2010 (Belize, Guyana, Qatar, Rwanda, United Arab Emirates). This indicates that applying a death rate of several years previously to the current population size might not be appropriate for some countries, especially those where the death rate can be considerably different even within short periods.

It is reassuring that a similar result has been obtained in a study where different methods were used to estimate the number of deaths attributable to “higher-than - optimum blood glucose concentration”[15], but it is possible that this similarity has occurred by chance.

These estimates exclude the number of deaths attributable to diabetes below the age of 20 and above the age of 79 years because there was very little data on the relative risk of dying in those age groups. Since diabetes is a relatively rare condition below the age of 20, even a high relative risk of dying associated with having diabetes would not substantially change the current estimates. On the other hand, with population ageing and increasing numbers of persons that live beyond the age of 79 years, a substantial number of deaths attributable to diabetes could have been missed if the risk of dying in elderly persons with diabetes was higher than the risk of their non-diabetic peers.

Including people with currently recognized categories of hyperglycaemia other than diabetes would have increased the current estimates of excess deaths attributable to hyperglycaemia because people within the category of impaired glucose tolerance (IGT) have been shown to have higher mortality than people with glycaemia below the cut-off point for IGT [16]. Estimating the burden of excess mortality in this category of hyperglycaemia was not undertaken because of insufficient input data for the model.



Obtaining accurate estimates of mortality attributable to diabetes with currently available data is difficult, and any attempt will be based on a set of assumptions. The estimates of the number of deaths in this study should be considered just that, estimates and accurate measures. However, it is highly plausible that the figures presented here are closer to the truth than estimates derived from routine sources of health statistics which systematically underestimate the burden of mortality due to diabetes [17].

The estimated excess number of deaths attributable to diabetes seems to be considerable and of a similar order of magnitude as deaths due to several infectious diseases that receive a lot of attention from policy makers, researchers, donors and the general public [18;19]. Diabetes contributes substantially the world over to premature adult mortality. A substantial proportion of these premature deaths are potentially preventable through public health action directed at primary prevention of diabetes in the population and improvement of care for all people with diabetes [20].



The views expressed within this paper are those of the authors and not necessarily those of WHO.

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**Table 1 Age and sex-specific relative risks of death used to estimate the proportion of all deaths attributable to diabetes**

Age group	DECODE Study <sup>1</sup>		DECODA Study <sup>2</sup> [Indians in Mauritius and Fiji]		DECODA Study <sup>3</sup> [All]		Taiwan Study <sup>4</sup>		NHANES <sup>5</sup>	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
20-29	3.66	6.05	3.40	5.12	3.70	5.95	5.42	4.68	3.08	3.20
30-39	3.38	5.41	3.50	4.98	3.30	5.61	5.26	4.64	4.60	3.10
40-49	1.85	3.14	2.60	3.65	1.95	3.41	4.24	4.25	2.80	2.80
50-59	1.63	2.64	2.30	3.29	1.65	2.73	3.02	3.44	2.00	2.60
60-69	1.60	2.04	1.60	2.51	1.62	2.08	2.22	2.58	1.65	2.10
70-79	1.39	1.79	1.50	2.42	1.40	1.78	1.46	1.61	1.40	1.60

<sup>1</sup> Used for Europe, Australia and New Zealand

<sup>2</sup> Used for South Asia

<sup>3</sup> Used for Africa and Eastern Mediterranean

<sup>4</sup> Used for Western Pacific (except Australia and New Zealand)

<sup>5</sup> Used for North and South America and the Caribbean



**Table 2 Number of deaths attributable to diabetes in age group 20-79 years in the year 2010**

<b>IDF Region</b>	<b>Number of deaths attributable to diabetes in age group 20-79 years</b>	<b>Percentage of all-cause deaths attributable to diabetes in age group 20-79 years</b>
<b>Africa</b>	332,584	6.0
<b>Europe</b>	634,054	11.0
<b>Middle East and North Africa</b>	294,037	11.5
<b>North America and Caribbean</b>	313,208	15.7
<b>South and Central America</b>	171,303	9.5
<b>South-East Asia</b>	1,142,914	14.3
<b>Western Pacific</b>	1,074,955	9.7



**Table 3 Number of deaths attributable to diabetes if the true relative risk of dying is 20% lower and 20% higher than estimated in the cohort studies**

IDF Region	Relative risk 20% lower	Relative risk 20% higher
<b>Africa</b>	217,914	441,267
<b>Europe</b>	345,126	882,648
<b>Middle East and North Africa</b>	181,898	392,806
<b>North America and Caribbean</b>	186,974	419,104
<b>South and Central America</b>	91,659	239,358
<b>South-East Asia</b>	802,914	1,461,543
<b>Western Pacific</b>	721,358	1,386,849



**Table 4a Number of male deaths attributable to diabetes in the year 2010 and percentage of all-cause mortality by age group and IDF Region**

IDF Region	Age group [years]					
	20-29	30-39	40-49	50-59	60-69	70-79
<b>Africa</b>	11,141 (3.1)	27,984 (5.3)	21,918 (4.2)	21,405 (4.3)	23,708 (4.9)	16,018 (3.4)
<b>Europe</b>	5,860 (4.3)	17,216 (8.0)	23,342 (6.0)	52,692 (7.4)	85,933 (10.4)	112,557 (9.0)
<b>Middle East and North Africa</b>	4,986 (3.4)	12,414 (9.0)	15,874 (9.1)	26,911 (9.6)	33,342 (10.1)	23,516 (6.0)
<b>North America and Caribbean</b>	2,090 (4.2)	7,104 (11.7)	16,396 (13.9)	30,136 (13.6)	43,555 (14.0)	41,726 (10.6)
<b>South and Central America</b>	1,527 (1.5)	8,584 (8.6)	13,744 (10.6)	19,845 (10.4)	22,520 (8.9)	17,273 (5.5)
<b>South-East Asia</b>	13,908 (3.9)	41,924 (10.0)	70,849 (12.5)	130,209 (14.9)	105,092 (9.6)	114,922 (9.6)
<b>Western Pacific</b>	9,976 (3.6)	33,198 (9.4)	96,470 (14.4)	170,141 (14.4)	180,205 (10.4)	98,276 (4.0)



**Table 4 b Number of female deaths attributable to diabetes and its percentage of all-cause mortality by age group and IDF Region**

IDF Region	Age group [years]					
	20-29	30-39	40-49	50-59	60-69	70-79
<b>Africa</b>	25,256 (6.1)	50,422 (9.5)	37,373 (8.7)	35,970 (9.0)	30,895 (7.1)	30,495 (6.0)
<b>Europe</b>	1,131 (2.8)	4,966 (6.9)	14,706 (9.5)	50,606 (15.0)	76,976 (15.4)	188,069 (16.0)
<b>Middle East and North Africa</b>	6,021 (6.3)	15,867 (16.2)	23,217 (19.3)	40,942 (22.2)	44,242 (17.7)	46,707 (13.1)
<b>North America and Caribbean</b>	634 (3.2)	3,634 (11.4)	15,776 (22.2)	41,362 (29.4)	58,544 (25.9)	52,252 (15.1)
<b>South and Central America</b>	456 (1.5)	1,937 (4.6)	7,833 (10.7)	20,638 (17.1)	29,580 (16.6)	27,367 (10.1)
<b>South-East Asia</b>	20,901 (7.1)	42,680 (15.6)	67,618 (19.0)	137,823 (24.0)	168,370 (20.1)	228,618 (20.2)
<b>Western Pacific</b>	3,032 (2.3)	15,742 (7.2)	61,207 (14.3)	127,138 (18.0)	161,150 (15.3)	118,420 (6.2)



**Table 5a****Deaths attributable to diabetes (DM) in males, 2010 - African Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Angola	185	442	334	353	386	236	1,937
Benin	126	214	189	244	271	162	1,206
Botswana	11	104	99	85	61	51	411
Burkina Faso	277	611	399	280	250	242	2,058
Burundi	83	148	116	116	108	86	658
Cameroon	579	1,145	726	587	700	554	4,291
Cape Verde	5	12	12	10	8	11	59
Central African Republic	96	233	178	138	152	110	907
Chad	3	83	226	382	408	130	1,232
Comoros	6	10	10	13	18	12	68
Congo, Democratic Republic of	737	1,590	1,172	1,178	1,401	885	6,963
Congo, Republic	65	173	135	121	140	90	724
Côte d'Ivoire	384	893	674	713	848	524	4,036
Djibouti	0	5	22	40	43	16	125
Equatorial Guinea	8	21	17	19	23	17	105
Eritrea	33	70	32	37	64	41	276
Ethiopia	606	1,315	1,088	1,207	1,615	1,231	7,061
Gabon	22	59	46	53	61	44	286
Gambia	21	42	38	47	68	53	268
Ghana	183	654	674	778	1,052	614	3,956
Guinea	136	258	215	261	283	148	1,301
Guinea-Bissau	31	63	44	44	53	36	270
Kenya	426	1,373	933	829	787	578	4,926
Lesotho	31	277	170	90	58	51	678
Liberia	64	123	95	102	115	66	566
Madagascar	148	289	278	374	471	362	1,921
Malawi	128	566	363	191	208	195	1,652
Mali	197	344	206	192	212	329	1,480
Mauritania	1	19	59	127	83	47	336
Mozambique	332	1,218	801	673	637	401	4,062
Namibia	14	68	57	50	56	45	290
Niger	154	344	434	527	666	703	2,829
Nigeria	3,257	6,942	5,162	5,322	5,960	3,676	30,319
Rwanda	87	94	83	86	65	96	511
Sao Tome and Principe	2	2	2	3	4	5	18
Senegal	163	267	228	332	640	643	2,274
Seychelles	0	3	5	10	10	8	36
Sierra Leone	175	355	272	242	274	148	1,466
Somalia	172	297	176	190	207	131	1,172
South Africa	564	2,218	2,694	2,949	2,923	1,605	12,953
Swaziland	14	118	81	36	33	22	304
Tanzania	534	1,590	1,063	895	953	653	5,688
Togo	92	214	160	172	206	136	979
Uganda	598	1,051	633	457	460	364	3,563
Zambia	198	800	498	333	338	196	2,362
Zimbabwe	193	1,266	1,018	517	330	265	3,590
<b>AFR Total males</b>	11,141	27,984	21,918	21,405	23,708	16,018	122,173



**Table 5b****Deaths attributable to diabetes (DM) in females, 2010 - African Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Angola	339	690	497	533	439	357	2,854
Benin	276	339	251	326	343	386	1,921
Botswana	53	399	300	232	121	165	1,269
Burkina Faso	689	831	548	456	492	700	3,716
Burundi	131	254	201	209	159	162	1,116
Cameroon	1,597	2,251	1,026	858	800	1,029	7,561
Cape Verde	5	8	8	11	12	31	75
Central African Republic	302	481	251	236	216	265	1,750
Chad	125	588	703	764	656	540	3,375
Comoros	6	13	13	17	18	16	83
Congo, Democratic Republic of	1,180	2,242	1,697	1,777	1,667	1,416	9,979
Congo, Republic	162	299	192	168	172	200	1,193
Côte d'Ivoire	831	1,466	871	718	718	796	5,400
Djibouti	5	35	65	74	57	52	288
Equatorial Guinea	22	35	24	26	27	32	165
Eritrea	42	107	55	69	84	76	434
Ethiopia	923	2,084	1,732	1,771	1,691	1,650	9,851
Gabon	49	93	62	56	55	83	398
Gambia	38	56	48	57	72	84	354
Ghana	463	1,011	793	857	1,040	1,198	5,362
Guinea	292	365	267	338	350	348	1,960
Guinea-Bissau	67	85	52	56	59	66	384
Kenya	922	2,982	1,753	1,259	814	816	8,545
Lesotho	97	601	405	210	118	144	1,575
Liberia	135	181	121	130	129	132	829
Madagascar	218	401	390	514	483	486	2,491
Malawi	321	935	605	397	259	294	2,811
Mali	498	562	337	372	374	661	2,804
Mauritania	21	77	116	215	190	207	825
Mozambique	888	2,412	1,606	1,042	824	687	7,457
Namibia	37	183	161	128	116	128	753
Niger	460	525	368	425	497	608	2,883
Nigeria	8,881	11,752	7,434	7,293	6,736	6,985	49,081
Rwanda	137	174	155	161	120	171	919
Sao Tome and Principe	3	3	3	4	5	10	28
Senegal	301	372	287	368	509	823	2,659
Seychelles	0	2	5	11	12	15	45
Sierra Leone	417	467	313	330	330	296	2,153
Somalia	141	279	232	280	223	184	1,339
South Africa	1,090	4,159	6,693	9,001	6,785	5,275	33,004
Swaziland	63	351	196	110	66	57	842
Tanzania	1,056	3,157	1,935	1,486	1,165	921	9,720
Togo	194	345	224	208	214	257	1,443
Uganda	523	1,322	923	705	537	562	4,572
Zambia	547	1,526	833	525	399	337	4,167
Zimbabwe	713	3,923	2,621	1,186	745	790	9,978
<b>AFR Total females</b>	<b>25,256</b>	<b>50,422</b>	<b>37,373</b>	<b>35,970</b>	<b>30,895</b>	<b>30,495</b>	<b>210,411</b>



**Table 6a**

**Deaths attributable to diabetes (DM) in males, 2010 - European Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Albania	10	22	30	62	157	208	489
Andorra	0	0	1	2	5	8	16
Austria	34	53	122	322	775	995	2,300
Azerbaijan	20	79	174	434	514	793	2,013
Belarus	111	354	451	1,025	1,427	1,555	4,923
Belgium	2	14	55	259	844	1,524	2,697
Bosnia and Herzegovina	4	18	48	158	329	525	1,082
Bulgaria	6	53	181	721	1,563	1,475	3,999
Croatia	16	32	70	244	529	987	1,879
Cyprus	3	7	11	34	81	81	218
Czech Republic	32	32	70	400	1,306	1,575	3,414
Denmark	1	12	50	198	525	439	1,226
Estonia	16	29	45	115	210	230	645
Finland	10	24	48	207	533	647	1,469
France	76	216	535	2,149	5,794	9,673	18,443
Georgia	9	47	104	240	416	562	1,377
Germany	228	402	1,318	3,531	8,490	13,616	27,585
Greece	15	46	85	267	774	1,770	2,957
Hungary	26	43	138	682	1,561	1,829	4,279
Iceland	0	0	0	1	5	8	15
Ireland	9	19	25	68	196	291	608
Israel	10	28	42	132	320	495	1,029
Italy	17	137	369	1,274	4,389	7,241	13,427
Kazakhstan	96	563	818	1,733	1,501	934	5,645
Kyrgyzstan	10	78	156	342	336	273	1,195
Latvia	11	51	67	171	342	386	1,028
Liechtenstein	0	0	0	1	2	3	7
Lithuania	37	118	179	336	549	540	1,759
Luxembourg	0	1	2	11	35	55	104
Malta	0	0	1	8	33	50	93
Moldova	29	69	135	340	490	571	1,634
Monaco	0	0	0	1	3	5	9
Montenegro	3	4	8	31	61	127	234
Netherlands	1	13	55	308	1,258	2,039	3,675
Norway	5	13	19	61	211	285	595
Poland	193	563	955	2,965	4,408	5,065	14,150
Portugal	27	56	243	283	944	1,272	2,825
Romania	78	258	451	1,422	2,709	4,066	8,985
Russian Federation	3,638	9,854	10,457	18,681	18,459	20,525	81,615
San Marino	0	0	0	1	2	3	5
Serbia	40	84	144	564	1,126	2,168	4,126
Slovakia	19	22	59	272	624	826	1,822
Slovenia	2	13	44	147	228	183	618
Spain	24	197	493	1,439	3,569	5,248	10,969
Sweden	7	19	39	137	513	691	1,406
Switzerland	27	39	80	207	541	746	1,640
Tajikistan	6	31	70	186	240	204	737
Macedonia, the Former Yugoslav Republic of	6	12	28	104	215	341	705
Turkey	146	568	981	2,460	4,470	4,375	13,001
Turkmenistan	18	94	200	338	312	190	1,151
Ukraine	682	2,423	2,957	5,555	7,445	8,688	27,751
United Kingdom	60	168	281	871	3,113	4,988	9,481
Uzbekistan	39	237	446	1,192	1,454	1,182	4,551
<b>EUR Total males</b>	<b>5,860</b>	<b>17,216</b>	<b>23,342</b>	<b>52,692</b>	<b>85,933</b>	<b>112,557</b>	<b>297,600</b>



**Table 6b**

**Deaths attributable to diabetes (DM) in females, 2010 – European Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Albania	24	26	30	63	162	565	869
Andorra	0	0	0	1	3	9	15
Austria	17	26	108	311	572	1,190	2,225
Azerbaijan	27	107	337	850	891	2,364	4,576
Belarus	11	70	210	839	1,226	3,442	5,799
Belgium	1	9	58	304	647	1,851	2,869
Bosnia and Herzegovina	3	18	71	215	396	1,045	1,748
Bulgaria	3	24	80	343	910	2,765	4,125
Croatia	6	15	48	171	337	1,227	1,804
Cyprus	0	2	6	18	38	106	171
Czech Republic	13	21	78	427	1,103	2,487	4,129
Denmark	5	18	57	182	417	839	1,518
Estonia	1	6	22	89	159	408	685
Finland	3	8	31	135	298	663	1,139
France	46	162	462	1,694	2,729	6,892	11,984
Georgia	8	40	117	296	486	1,223	2,169
Germany	148	250	1,171	3,475	6,130	15,821	26,994
Greece	6	23	65	227	578	2,687	3,585
Hungary	15	30	133	713	1,395	3,259	5,545
Iceland	0	0	0	2	4	12	19
Ireland	13	22	36	82	137	300	589
Israel	7	25	45	145	220	476	918
Italy	6	74	341	1,313	3,255	8,977	13,966
Kazakhstan	3	76	393	1,647	1,556	1,862	5,538
Kyrgyzstan	1	17	88	335	326	413	1,180
Latvia	1	8	33	131	249	566	988
Liechtenstein	0	0	0	1	2	4	8
Lithuania	3	23	81	260	431	987	1,784
Luxembourg	0	0	2	11	24	68	107
Malta	0	0	2	16	44	78	141
Moldova	4	17	77	426	690	1,391	2,605
Monaco	0	0	0	1	1	3	6
Montenegro	1	3	8	29	52	173	265
Netherlands	1	12	87	465	1,110	2,433	4,108
Norway	3	9	20	61	139	335	567
Poland	20	113	476	2,523	3,602	8,391	15,126
Portugal	16	38	196	296	807	1,783	3,136
Romania	35	133	316	1,126	1,932	5,540	9,083
Russian Federation	347	1,846	4,833	17,097	21,001	55,364	100,488
San Marino	0	0	0	1	2	4	7
Serbia	16	46	128	508	854	2,942	4,494
Slovakia	8	13	50	267	525	1,392	2,256
Slovenia	1	4	24	96	120	182	427
Spain	16	102	310	931	2,015	6,207	9,581
Sweden	10	22	48	165	529	1,456	2,231
Switzerland	17	24	84	251	459	876	1,710
Tajikistan	1	13	78	310	276	389	1,067
Macedonia, the Former Yugoslav Republic of	3	10	26	87	180	469	775
Turkey	136	760	1,739	3,987	5,589	8,618	20,830
Turkmenistan	1	20	102	394	354	365	1,238
Ukraine	77	524	1,355	4,965	8,142	19,985	35,047
United Kingdom	39	93	301	990	2,454	5,349	9,226
Uzbekistan	4	65	337	1,334	1,421	1,834	4,995
<b>EUR Total females</b>	<b>1,131</b>	<b>4,966</b>	<b>14,706</b>	<b>50,606</b>	<b>76,976</b>	<b>188,069</b>	<b>336,454</b>



**Table 7a****Deaths attributable to diabetes (DM) in males, 2010 - Middle East and North African Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Afghanistan	670	2,114	1,847	1,678	1,497	532	<b>8,337</b>
Algeria	341	489	552	957	1,398	1,571	<b>5,309</b>
Armenia	6	22	76	210	292	488	<b>1,095</b>
Bahrain	6	21	27	54	44	24	<b>177</b>
Egypt	767	1,690	2,555	5,335	5,547	2,906	<b>18,800</b>
Iran, Islamic Republic of	179	468	869	2,137	3,431	3,839	<b>10,924</b>
Iraq	406	1,382	1,296	1,800	2,131	1,057	<b>8,073</b>
Jordan	18	85	154	210	367	243	<b>1,078</b>
Kuwait	17	46	55	73	116	102	<b>409</b>
Lebanon	6	32	82	243	492	536	<b>1,391</b>
Libyan Arab Jamahiriya	58	95	101	163	301	316	<b>1,034</b>
Morocco	160	283	316	876	1,596	1,327	<b>4,558</b>
Oman	38	80	102	133	149	92	<b>594</b>
Pakistan	1,340	3,282	4,799	8,651	10,865	6,680	<b>35,617</b>
Qatar	9	27	24	33	27	13	<b>133</b>
Saudi Arabia	343	1,162	1,623	1,816	1,527	1,326	<b>7,798</b>
Sudan	14	218	577	1,187	1,558	517	<b>4,071</b>
Syrian Arab Republic	331	398	349	573	1,057	1,220	<b>3,928</b>
Tunisia	49	139	183	372	482	480	<b>1,706</b>
United Arab Emirates	28	119	106	171	170	78	<b>672</b>
Yemen	199	261	181	239	292	167	<b>1,339</b>
<b>MENA Total males</b>	<b>4,986</b>	<b>12,414</b>	<b>15,874</b>	<b>26,911</b>	<b>33,342</b>	<b>23,516</b>	<b>117,042</b>



**Table 7b****Deaths attributable to diabetes (DM) in females, 2010 – Middle East and North African Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Afghanistan	1,185	2,498	2,184	2,295	1,667	864	10,694
Algeria	374	835	1,150	1,706	1,881	2,822	8,768
Armenia	5	25	120	327	407	978	1,861
Bahrain	2	9	25	54	56	69	215
Egypt	784	1,964	3,410	9,512	11,186	12,461	39,317
Iran, Islamic Republic of	152	723	1,751	4,009	4,932	5,962	17,529
Iraq	127	682	1,405	2,176	2,236	1,708	8,334
Jordan	16	99	210	283	364	329	1,301
Kuwait	7	24	44	70	124	121	389
Lebanon	1	19	116	382	590	722	1,831
Libyan Arab Jamahiriya	75	159	180	218	341	559	1,532
Morocco	107	365	606	1,229	1,351	1,709	5,366
Oman	20	44	64	99	117	129	472
Pakistan	2,155	5,434	8,091	12,968	12,738	11,012	52,397
Qatar	1	5	14	23	32	26	101
Saudi Arabia	232	811	1,054	1,331	1,298	1,581	6,307
Sudan	289	1,221	1,558	2,252	2,607	2,253	10,180
Syrian Arab Republic	225	405	523	881	1,157	1,959	5,150
Tunisia	25	131	293	575	701	1,047	2,772
United Arab Emirates	14	64	88	113	48	80	408
Yemen	224	349	333	438	410	316	2,071
<b>MENA Total females</b>	6,021	15,867	23,217	40,942	44,242	46,707	176,995



**Table 8a****Deaths attributable to diabetes (DM) in males, 2010 - North America and Caribbean Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Antigua & Barbuda	0	1	3	5	4	4	17
Bahamas	1	16	32	27	26	15	118
Barbados	1	5	15	26	32	25	104
Belize	2	15	19	19	18	13	85
Canada	24	268	879	1,717	1,879	948	5,715
Dominica	0	2	3	4	5	6	21
Grenada	0	3	7	6	7	3	26
Guyana	2	41	146	255	188	45	677
Haiti	52	352	567	634	619	440	2,666
Jamaica	14	94	148	149	133	52	588
Mexico	339	2,350	3,476	5,698	6,722	6,409	24,994
St Kitts and Nevis	0	1	2	3	3	2	11
St Lucia	0	4	8	11	6	3	33
St Vincent and the Grenadines	0	5	11	8	8	7	39
Suriname	4	27	48	41	33	18	170
Trinidad and Tobago	6	60	127	156	114	41	503
United States of America	1,644	3,861	10,905	21,377	33,759	33,694	105,241
<b>NAC Total males</b>	2,090	7,104	16,396	30,136	43,555	41,726	141,007



**Table 8b****Deaths attributable to diabetes (DM) in females, 2010 - North America and Caribbean Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Antigua & Barbuda	0	1	3	8	9	7	28
Bahamas	1	6	18	32	37	26	121
Barbados	0	2	11	30	40	41	124
Belize	1	4	10	23	24	13	75
Canada	20	122	699	2,135	3,294	3,213	9,483
Dominica	0	1	2	3	7	8	20
Grenada	1	2	9	14	18	22	65
Guyana	3	16	63	133	142	98	454
Haiti	71	351	753	1,067	1,310	1,108	4,660
Jamaica	6	27	98	149	186	230	696
Mexico	149	877	2,841	7,633	9,637	8,762	29,898
St Kitts and Nevis	0	0	1	4	7	8	20
St Lucia	0	1	7	11	15	13	47
St Vincent and the Grenadines	0	3	7	9	10	11	39
Suriname	3	9	31	50	58	41	193
Trinidad and Tobago	3	12	49	131	170	128	493
United States of America	377	2,200	11,176	29,930	43,579	38,524	125,785
<b>NAC Total females</b>	634	3,634	15,776	41,362	58,544	52,252	172,201



**Table 9a**

**Deaths attributable to diabetes (DM) in males, 2010 - South and Central American Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Argentina	32	328	864	2,122	2,939	1,993	<b>8,278</b>
Bolivia	25	169	295	452	523	356	<b>1,819</b>
Brazil	791	3,926	6,543	9,571	10,808	9,143	<b>40,781</b>
Chile	22	168	363	602	775	580	<b>2,509</b>
Colombia	73	509	829	1,274	1,543	1,344	<b>5,571</b>
Costa Rica	12	87	145	190	170	99	<b>703</b>
Cuba	8	140	462	661	718	338	<b>2,327</b>
Dominican Republic	33	367	528	648	567	272	<b>2,414</b>
Ecuador	46	281	395	524	525	397	<b>2,168</b>
El Salvador	60	377	390	357	323	161	<b>1,666</b>
Guatemala	134	770	779	629	519	280	<b>3,112</b>
Honduras	33	182	265	355	340	225	<b>1,401</b>
Nicaragua	32	212	299	299	288	153	<b>1,284</b>
Panama	14	98	138	152	167	93	<b>660</b>
Paraguay	10	65	132	185	157	76	<b>626</b>
Peru	43	336	517	707	793	740	<b>3,136</b>
Uruguay	2	19	43	126	219	177	<b>586</b>
Venezuela	158	551	756	992	1,146	847	<b>4,451</b>
<b>SACA Total males</b>	<b>1,527</b>	<b>8,584</b>	<b>13,744</b>	<b>19,845</b>	<b>22,520</b>	<b>17,273</b>	<b>83,493</b>



**Table 9b****Deaths attributable to diabetes (DM) in females, 2010 - South and Central American Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Argentina	13	103	511	1,749	2,631	2,237	7,243
Bolivia	14	72	226	545	751	627	2,235
Brazil	187	868	3,459	9,368	13,907	14,539	42,328
Chile	6	38	186	524	775	648	2,175
Colombia	15	106	557	1,530	2,135	1,486	5,829
Costa Rica	4	10	59	138	191	124	526
Cuba	7	69	367	880	1,454	1,291	4,068
Dominican Republic	29	161	436	884	1,142	1,197	3,850
Ecuador	13	65	235	614	734	592	2,254
El Salvador	17	37	178	413	611	395	1,650
Guatemala	51	84	358	783	930	547	2,753
Honduras	19	32	141	345	418	364	1,319
Nicaragua	15	25	137	358	391	252	1,179
Panama	7	13	61	162	227	151	623
Paraguay	6	19	59	166	283	327	861
Peru	22	123	437	1,030	1,343	1,126	4,081
Uruguay	1	6	29	110	176	156	477
Venezuela	30	107	396	1,038	1,480	1,308	4,360
<b>SACA Total females</b>	456	1,937	7,833	20,638	29,580	27,367	87,810



**Table 10a****Deaths attributable to diabetes (DM) in males, 2010 - South-East Asian Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Bangladesh	2,482	4,864	7,458	11,195	7,053	4,548	<b>37,600</b>
Bhutan	1	3	5	10	8	8	<b>34</b>
India	11,111	36,249	61,488	114,922	94,961	107,176	<b>425,906</b>
Maldives	2	3	4	9	7	7	<b>33</b>
Mauritius	9	49	154	273	184	146	<b>814</b>
Nepal	88	298	607	1,225	904	700	<b>3,822</b>
Sri Lanka	215	459	1,132	2,575	1,976	2,337	<b>8,694</b>
<b>SEA Total males</b>	<b>13,908</b>	<b>41,924</b>	<b>70,849</b>	<b>130,209</b>	<b>105,092</b>	<b>114,922</b>	<b>476,903</b>

**Table 10b****Deaths attributable to diabetes (DM) in females, 2010 - South-East Asian Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Bangladesh	4,401	8,460	12,300	16,848	13,451	10,705	<b>66,164</b>
Bhutan	1	3	5	10	10	15	<b>44</b>
India	16,224	33,430	53,488	116,711	150,186	211,697	<b>581,736</b>
Maldives	1	2	5	11	12	18	<b>49</b>
Mauritius	5	29	87	202	222	231	<b>776</b>
Nepal	148	490	974	1,863	1,781	1,592	<b>6,848</b>
Sri Lanka	120	266	759	2,179	2,709	4,361	<b>10,394</b>
<b>SEA Total females</b>	<b>20,901</b>	<b>42,680</b>	<b>67,618</b>	<b>137,823</b>	<b>168,370</b>	<b>228,619</b>	<b>666,011</b>



**Table 11a****Deaths attributable to diabetes (DM) in males, 2010 - Western Pacific Region**

Country	Number of deaths in males attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Australia	20	80	117	337	1,059	1,683	3,296
Brunei Darussalam	4	9	18	44	40	19	134
Cambodia	244	531	1,172	1,199	757	187	4,090
China	5,790	16,987	52,184	94,506	102,913	52,887	325,268
Cook Islands	0	0	0	0	0	0	2
Korea, DPR	182	739	2,216	3,018	4,820	1,671	12,646
Korea Republic	168	889	3,287	5,197	5,543	3,338	18,422
Fiji	3	19	88	174	153	31	467
Indonesia	1,511	4,840	13,086	19,362	18,049	8,783	65,630
Japan	108	776	2,852	8,043	15,353	10,605	37,739
Kiribati	2	5	15	14	6	2	45
Lao People's Democratic Republic	127	235	406	510	356	213	1,846
Malaysia	428	992	2,467	4,293	4,433	1,718	14,330
Marshall Islands	1	5	14	20	17	3	60
Micronesia, Federated States of	1	1	4	9	7	3	26
Mongolia	6	46	154	137	55	12	410
Myanmar	0	1,190	3,161	4,757	4,302	3,704	17,114
Nauru	1	3	6	7	4	1	22
New Zealand	4	12	22	64	188	306	597
Niue	0	0	0	0	0	0	0
Palau	0	1	2	5	2	1	11
Papua New Guinea	3	23	124	377	340	82	950
Philippines	378	1,880	4,707	8,456	5,861	1,591	22,873
Samoa	0	3	13	27	20	9	73
Singapore	3	29	193	703	770	635	2,333
Solomon Islands	0	1	5	18	25	10	59
Thailand	761	3,268	7,830	13,866	9,828	5,577	41,130
Timor-Leste	6	15	32	55	45	16	169
Tonga	1	2	4	8	10	8	32
Tuvalu	0	1	2	3	3	1	11
Vanuatu	0	0	3	11	13	4	31
Viet Nam	222	616	2,285	4,919	5,231	5,174	18,447
<b>WP Total males</b>	<b>9,976</b>	<b>33,198</b>	<b>96,470</b>	<b>170,141</b>	<b>180,205</b>	<b>98,276</b>	<b>588,266</b>



**Table 11b****Deaths attributable to diabetes (DM) in females, 2010 - Western Pacific Region**

Country	Number of deaths in females attributable to DM in the 20-79 age-group						Total
	20-29	30-39	40-49	50-59	60-69	70-79	
Australia	16	66	154	411	811	1,826	3,284
Brunei Darussalam	1	5	13	29	22	22	92
Cambodia	93	285	834	1,196	1,065	363	3,835
China	629	5,535	28,984	68,501	87,289	58,369	249,307
Cook Islands	0	0	0	0	1	0	2
Korea, DPR	90	378	1,198	1,785	3,990	3,584	11,024
Korea Republic	97	103	757	1,807	3,267	4,354	10,386
Fiji	5	14	57	115	129	48	368
Indonesia	1,171	4,604	14,185	22,041	24,871	14,887	81,760
Japan	19	177	920	3,414	8,081	9,079	21,690
Kiribati	1	3	7	8	8	4	30
Lao People's Democratic Republic	55	171	389	545	421	262	1,843
Malaysia	117	313	1,137	2,647	3,359	1,929	9,502
Marshall Islands	1	4	9	21	23	8	65
Micronesia, Federated States of	1	1	4	7	7	4	24
Mongolia	1	11	75	102	66	23	278
Myanmar	0	712	2,219	4,253	4,761	5,017	16,961
Nauru	0	2	4	4	3	1	14
New Zealand	3	12	39	111	201	439	804
Niue	0	0	0	0	0	0	0
Palau	0	0	1	1	2	1	6
Papua New Guinea	12	56	196	377	414	171	1,225
Philippines	327	1,506	4,141	7,496	8,994	5,460	27,924
Samoa	0	2	12	20	23	16	73
Singapore	2	8	86	310	500	593	1,499
Solomon Islands	0	2	7	17	27	18	72
Thailand	302	1,453	4,330	8,760	8,641	6,753	30,239
Timor-Leste	5	13	40	60	62	24	204
Tonga	1	3	6	19	25	14	68
Tuvalu	0	0	3	3	5	1	13
Vanuatu	0	1	5	10	14	6	36
Viet Nam	83	298	1,397	3,068	4,068	5,145	14,058
<b>WP Total females</b>	<b>3,032</b>	<b>15,742</b>	<b>61,207</b>	<b>127,138</b>	<b>161,150</b>	<b>118,420</b>	<b>486,689</b>