Part 1

Ten highlights in health statistics
The target for monitoring progress towards Millennium Development Goal 5 (MDG 5) (improve maternal health) is to reduce the maternal mortality ratio in all countries so that by 2015 it is one quarter of its 1990 level. This indicator is often described as the most seriously “off track” of all the health-related MDG indicators. The most recent interagency estimates developed by technical experts from academic institutions and international agencies (WHO, UNICEF, UNFPA and the World Bank) provide updated data on maternal mortality, while acknowledging the large uncertainty in these estimates because there are few or no data available for most high-mortality countries.1

The latest estimate is that 536 000 women died in 2005 as a result of complications of pregnancy and childbirth, and that 400 mothers died for every 100 000 live births (this is the “maternal mortality ratio”, the main indicator of the safety of pregnancy and childbirth). The maternal mortality ratio was 9 in developed countries, 450 in developing countries and 900 in sub-Saharan Africa. This means that 99% of the women who died in pregnancy and childbirth were from developing countries. Slightly more than half of these deaths occurred in sub-Saharan Africa and about a third in southern Asia: together these regions accounted for over 85% of maternal deaths worldwide.

Meeting the MDG target for maternal mortality requires a decline in the maternal mortality ratio of around 5.5% each year. No region in the world has achieved this result. Globally, the maternal mortality ratio showed a total fall of 5.4% in the 15 years between 1990 and 2005, an average reduction of 0.4% each year.
In sub-Saharan Africa, where most deaths occur and the risk for individual women is very high, there was hardly any improvement between 1990 and 2005. Nevertheless, significant progress was made in eastern and south-eastern Asia, Latin America and the Caribbean, northern Africa and Oceania. In eastern Asia, where the largest decline was recorded, the maternal mortality ratio fell by more than 40% between 1990 and 2005.

Understanding the data and estimates

The uncertainty surrounding these estimates is very wide: the number of maternal deaths globally could be as low as 220,000 or as high as 870,000 and the global maternal mortality ratio could be as low as 220 or as high as 650 per 100,000 live births.

Counting maternal deaths accurately requires a system for recording deaths among women of reproductive age and a system for identifying and recording the cause of death. Estimating the maternal mortality ratio requires a system for counting the number of live births as well. At present, only one in eight of the world’s births occurs in countries where births and deaths are counted and where causes of death are identified and recorded accurately. Most countries use surveys of a limited sample of households to produce maternal mortality statistics but, although there are a number of different survey methods, all have important weaknesses. A quarter of the world’s births take place in countries where there are no complete civil registration systems at all.

The maternal mortality estimates for countries without good systems of civil registration are in some cases corrected statistics and in other cases predicted statistics. Corrected statistics are based on survey data, adjusted in various ways to deal with missing data, bias and different data collection methods. Predicted statistics are presented for around one third of countries with no recent, nationally representative surveys. Predicted maternal mortality estimates are generated by a statistical model, built up from observations in 73 developing countries for which good data are available. Because of the uncertainty surrounding estimates derived from statistical modelling, predicted values are not appropriate for monitoring trends. Only a few countries have empirical data on maternal mortality for more than one year, and these are mostly middle-income countries and countries with initial maternal mortality ratios below 200 deaths per 100,000 live births. The trend estimates described here have been derived using statistical techniques that make the most efficient use of incomplete data. The limitations of the available data mean that it is only possible to generate trend estimates at the global and regional levels.
Coverage gap and inequity in maternal, neonatal and child health interventions

Coverage, defined as the percentage of people receiving a specific intervention among those who need it, is a key health system output and an essential indicator for monitoring health service performance. Using data available from Demographic and Health Surveys (DHS) and UNICEF’s Multiple Indicator Cluster Surveys (MICS), a new study conducted in the context of the Maternal, Newborn and Child Survival Countdown examines gaps in coverage in maternal, neonatal and child health interventions (services that are essential to reach Millennium Development Goals (MDG) 4 and 5) and patterns of inequality in 54 countries that represent more than 90% of maternal and child deaths worldwide each year.

Gaps in coverage range from 20% to over 70%

The coverage gap is an aggregate index of the difference between observed and “ideal” or universal coverage in four intervention areas: family planning, maternal and neonatal care, immunization, and treatment of sick children. Estimates from the most recent surveys showed that the mean overall gap across all 54 countries was 43%, with values for individual countries ranging from more than 70% in Chad and Ethiopia to less than 20% in Peru and Turkmenistan. In 18 of the 54 countries, the gap was 50% or more; it was between 30% and 49% in 29 countries and less than 30% in the remaining 7 countries.

Coverage gap observed in latest (around 2005) and earliest (prior to 2000) periods, by country
Gradual but slow progress in most countries

In the 40 countries that had been subject to at least two surveys since 1990, the coverage gap fell in all except four – Chad, Kenya, Zambia and Zimbabwe – where it increased. On average, the gap fell by about 0.9 percentage points per year. Only in Cambodia (2000–2005), Mozambique (1997–2003) and Nepal (2000–2005) was the decline more than 2 percentage points per year. Analysis of change by intervention area showed that collectively, in countries where a positive trend was recorded, the largest contribution to the decline in the coverage gap came from immunization (33%), closely followed by maternal and neonatal care (30%), family planning (20%) and treatment of sick children (17%).

Up to three times larger gaps among the poor

There are large within-country differences in the coverage gap between the poorest and wealthiest population quintiles. In India and the Philippines, the wealthiest groups are three times more likely to receive care than the poorest. In terms of absolute difference, Nigeria has the largest inequity in coverage: the difference between maximum and actual coverage is 45 percentage points larger for the poorest than for the best-off population quintile. Some countries, including the formerly socialist republics Azerbaijan and Turkmenistan, have remarkably small differences by wealth quintile. Inequalities between population groups are particularly high for maternal and neonatal care, which includes antenatal care and the presence of a skilled attendant at delivery. For these interventions, the coverage gap for the poorest and best-off quintiles differs by 33.9%. The difference is smallest for the treatment of sick children and family planning.
Understanding the data and estimates

The coverage gap index is a summary measure of the difference between maximum and actual coverage for key interventions. It has been constructed to reflect a range of essential public health interventions that draw on different health system delivery strategies. Such a summary measure is useful because a general picture cannot easily be obtained from looking at a large number of indicators. Nevertheless, the aggregate index is not intended to replace existing measures for the coverage of individual interventions.

Ideally, a summary measure would include a set of interventions with the largest impact on health and mortality. The components of the coverage gap could then be weighted according to potential health gains. At present, long-term reliable and comparable data (from 1990) are available only for the areas of family planning, maternal and neonatal care, immunization, and treatment of sick children. For each of these areas, between one and three specific indicators were selected for the analysis. These included: need for family planning satisfied; antenatal care use; skilled birth attendant; coverage with BCG, measles and DPT3 vaccination; and treatment for diarrhoeal disease and suspected pneumonia. A broader set of interventions would provide a more complete picture of coverage trends, but is currently not available. Future analyses should include a broader set of interventions in the field of maternal, neonatal and child health (e.g. insecticide-treated bednets or vitamin A supplementation) and also adult health (e.g. antiretroviral therapy coverage, mammography screening).

All coverage indicators for maternal, neonatal and child health rely on household survey data. This allows computation of gaps by background characteristics such as wealth, education or place of residence, which would not have been possible with clinical data. Coverage statistics from household surveys rely on the accuracy of responses from respondents and this could affect especially the assessment of treatment of childhood illness, as there may well be variations in the accuracy of reporting of symptoms by socioeconomic status. Asset indices also present some limitations owing to the fact that different choices of assets for the construction of the index can result in changes in the classification of households. Despite these limitations, however, the coverage gap measure consistently demonstrates wide coverage gaps and consistent trends over time in most Countdown study countries.
HIV/AIDS ESTIMATES ARE REVISED DOWNWARDS

HIV/AIDS is one of the most urgent threats to global public health. Most of the infections with HIV and deaths due to the disease could be prevented if people everywhere had access to good services for preventing and treating HIV infection. Estimates of the size and course of the HIV epidemic are updated every year by UNAIDS and WHO. In 2007, improved survey data and advances in estimation methodologies led to substantially revised estimates of numbers of people living with HIV, of HIV-related deaths and of new infections worldwide.

The number of people living with HIV continues to rise but is lower than previously estimated

The number of people living with HIV worldwide in 2007 was estimated at 33.2 million; there may be as few as 30.6 million or as many as 36.1 million. The latest estimates cannot be compared directly with estimates published in previous years. The new data and improved methods used in 2007 also led to a substantial revision of the estimates for 2006 and before. For instance, the new best estimate for 2006 is now 32 million and not 39.5 million as published in 2006. For 2000, UNAIDS and WHO now estimate that 27.6 million people were infected, compared with 36.1 million estimated at that time.

(A) NUMBER OF PEOPLE LIVING WITH HIV: PREVIOUS AND CURRENT ESTIMATES, 2000–2007;
(B) PREVALENCE OF HIV INFECTION AMONG ADULTS, 1990–2007: COMPARING SUB-SAHARAN AFRICA AND THE GLOBAL AVERAGE

Sub-Saharan Africa continues to be the region most affected by HIV/AIDS. In 2007, one in every three people in the world living with HIV lived in sub-Saharan Africa, a total of 22.5 million. Although other regions are less severely affected, 4 million people in south and south-east Asia and 1.6 million in eastern Europe and central Asia were living with HIV/AIDS.
While total numbers of people living with HIV have risen, overall prevalence has not changed

Although the total number of people living with HIV has increased significantly over the years, the proportion infected has not changed since the end of the 1990s. In fact, the number of people who become infected every day (over 6800) is greater than the number who die of the disease (around 6000). Worldwide, 0.8% of the adult population (aged 15–49 years) is estimated to be infected with HIV, with a range of 0.7–0.9%.

In sub-Saharan Africa, the estimated proportion of the population infected has actually fallen steadily since 2000. Current data indicate that HIV prevalence reached a peak of nearly 6% around 2000 and fell to about 5% in 2007. This reflects significant changes in high-risk forms of behaviour in a number of countries but is also a result of the maturity of the pandemic, especially in sub-Saharan Africa where HIV first took hold among the general population.

Understanding the data and estimates

HIV infection is detected by testing for HIV antibodies in the blood, although in practice only a small proportion of people ever have an HIV test. This is particularly true in developing countries, where access to health care services is limited. For many years, scientists trying to estimate HIV prevalence had to rely on tests carried out on the blood of pregnant women attending antenatal care in clinics equipped to test for HIV. There are many problems in relying on this approach. Not all women attend for antenatal care and not all antenatal clinics have the ability to test for HIV, although in some cases tests are done at central level. In general, both antenatal care attendance and availability of antibody testing are higher in urban than in rural areas. In addition, bias can arise because pregnant women are not representative of the population at risk of HIV infection, especially in settings where HIV is largely confined to high-risk groups such as sex workers or men who have sex with men. In some settings, HIV testing of groups at high risk of infection has been used to estimate overall prevalence, but these estimates will be accurate only if infection outside the high-risk groups is low.

More recently, it has been possible to introduce antibody testing into household surveys that have large samples of the population selected at random. This gives a more unbiased estimate of the overall prevalence of HIV infection, provided survey participation rates are high. Since 2001, 30 countries in sub-Saharan Africa, Asia and the Caribbean have included HIV testing in household surveys. It was found that prevalence estimates from surveys are generally lower than those calculated on the basis of pregnant women or high-risk groups. The most dramatic example of this was in India: in the National Family Health Survey, 100,000 adults from all over the country were tested for HIV and 0.28% were found to be infected, half the level generated by the earlier methods. This has resulted in a significantly lower estimate of the number of people living with HIV in India. Overall, 70% of the downward adjustment in 2007 is accounted for by new figures for just six countries: Angola, India, Kenya, Mozambique, Nigeria and Zimbabwe.

There have also been improvements to the methods used for estimating HIV prevalence in countries without survey-based data. For example, it is now clear that pregnant women attending antenatal clinics in major cities are more likely to be infected with HIV than adults in general. Therefore, reliance on testing women in urban antenatal clinics tends to overestimate the prevalence of HIV. The new estimates have been adjusted to reflect this.

Estimating mortality due to AIDS is difficult in developing countries, where most deaths occur but where systems for counting deaths and recording cause of death are weak or nonexistent.

Currently, new infection rates and deaths due to HIV/AIDS are estimated from the application of statistical models using data on HIV prevalence, average time between HIV infection and death in the absence of treatment, and survival rates of people receiving treatment. In the absence of antiretroviral treatment, the net median survival time after infection with HIV is now estimated to be 11 years, instead of the previously estimated 9 years. These changes are based on recent information generated by longitudinal research studies. For the same level of prevalence, this longer average survival period has resulted in lower estimates of new infections and deaths due to AIDS.

The contribution of the number of people on antiretroviral treatment to the total number of people living with HIV/AIDS is still small. In the future, however, as more people benefit from treatment and live longer with HIV infection, this will increasingly affect the number of people in the world living with HIV/AIDS.
PROGRESS IN THE FIGHT AGAINST MALARIA

Malaria is endemic in many of the world’s poorest countries. The MDG target aims to have halted and begun to reverse the incidence of the disease by 2015. Indicators for monitoring progress include the proportion of the population in risk areas using effective prevention and treatment measures, and the incidence and death rates associated with malaria. In Africa, where 80% of the global burden of malaria occurs, new data from household surveys and research analysis based on surveillance data allow one to assess changes in intervention coverage in the fight against malaria in the region. Nevertheless, further efforts are needed to accurately monitor progress towards the MDG target and evaluate the intensified efforts against malaria. Most countries in the region still lack good standard measurement tools.

Use of insecticide-treated nets has increased substantially

Insecticide-treated nets (ITNs) are a cheap and highly effective way of reducing the burden of malaria. They prevent malaria transmission and reduce the need for treatment, thus lessening pressure on health services and averting deaths, especially in young children. In the majority of the 21 African countries with data from at least two national surveys, the proportion of children sleeping under ITNs increased five to ten times within five years. These observed increases reflect trends in the production of nets and in resources available for their procurement, which have both increased substantially in the past five years.
The poor do not benefit as much from malaria intervention coverage

Intervention indicators at national level often hide important within-country disparities. A malaria indicator survey (MIS) from Zambia, a country with endemic malaria, showed that children living in the wealthiest households are better protected by bednets; they have a lower chance of carrying the malaria parasite, and when they fall sick they are more likely to be treated with antimalarial medication. Similarly, pregnant women living in better-off households are more likely to receive intermittent preventive treatment than their poorer counterparts. The pattern is not consistent across Africa, however; in Eritrea and Gabon, for instance, there is no difference in bednet use between different geographical or income groups, while in Ghana the direction of the relationship is unclear.8,9

Studies are increasingly showing the impact of control measures

A recent study in Zanzibar showed that, following deployment of antimalarial combined therapy, malaria-associated morbidity and mortality decreased dramatically: crude under-five mortality decreased by 52% while infant and child mortality declined by 33% and 71%, respectively.10 Similarly, in Eritrea, following implementation of multiple intervention coverage, malaria morbidity and case fatality fell by 84% and 40%, respectively.8,11 A more recent review of data from selected clinics in Rwanda suggested a similarly large impact, whereby death rates and malaria cases in children under five fell by about 66% and 64%, respectively.12 The trend observed from inpatient records was consistent with outpatient laboratory reports obtained for all ages. The proportion of positive cases among those suspected of having malaria (slide positivity rate) declined sharply over time, from a high of about 50% in September 2002 to below 20% five years later.
**Understanding the data and estimates**

MDG goal 6 for malaria requires the measurement of two indicators: prevalence and mortality rate. Measuring trends in these indicators requires health information systems that produce timely and comparable population-level statistics, complete surveillance systems with well-functioning laboratories, and civil registration systems with notification and assignment of cause of death. In resource-poor settings, such systems are either nonexistent or seriously inadequate. As a result, analyses in high-burden countries are based on multiple sources, mainly household surveys and surveillance data from health facilities.

Malaria modules in health surveys or special malaria indicator surveys are important sources of information on levels and, when data are available for more than one time period, on trends in intervention coverage. Some malaria indicator surveys include biomarkers such as malaria and anaemia prevalence. Intervention indicators covered in such surveys include data on: ownership and use of ITNs; exposure to indoor residual spraying against mosquitoes; use of intermittent preventive antimalarial therapy during pregnancy; and treatment practices for children with suspected malaria. The last indicator is often based on questions about fever in the previous two weeks and the kind of drugs, if any, used to treat the fever. Such recall data have several pitfalls, however: mothers’ reports on fever in their children may not be accurate; the child may have a fever but not malaria; and recall of the type of medicines given is often poor and may vary according to the socioeconomic background of the respondent.

Surveillance reports from health facilities are the main source of data on malaria morbidity and mortality in Africa. Data routinely collected through surveillance systems include the number of suspected malaria cases, the number of laboratory-confirmed malaria cases, and admissions to and deaths in health facilities. In general, health facility data on malaria case rates have to be interpreted with great caution for a number of reasons. First, the term “prevalence” referring to “parasitic infection” may not be directly relevant in settings where malaria is endemic and transmission rates are stable, because the majority of people in such settings will have parasitic infection but will be asymptomatic, and few have a laboratory confirmation of the diagnosis. Second, patients seeking care are more likely to have the disease, which means that the slide positivity rate cannot be taken as reflecting the actual prevalence in the population. Third, data on trends in malaria cases and deaths in clinics have to be interpreted carefully, because changes in the quality of recording and reporting practices as well as changes in the system of diagnosis could affect observed trends over time. For instance, by using “clinical malaria” cases in the analysis, the above-mentioned studies risk including an unknown proportion of other diseases that are diagnosed as malaria. It should also be noted that not all those with severe malaria may seek care in formal facilities, and some may die at home. Moreover, for all studies, the data on intervention, malaria morbidity and mortality are limited to a five-year period or less, which may be too short to generalize on long-term trends. Because of all these issues, it is standard practice to adjust the reported data for possible confounders and biases before they are used for the purpose of MDG monitoring.
Tobacco use is the single largest cause of preventable death in the world today. The WHO report on the global tobacco epidemic, 2008 provides a comprehensive analysis, based on data from 135 countries, of patterns of tobacco use, the deaths that result and the measures to reduce deaths.

**Tobacco use is a risk factor for six of the eight leading causes of death**

Tobacco kills a third to a half of all those who use it. On average, every user of tobacco loses 15 years of life. Total tobacco-attributable deaths from ischaemic heart disease, cerebrovascular disease (stroke), chronic obstructive pulmonary disease and other diseases are projected to rise from 5.4 million in 2004 to 8.3 million in 2030, almost 10% of all deaths worldwide. More than 80% of these deaths will occur in developing countries.

**Tobacco use is high in many countries**

Tobacco use is highly prevalent in many countries. According to estimates for 2005, 22% of adults worldwide currently smoke tobacco. Some 36% of men smoke compared to 8% of women.

Over a third of adult men and women in eastern and central Europe currently smoke tobacco. Adult smoking prevalence is also high in south-east Asia and northern and western parts of Europe. However, nearly two thirds of the world’s smokers live in just 10 countries: Bangladesh, Brazil, China, Germany, India, Indonesia, Japan, the Russian Federation, Turkey and the United States, which collectively comprise about 58% of the global population.
PERCENTAGE OF TOBACCO USE AMONG ADULTS, 2005

THE STATE OF TOBACCO CONTROL POLICIES IN THE WORLD, 2005

* Note that for taxation, “No policy” implies an excise tax rate 25% or less. For smoke-free policy, “No policy” means no smoke-free legislation or no smoke-free legislation covering either health care or educational facilities.
WHO recommends five policies for controlling tobacco use: smoke-free environments; support programmes for tobacco users who wish to stop; health warnings on tobacco packs; bans on the advertising, promotion and sponsorship of tobacco; and higher taxation of tobacco.

About half of all countries in the world implement none of these five recommended policies, despite the fact that tobacco control measures are cost-effective and proven. Moreover, not more than 5% of the world’s population is fully covered by any one of these measures.

**Efforts to control tobacco use reach only 5% of the world’s population**

Understanding the data and estimates

Data on the prevalence of smoking are obtained by asking questions on tobacco use in population surveys. However, such surveys differ widely in quality and coverage, particularly with regard to representation of all age groups. Some surveys cover only cigarette smoking while others include the use of other tobacco products such as pipes, cigars and chewing tobacco. Some surveys count only daily users while others include occasional users. There are international standards for conducting surveys of tobacco use, but not all countries are able to provide data meeting these standards.

For the 2008 report, data were used from 135 countries that satisfied international standards, taking into account the date of the survey, the extent to which it was representative of the general population, the definition of smoking used and whether all age groups were sampled. Eighteen countries provided data that did not meet international standards, either because the information was too old or because the survey methods were not comparable. No data were available for 41 countries.

One common problem in comparing tobacco use in different countries and at different times is that changes in the age structure of the population can affect tobacco use. It is important to avoid attributing to government policy changes that are simply due to changes in the population structure. To make meaningful comparisons between countries and over time, estimates of the prevalence of tobacco use need to be age-standardized; this was achieved in the 2008 report by using the WHO standard population.

Data on the implementation of tobacco control policies were collected from country focal points for the WHO Tobacco Free Initiative. A standard set of criteria is used to identify five local experts familiar with their country’s policies. For the 2008 report, these experts answered 32 questions about their country’s tobacco control policies and practice. Although the questionnaires used are standardized, self-assessment of performance by the countries themselves may introduce some reporting biases, although the level and direction are difficult to quantify. The data do, however, present a compelling picture of how much still needs to be done to implement tobacco control policies.
Globally, cancer is one of the top ten leading causes of death. It is estimated that 7.4 million people died of cancer in 2004 and, if current trends continue, 83.2 million more will have died by 2015. Among women, breast cancer is the most common cause of cancer mortality, accounting for 16% of cancer deaths in adult women.

There is evidence that early detection through mammography screening and adequate follow-up of women with a positive result could significantly reduce mortality from breast cancer. The World Health Survey provides the first and a unique opportunity to examine the prevalence of screening in a broad range of countries comprising two thirds of the world’s population.

**Less than a quarter of women had breast cancer screening**

At present, breast cancer, along with cervical, colorectal and possibly oral cancers, is the only type for which early screening has been shown to reduce mortality from the disease. There is sufficient evidence to show that mammography screening among women aged 50–69 years could reduce mortality from breast cancer by 15–25%.
Data from the surveys indicate that screening is almost universal in Finland, Luxemburg, the Netherlands and Sweden, with 85% or more women aged 50–69 years having had mammography in the previous three years. This observation is consistent with recent findings on cancer screening in the region. By contrast, screening prevalence is extremely low in most low-income countries, being less than 5% in 2000–2003. Overall, in the 66 countries surveyed, only 22% of women aged 50–69 years had had a mammogram in the previous three years.

**Even in countries where screening is common, there are huge differences according to wealth status**

Estimates from the surveys show that the prevalence of mammography varies significantly by wealth. In the 25 Member States of the WHO European Region surveyed, where breast screening is generally higher than in low-income countries, screening among women in the lowest wealth quintile was lower than among their wealthier counterparts.

In the Russian Federation, women in the wealthiest group are seven times more likely to have had a mammogram than women in the poorest group. By contrast, in countries such as Austria, Belgium and the Netherlands, women in the lowest income quintile are as likely to have had mammography as their wealthier counterparts. This is also the case in countries such as Kazakhstan and Portugal, although overall prevalence of screening in these two countries is relatively low.
Breast cancer is a major cause of death among adult women in much of the world. Using data from the 2004 Global Burden of Disease (GBD), lifetime risk of dying from breast cancer is estimated at about 33 per thousand among women in high-income countries compared with 25 per thousand in upper/middle-income countries and less than 15 per thousand in low- and lower/middle-income countries. These higher rates in wealthier countries reflect a combination of factors, including increasing longevity and a lower risk of dying from other causes, higher exposure to breast cancer risk factors such as overweight and hormone replacement therapy, and lower protective factors such as breastfeeding practices and fertility. Among women in their late 30s in high-income countries, about 10% of deaths are due to breast cancer; this proportion rises to 14% among women in their 50s.

Understanding the data and estimates

Monitoring trends in breast cancer screening requires the use of data from various sources, the two main ones being facility service records and household surveys. The prevalence data are derived from the World Health Survey conducted by WHO during 2003–2004 in 66 Member States comprising two thirds of the world’s population. This makes it the largest single database ever assembled for estimating proportions of the population screened for breast cancer. Nevertheless, the retrospective nature of the data and the long reference period used for collecting the required information mean that recall biases are likely to affect the results.

Women who are less educated and in the low-income group may also lack or have limited knowledge about the procedure. This also means that the responses for these women could potentially be biased downwards. However, the differences observed between low- and high-income countries and between the upper- and lower-income quintiles in the latter group of countries are so large that the bias is unlikely to alter the overall conclusions. In addition, many low-income countries have no national policy on breast screening and very few facilities with the necessary equipment; this is also consistent with the lower estimates reported for these countries.

The key source of information on cancer mortality in the 2004 GBD database, the main source of data used for estimating breast cancer mortality by income group, is cancer registry and death registration data containing information on distribution of cause of death; these however were available only for a limited number of countries. A statistical model, further adjusted by epidemiological evidence from registries, verbal autopsy studies and disease surveillance systems, was used to generate the needed estimates in countries with inadequate or limited data. For this reason, estimates of the effect of breast cancer on mortality reported for low- and lower/middle-income countries should be treated with great caution, as the relevant data are largely absent in these countries.
Half a century ago, a child born in Europe could expect to live for about 66 years, a life expectancy at birth that was the highest of any region in the world except North America. By contrast, average life expectancy at birth 50 years ago was 38 years in sub-Saharan Africa, 41 years in Asia, 45 years in the Middle East, 51 years in Latin America and the Caribbean and 60 years in Oceania. Over the following 50 years, average life expectancy at birth improved all over the world, increasing by almost 27 years in Asia, 23 years in the Middle East, 21 years in Latin America, 14 years in Oceania and 11 years in sub-Saharan Africa. The smallest increase was in Europe, where life expectancy increased by only 8 years, albeit starting from a higher baseline than in most other regions. Analysis of death registration data suggests that the reason for the relative stagnation in life expectancy in Europe as a whole lies in the very slow pace of change in some parts of the continent of Europe.

**Eastern Europe has seen only modest increases in life expectancy**

In 2005, life expectancy at birth for both sexes was 78.6 years in northern, southern and western Europe. Compared to the level in 1950, this represented an increase of over 15 years in southern Europe, some 11 years in western Europe and about 9 years in northern Europe. Over the same period, life expectancy in eastern Europe increased from 64.2 years in 1950 to 67.8 years in 2005, representing an increase of only about 4 years.

**LIFE EXPECTANCY AT BIRTH IN EUROPE, 1950–2005**

![Life Expectancy Chart](chart.png)
Excess mortality in eastern Europe occurs mainly in adult men

In 2005, the male population in eastern Europe was outlived by its counterparts in other parts of Europe by an average of 13.3 years. Of the total deficit in life expectancy, approximately 8.7 years (65%) was due to excess mortality in the 15–59-year age group; a further 3.5 years’ difference was due to excess mortality among men aged 60 years or over.

For women, the picture is rather different. Although women living in eastern Europe were outlived by their counterparts elsewhere in the region by 7.9 years, this was largely a result of higher mortality in older ages (contributing well over 50%), with excess mortality in the 15–59-year age group accounting for the remaining 35% of the difference. For both males and females, mortality under the age of 15 contributed only around 10% of the overall difference in life expectancy at birth between the regions.

Excess mortality is due to noncommunicable diseases and injuries

The single most important contributor to excess mortality in eastern Europe is cardiovascular diseases. Among males, almost 50% of the excess mortality was due to cardiovascular diseases, with a further 20% due to injuries. Excess mortality due to infections and cancer contributed 13% and 10% of the difference, respectively, while other causes contributed 5%. For females, almost 80% of the difference in life expectancy was due to excess mortality from cardiovascular diseases, followed by deaths from injuries, cancer and infections, each contributing between 3% and 8%.
Analysis of mortality statistics over time and by cause of death requires a well-functioning system of registering deaths coupled with medical certification of cause of death. Such systems exist in almost all European countries. Data are reported regularly by Member States to WHO, which collates the data using consistent standard procedures. The cause of death information is generally coded according to the latest (tenth) revision of the *International statistical classification of diseases and related health problems* (ICD-10). Four countries still use the earlier version, ICD-9; for the purposes of analysis, the data for these countries have been mapped to the corresponding ICD-10 codes.

One of the major limitations of death registration data relates to coverage error, so it is common practice to assess coverage before data are used for further processing. WHO calculates coverage by dividing the total deaths reported from the civil registration system by the total deaths estimated by WHO for the same year. The data for the countries included in the study are of good quality, with coverage rates of 90% or more.

The underlying data come from individual countries, which may apply different medical concepts, diagnostic practices and interpretation of rules for determining the underlying causes of death. In addition, there may be variation in coding practices by coders when the information on death certificates is ambiguous or incomplete. As a result, there is likely to be some inherent bias in the data. These problems will be accentuated in data for earlier periods, and must be borne in mind in interpreting cause of death data across countries and over time.
MONITORING DISEASE OUTBREAKS: meningococcal meningitis in Africa

Meningococcal meningitis is a bacterial infection of the meninges, the thin lining that surrounds the brain and spinal cord. Meningitis occurs sporadically and in small outbreaks worldwide, but the highest activity is concentrated in sub-Saharan Africa, in an area determined by its environmental conditions, called the “meningitis belt”. In this belt, which covers 21 countries and where about 350 million people live, the highest disease morbidity is recorded during the dry season. To avert the burden of the disease and the deaths resulting from it, timely and reliable epidemiological surveillance is very important; only then can an immediate response with reactive vaccination be mounted.

Almost 55 000 cases and 4000 deaths reported in 2007

Epidemics of meningococcal meningitis have hit the African meningitis belt in periodic waves. The last major wave occurred in 1996/1997 and affected more than 220 000 people in 17 countries. This was followed by several years of low disease incidence in the belt until 2006, when the epidemic season saw yet another marked rise in meningitis rates across the region. This trend increased further in 2007. During 2007, 54 676 suspected cases of meningitis and 4062 deaths were reported from the belt countries. However, 49% of all cases were reported from just one country: Burkina Faso. The case fatality rate for 2007 of 7.4% was significantly lower than that for 2006 (8.5%).

SUSPECTED MENINGITIS CASES AND MENINGITIS DEATHS IN THE MENINGITIS BELT 1965–2007

Although there is a general belief that the epidemics come in cycles of 10–14 years, these tend to vary from country to country and are moderated by several factors, including the spread of new strains, the extent and frequency of previous vaccination campaigns, and climatic and environmental factors.
The WHO strategy focuses on reactive vaccination to halt the outbreak and effective case management through antibiotic treatment to reduce the lethality of the disease. For this to be effective, a system of early detection and rapid laboratory confirmation is required. This would then help to determine predefined alert and epidemic thresholds and distinguish between a seasonal rise and an emerging epidemic. For instance, for a population of more than 30,000, the epidemic threshold is an incidence of 15 cases per 100,000 population per week. In 2006–2007, a number of districts in Burkina Faso and the Sudan crossed the epidemic threshold determined for the region.

Districts are the primary unit for surveillance and response

For most acute outbreak diseases, it is difficult to estimate the population attack and mortality rates. The ability to detect and report all cases depends on the intensity of surveillance. Enhanced epidemic meningitis surveillance requires systematic weekly collection, compilation and analysis of epidemiological data as well as the adequate collection, transportation and analysis of laboratory specimens. If there is an improvement or deterioration in the surveillance system, then a change in the number of reported cases and deaths is likely to be a reflection of surveillance practices and not of the true course of the epidemic.

Outbreak data are not always directly comparable owing to the use of different systems. Some countries, such as Burkina Faso, Mali and Niger, have greater experience with enhanced surveillance and generally examine a larger proportion of samples in the laboratory. Even then, some indicators should be used to assess the quality of the laboratory tests and its suitability for surveillance. For instance, a large proportion of negative samples should be viewed as an indication that the samples may have been contaminated, or could suggest poor storage and transport or poorly functioning laboratory tests.

Case fatality rates – the proportion of meningitis patients who die – are also difficult to compare as the number of cases detected varies between populations and years. In some years, case fatality rates may be high because of a particularly virulent type of the meningococcus. Mortality numbers and rates should also be interpreted with caution as many deaths may go undetected or the cause of death may be wrongly identified.

During epidemics, standardized treatment is applied and thus laboratory confirmation is not aimed at guiding case management in this context. Laboratory confirmation of the first suspected cases is sufficient to identify the pathogen responsible for the epidemic in the district and for mass vaccination to be started with the appropriate vaccine. In this case, the high incidence due to the epidemic does not indicate the need for an increased collection of cerebrospinal fluid samples.
Future trends in global mortality: major shifts in cause of death patterns

The original Global Burden of Disease (GBD) Study was published in 1991 to provide a comprehensive assessment of disease burden for 107 diseases and injuries and 10 selected risk factors for the world and 8 major regions. Since then, WHO has regularly published updates of the GBD in its World Health Reports. These updates draw on WHO's extensive databases on levels of child and adult mortality and on causes of death in Member States that have useable death registration data, together with data from surveillance systems and epidemiological studies. They provide internally consistent estimates for a total of 135 diseases and injuries, for 8 age groups and 14 subregions of the 6 WHO regions. The most recent update goes further and takes into account the latest projections by UNAIDS and WHO for HIV prevalence and mortality, as well as updated World Bank forecasts for economic growth. The resulting estimates suggest a massive shift in the distribution of deaths over the coming 25 years.

Noncommunicable conditions will cause over three quarters of all deaths in 2030

As populations age in middle- and low-income countries over the next 25 years, the proportion of deaths due to noncommunicable diseases will rise significantly. Globally, deaths from cancer will increase from 7.4 million in 2004 to 11.8 million in 2030, and deaths from cardiovascular diseases will rise from 17.1 million to 23.4 million in the same period. Deaths due to road traffic accidents will increase from 1.3 million in 2004 to 2.4 million in 2030, primarily owing to increased motor vehicle ownership and use associated with economic growth in low- and middle-income countries. By 2030, deaths due to cancer, cardiovascular diseases and traffic accidents will collectively account for 56% of the projected 67 million deaths due to all causes.

This increase in deaths from noncommunicable diseases will be accompanied by large declines in mortality for the main communicable, maternal, perinatal and nutritional causes, including HIV infection, tuberculosis and malaria. However, deaths worldwide from HIV/AIDS are expected to rise from 2.2 million in 2008 to a maximum of 2.4 million in 2012 before declining to 1.2 million in 2030.
The top 20 causes of death in 2030

It is predicted that the four leading causes of death in the world in 2030 will be ischaemic heart disease, cerebrovascular disease (stroke), chronic obstructive pulmonary disease (COPD) and lower respiratory infections (mainly pneumonia). Much of the increase in COPD is associated with projected increases in tobacco use. On the other hand, road traffic accidents will emerge as the fifth leading cause of death in 2030, rising from its position as the ninth leading cause in 2004.

Although deaths due to HIV/AIDS are projected to fall by 2030, it will remain the tenth leading cause of death worldwide. Deaths due to other communicable diseases are projected to decline at a faster rate: tuberculosis will fall to No. 20 and diarrhoeal diseases to No. 23 in the list of leading causes.

### Leading Causes of Death, 2004 and 2030 Compared

<table>
<thead>
<tr>
<th>Disease or injury</th>
<th>Deaths (%)</th>
<th>Rank</th>
<th>Rank</th>
<th>Disease or injury</th>
<th>Deaths (%)</th>
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<td>Ischaemic heart disease</td>
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</tr>
<tr>
<td>Diarrhoeal diseases</td>
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<td>5</td>
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<td>Road traffic accidents</td>
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<td>HIV/AIDS</td>
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<td>6</td>
<td>6</td>
<td>Trachea, bronchus, lung cancers</td>
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<td>Tuberculosis</td>
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<td>Diabetes mellitus</td>
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<tr>
<td>Trachea, bronchus, lung cancers</td>
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<td>Hypertensive heart disease</td>
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<td>9</td>
<td>Stomach cancer</td>
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<td>HIV/AIDS</td>
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<tr>
<td>Diabetes mellitus</td>
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<td>12</td>
<td>Self-inflicted injuries</td>
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<tr>
<td>Birth asphyxia and birth trauma</td>
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<td>23</td>
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<tr>
<td>Alzheimer and other dementias</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Malaria</td>
<td>0.4</td>
</tr>
</tbody>
</table>

* Comprises severe neonatal infections and other, noninfectious causes arising in the perinatal period.
Understanding the data and estimates

WHO’s updated mortality projections are based on historically observed relationships between trends in economic and social development and cause-specific mortality. This update uses the same projection methods for 2002 as previously published, based on updated GBD estimates for 2004, together with updated projections of HIV deaths prepared by UNAIDS and WHO and updated forecasts of economic growth published by the World Bank.

Apart from the incorporation of new epidemiological data for specific causes, the updated GBD estimates for 2004 incorporate more recent death registration data for many countries, new African mortality data using verbal autopsy methods to assign cause of death, and improved methods for estimating causes of child deaths in countries without good death registration data. For these reasons, and also because of revisions to the United Nations population estimates, the GBD estimates for 2004 are not directly comparable with the previous estimates for 2002.

The projections were made based on the assumption of “business as usual”, which does not specifically take account of possible changes in major risk factors (with the exception of tobacco use and, to a limited extent, overweight and obesity). If such behavioural risk factors do not decline with economic development and strengthened health systems in developing countries, these projections may in fact underestimate future mortality in low- and middle-income countries.

In addition, there were 78 countries without useable death registration data. For these countries, cause of death models based on all-cause mortality levels (excluding HIV, war and natural disasters), gross national income per capita, and region were applied at country level for estimating the proportion of deaths in broad cause groups (communicable, noncommunicable and injury) by age and sex. Specific causes were further adjusted on the basis of epidemiological evidence from population registries, verbal autopsy studies, disease surveillance systems and existing WHO databases.

Notwithstanding these shortcomings, it is estimated that the projected reduction in deaths worldwide due to communicable diseases and maternal and perinatal conditions between 2004 and 2030 will mostly result from epidemiological change, offset to some extent by population growth. Population ageing will have little effect.

Demographic changes will lead to substantially more deaths from noncommunicable diseases in all regions, even though age/sex-specific death rates are projected to decline for most causes other than lung cancer. The impact of population ageing is generally much more important than that of population growth.
Many countries rely heavily on out-of-pocket payments (OOPs) by patients to finance their health care systems. OOPs include fees for services levied by public and/or private providers (officially or unofficially) and co-payments where insurance does not cover the full cost of care. This arrangement prevents some people, especially poorer families, from receiving the care they need. In some cases, OOPs can be high enough to cause financial catastrophe and impoverishment, especially when there is severe illness or major injury. In 2005, the Member States of WHO endorsed a resolution on “Sustainable health financing, universal coverage and social health insurance”, calling on countries to develop health financing systems that ensure that people have access to health care without risking financial catastrophe or impoverishment. A new study, based on surveys conducted in 89 countries covering nearly 90% of the world’s population, provides for the first time a global estimate of the scale and distribution of catastrophic health care spending and indicates how the problem can be reduced.

150 million people suffer catastrophic health care costs each year

From the 89 countries included in this study, each year an average of 2.3% of households experience financial catastrophe due to health care costs, corresponding to over 150 million people worldwide. More than 100 million people are impoverished because they must pay for health care.

Catastrophic health care spending occurs in countries at all levels of development. Nevertheless, the problem is more frequent and more severe in middle-income countries, and most frequent and most severe in low-income countries.

Out-of-pocket payments are the main cause of catastrophic spending

Catastrophic spending and impoverishment are strongly associated with the use of OOPs to finance health care. Fewer households are affected by financial catastrophe where there is less reliance on OOPs. In systems where OOPs make up less than 15% of total spending on health care, fewer households tend to face financial catastrophe due to the cost of health care. Other factors, such as the availability of health services and income inequality, do play a role but OOPs for health care are the main factor.
Moving away from OOPs to some form of prepayment scheme is the key to reducing financial catastrophe from health care costs. Prepayment can take the form of taxation, with health care costs paid for by the government or through publicly or privately managed insurance premiums. Either can be effective, and countries may choose their own approach, taking into account their current institutional structures, culture and traditions, and stage of economic development.

Understanding the data and estimates

The data are derived from household surveys that collect information on household spending, including spending on health care. Currently, data are available from 116 surveys covering 89 countries. In most cases, information on frequent expenses was collected for the previous month, and information on spending on durable goods or large items such as hospitalization was collected for the previous 6 or 12 months. How households were selected, and exactly how the questions were asked, varied among the surveys, but all the surveys were recent and the countries included account for 90% of the world’s population.

To estimate the incidence, one first needs to define a threshold for financial catastrophe. The study defined catastrophic spending as health care payments reaching or exceeding 40% of a household’s capacity to pay in any year. The household’s capacity to pay is defined as its non-food spending, and commitment of 40% of non-subsistence spending to a single item is generally associated with significant financial stress.

The results probably underestimate the risk of catastrophic health care spending because only actual OOPs for health care were included. Costs incurred by those who need services but cannot afford them, transport costs and loss of income due to illness were not considered.
REFERENCES