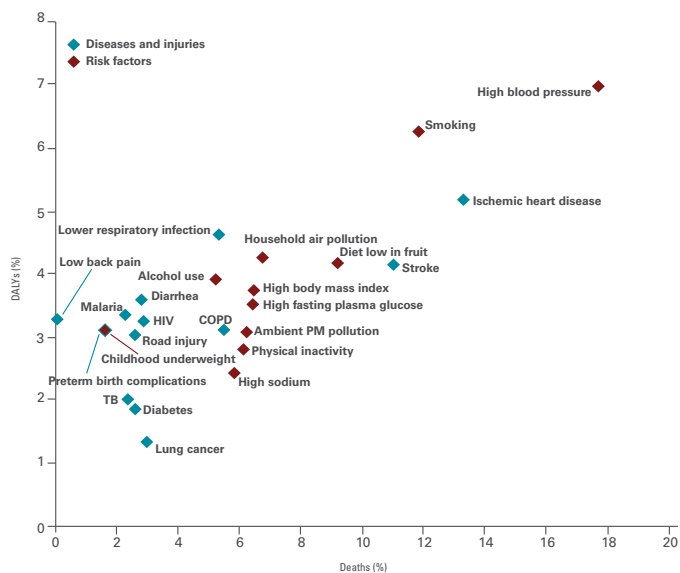


Figure 3: The 10 leading diseases and injuries and 10 leading risk factors based on percentage of global deaths and DALYs, 2010



All risk factors analyzed met common criteria in four areas:

1. The likely importance of a risk factor for policymaking or disease burden.
2. Availability of sufficient data to estimate exposure to a particular risk factor.
3. Rigorous scientific evidence that specific risk factors cause certain diseases and injuries.
4. Scientific findings about the effects of different risk factors that are relevant for the general population.

To calculate the number of DALYs attributable to different risk factors, researchers compared the disease burden in a group exposed to a risk factor to the disease burden in a group that had zero exposure to that risk factor. When subjects with zero exposure were impossible to find, as in the case of high blood pressure, for example, researchers established a level of minimum exposure that leads to the best health outcomes.

RAPID HEALTH TRANSITIONS: GBD 2010 RESULTS

GBD 2010 found that the leading causes of premature death and disability, or DALYs, have evolved dramatically over the past 20 years. Figure 4 shows the changes in the leading causes of DALYs in 1990 and 2010. Communicable, newborn, maternal, and nutritional causes are shown in red, non-communicable diseases appear in blue, and injuries are shown in green. Dotted lines indicate causes that have fallen in rank during this period, while solid lines signal causes that have risen in rank.

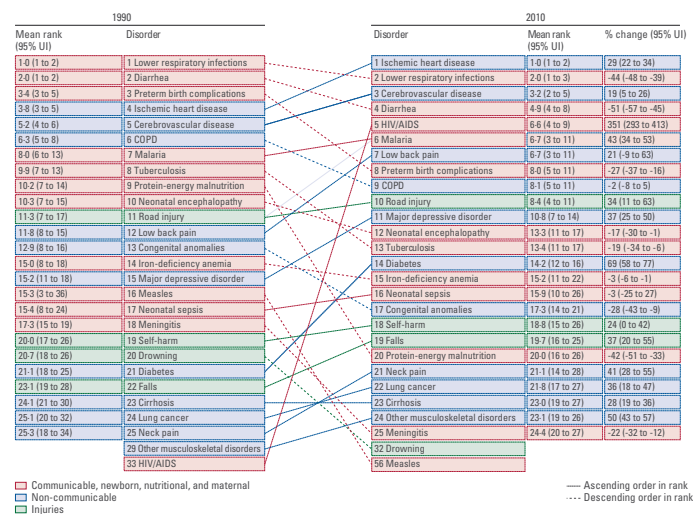
Causes associated with ill health and death in adults, such as ischemic heart disease, stroke, and low back pain, increased in rank between 1990 and 2010, while causes that primarily affect children, such as lower respiratory infections, diarrhea, preterm birth complications, and protein-energy malnutrition, decreased in rank. Unlike most of the leading communicable causes, HIV/AIDS and malaria increased by 351% and 21%, respectively. Since 2005, however, premature mortality and disability from these two causes have begun to decline. Four main trends have driven changes in the leading causes of DALYs globally: aging populations, increases in non-communicable diseases, shifts toward disabling causes and away from fatal causes, and changes in risk factors.

Box 4: GBD data visualization tools

For the first time in the history of GBD research, IHME has developed many free data visualization tools that allow individuals to explore health trends for different countries and regions. The visualization tools allow people to view GBD estimates through hundreds of different dimensions. Only a few examples are explored in the figures throughout this document. We encourage you to visit the IHME website to use the GBD data visualization tools and share them with others.

To use the GBD data visualization tools, visit www.ihmeuw.org/GBDcountryviz

Figure 4: Global disability-adjusted life year ranks, top 25 causes, and percentage change, 1990-2010

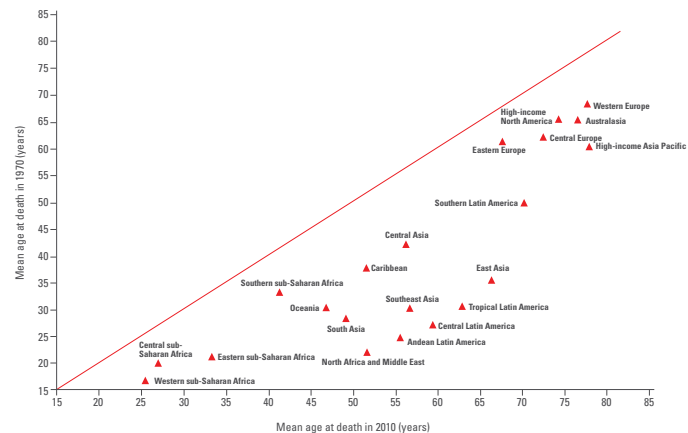


Note: UI = uncertainty interval.

MOST OF THE WORLD'S POPULATION IS LIVING LONGER AND DYING AT LOWER RATES

In much of the world, GBD 2010 found that people are living to older ages than ever before, and the entire population is getting older. Since 1970, the average age of death has increased 35 years. Figure 5 illustrates the dramatic changes that have occurred in Asia and Latin America. In East Asia, which includes China, the Democratic People's Republic of Korea, and Taiwan, people lived 36 years on average in 1970, increasing to 66 years in 2010. The average age of death increased from 31 to 63 in tropical Latin America, which includes Brazil and Paraguay. People in the Middle East and North Africa lived 30 years longer on average in 2010 than they did in 1970.

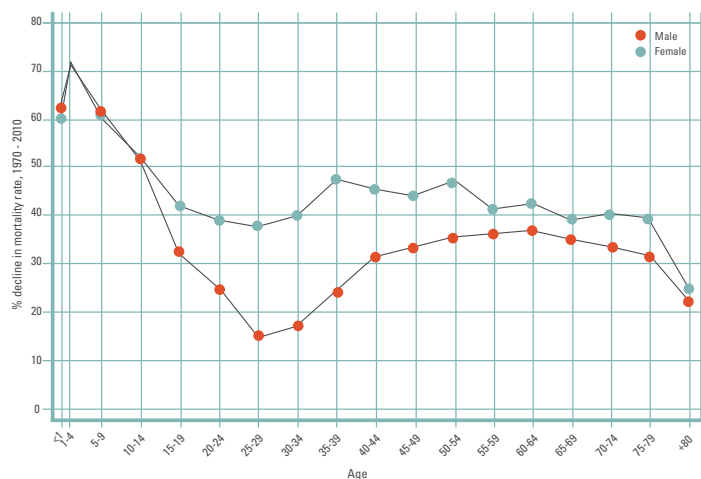
Figure 5: Average age of death, 1970 compared with 2010



Sub-Saharan Africa has not made nearly as much progress as other developing regions, and people in this part of the world tend to die at much younger ages than in any other region. Eastern sub-Saharan Africa made the most progress out of the four sub-Saharan African regions, with people living on average 12 years longer in 2010 than they did in 1970. In western, southern, and central sub-Saharan Africa, the average age at death has risen by less than 10 years. Compared to the rest of the developing world, progress in sub-Saharan Africa has in particular been held back by the HIV/AIDS epidemic, maternal deaths, and child mortality caused by infectious diseases and malnutrition. Some of those trends are changing, though. Over the past decade, sub-Saharan African regions have made encouraging strides in reducing child mortality and in lowering mortality from HIV/AIDS and malaria. These successes are explored elsewhere in this report.

Another way to understand changes in global demographic trends is to explore reductions in mortality rates by sex and age group. Figure 6 shows how death rates have declined in all age groups between 1970 and 2010. These changes have been most dramatic among males and females aged 0 to 9 years, whose death rates have dropped over 60% since 1970. Among age groups 15 and older, the decrease in female death rates since 1970 has been greater than the drop in male death rates. The gap in progress between men and women was largest between the ages of 15 to 54, most likely due to the persistence of higher mortality from injuries among men.

Figure 6: Global decline in age-specific mortality rate, 1970-2010



LEADING CAUSES OF DEATH ARE SHIFTING TO NON-COMMUNICABLE DISEASES

In part because many people are living longer lives and the population is growing older, the leading causes of death have changed. Worldwide, the number of people dying from non-communicable diseases, such as ischemic heart disease and diabetes, has grown 30% since 1990. Population aging and, to a lesser extent, overall population growth also contributed to this increase in deaths from non-communicable diseases. At the same time, the death rate from non-communicable diseases decreased over this period from 645.9 deaths per 100,000 people to 520.4, which is an indication that the world is making progress in this area.

The rise in the total number of deaths from non-communicable diseases has increased the number of healthy years lost, or DALYs, from these conditions. Figure 7 shows changes in the 25 leading causes of DALYs between 1990 and 2010 ordered from highest to lowest ranking cause from left to right. Non-communicable causes are shown in blue; communicable, nutritional, maternal, and newborn causes in red; and injuries in green.

Figure 7: Global shifts in leading causes of DALYs, 1990-2010

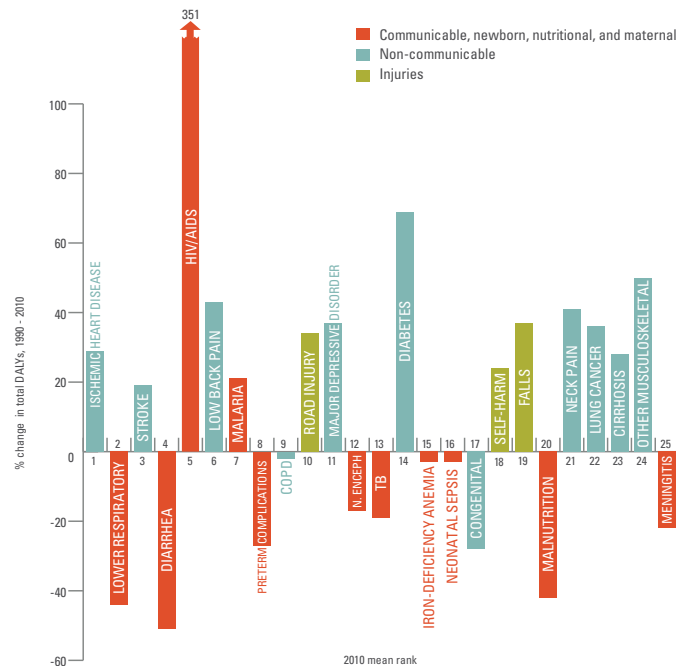
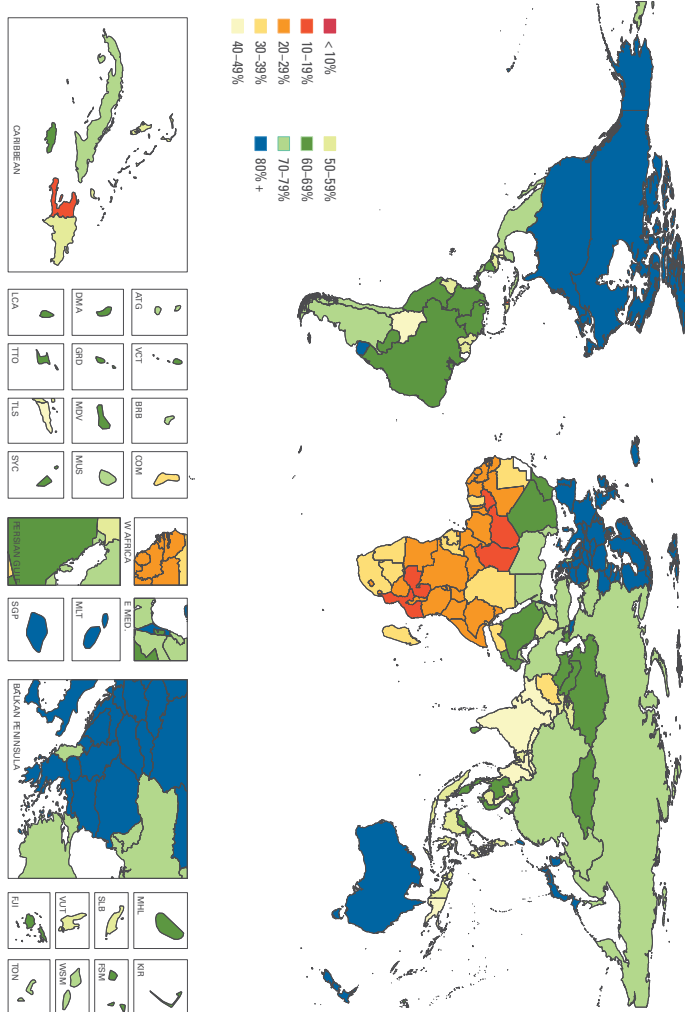


Figure 7 shows that among non-communicable diseases, diabetes and different types of musculoskeletal disorders such as low back and neck pain increased the most between 1990 and 2010.

In many countries, non-communicable diseases account for the majority of DALYs. Figure 8 shows the percent of healthy years lost from this disease group by country in 2010. In most countries outside of sub-Saharan Africa, non-communicable diseases caused 50% or more of all healthy years lost, or DALYs. In Australia, Japan, and richer countries in Western Europe and North America, the percentage was greater than 80%.

Figure 8: Percent of global DALYs due to non-communicable diseases, 2010



An in-depth look at the country-level data reveals the specific diseases that are driving overall shifts from communicable to non-communicable diseases. As an example, Figure 9 displays the changes in the top 25 causes of DALYs in Mexican women between 1990 and 2010. The top causes are organized by ranking from left to right. Most non-communicable diseases rose over time, while communicable, newborn, nutritional, and maternal conditions have fallen during this period. Among the top five causes in 2010, chronic kidney disease increased the most (211%), followed by other musculoskeletal conditions and diabetes, which grew 88% and 75% each. Among communicable, nutritional, newborn, and maternal conditions, lower respiratory infections and diarrheal diseases experienced the most dramatic declines, falling by 65% and 83%, respectively.

Figure 9: Leading causes of DALYs for females, Mexico, 1990-2010

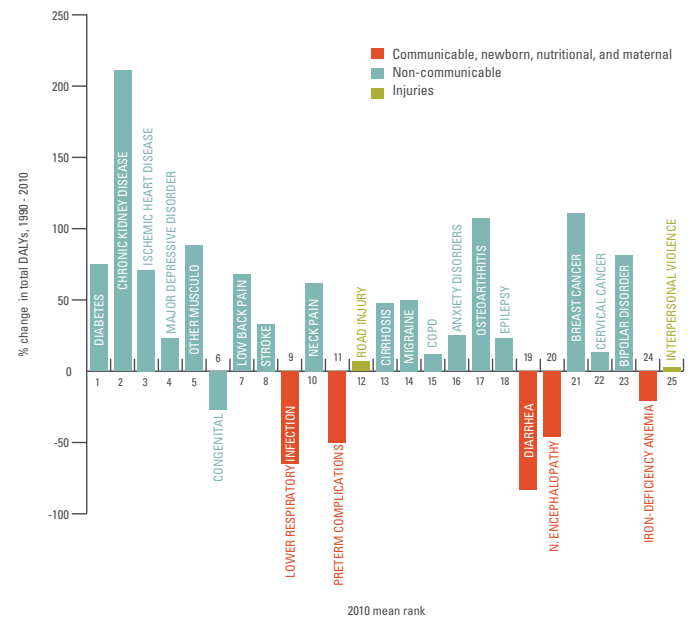
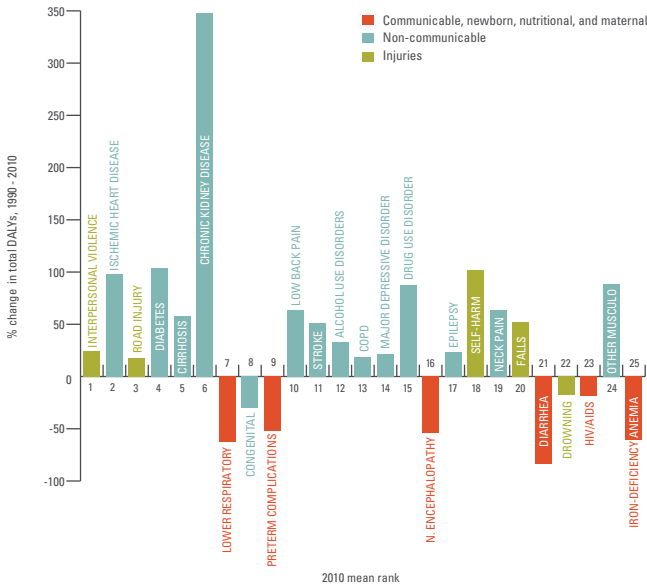


Figure 10 shows declines in DALYs among Mexican men from communicable, nutritional, and newborn conditions coupled with increases in non-communicable diseases between 1990 and 2010. Out of all the non-communicable diseases shown in this figure, chronic kidney disease increased the most over the period (348%). Other leading causes of DALYs such as diabetes increased by 104%, ischemic heart disease grew by 98%, and cirrhosis by 58%. In addition to displaying the rising prominence of non-communicable diseases, this visualization shows that injuries are among the most dominant causes of healthy life lost in men in Mexico. DALYs caused by interpersonal violence ranked the highest in 2010, while road traffic injuries ranked third.

Figure 10: Leading causes of DALYs for males, Mexico, 1990-2010



Another visualization tool, GBD Compare, displays proportional changes in disease patterns over time using a treemap diagram, which is essentially a square pie chart. Causes of premature death and disability are shown in boxes. The size of each box represents the percentage of total DALYs, or numbers of healthy years lost, due to a specific cause. Figures 11a and 11b show how DALYs have changed in India between 1990 and 2010. In 1990, non-communicable diseases accounted for 31% of DALYs

in both sexes, while communicable, nutritional, maternal, and newborn causes accounted for 43%. By 2010, they represented 45% and 43% of total disease burden, respectively. Premature death and disability from most communicable, nutritional, maternal, and newborn causes decreased during this period, with the exception of HIV/AIDS. DALYs from many non-communicable causes rose. Dramatic increases occurred in causes such as ischemic heart disease (66% increase), depression (53% increase), diabetes (93% increase), migraine (57% increase), and low back and neck pain (57% increase). In 2010, ischemic heart disease caused nearly 26 million DALYs, the largest number of any non-communicable cause. In addition to non-communicable disease burden, health loss from injuries such as self-harm and road traffic injuries increased 136% and 63%, respectively.

Figure 11a: Causes of DALYs, both sexes, all ages, India, 1990

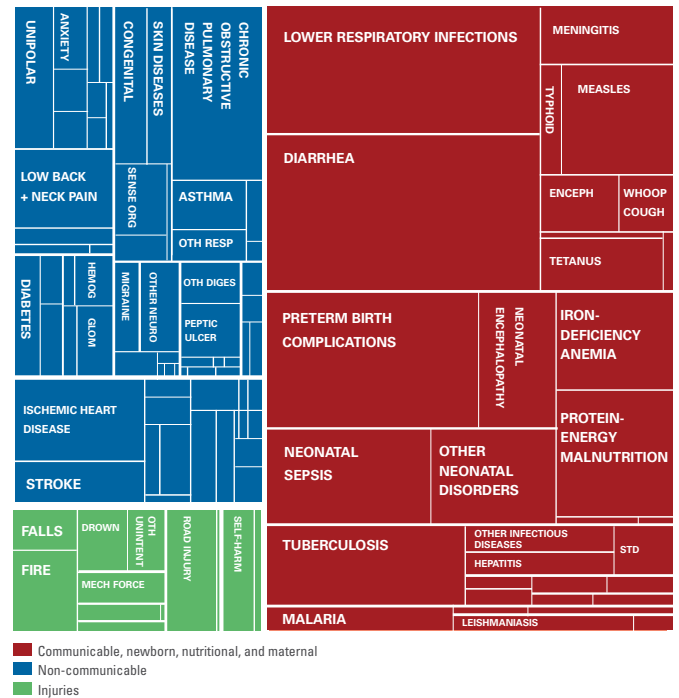
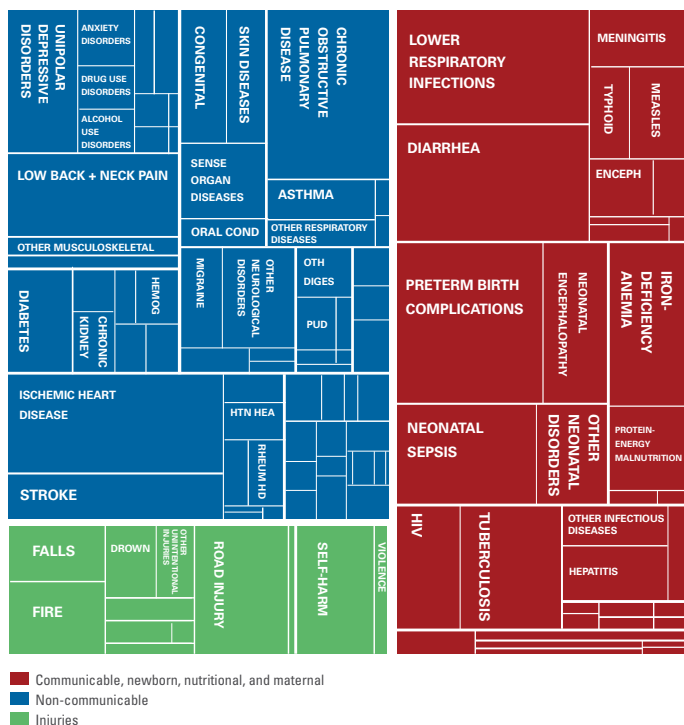


Figure 11b: Causes of DALYs, both sexes, all ages, India, 2010



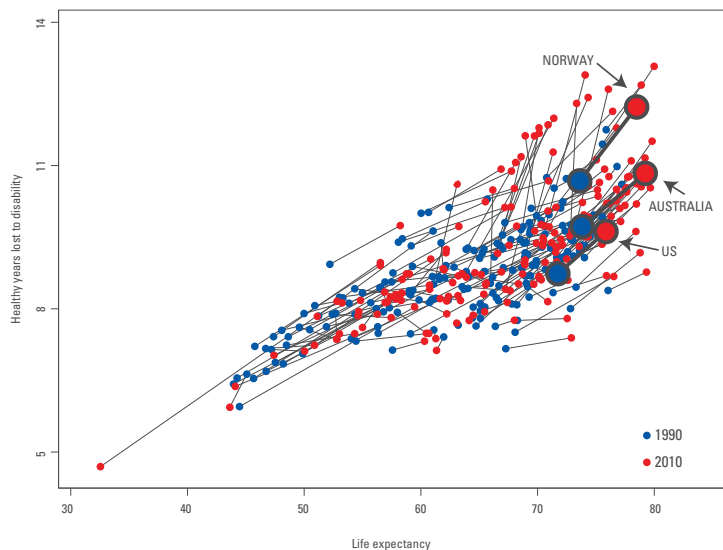
DISABILITY INCREASES IN MIDDLE- AND HIGH-INCOME COUNTRIES

Most countries in the world have succeeded in reducing deaths early in life, increasingly longer lives are redefining “old age” in many countries, and people in all age groups are dying at lower rates than in the past. Simply living longer does not mean that people are healthier. Little progress has been made in reducing the prevalence of disability, so people are living to an older age but experiencing more ill health. Many people suffer from different forms of disability throughout their lives, such as mental and behavioral health problems starting in their teens, and musculoskeletal disorders beginning in middle age. These findings have far-reaching implications for health systems.

While life expectancy can be used to measure a country’s health, it does not reflect the quality of life throughout a person’s lifespan. For this reason, GBD calculates healthy life expectancy, which reflects the number of years that a person can expect to live in good health free from disability. The difference between life expectancy and healthy life expectancy is the number of years lost to disability.

Figure 12 shows healthy years lost to disability versus life expectancy for males in 1990 and 2010. Researchers found that countries with higher life expectancies tend to have more years lived with disability. Three countries, Australia, Norway, and the US, are highlighted in the figure. Australia experienced the largest increase in life expectancy (5.4 years) during this period, and healthy years lost to disability increased by 1.1 years. While Norway’s life expectancy did not increase by as many years as Australia’s, rising just 4.9 years, its healthy years lost to disability increased by a greater amount, 1.5 years. In the US, life expectancy rose by 4.1 years from 1990 to 2010, and its healthy years lost to disability increased by 0.88 years. These countries illustrate how years lived with disability tend to increase as life expectancy rises. Valuable public health lessons could potentially be learned by understanding how Australia managed to increase its life expectancy while more effectively mitigating the corresponding increase in healthy years lost to disability compared to Norway.

Figure 12: Global healthy years lost to disability versus life expectancy, males, 1990 and 2010



To further elucidate the global shift towards disability, Figure 13 illustrates regional changes in the composition of healthy years lost, or DALYs. DALYs are broken out into years lived with disability (YLDs) and years of life lost (YLLs), also known as years lost to premature death. Outside southern sub-Saharan Africa, Eastern Europe, and the Caribbean, a greater percentage of healthy years were lost from disability in 2010 compared to 1990. As shown in Figure 13, this disability transition has been most dramatic in the Middle East and North Africa, parts of Latin America, and East, South, and Southeast Asia. For example, in the Middle East and North Africa region, 42% of healthy years lost were caused by disability in 2010, compared to 27% in 1990. In Andean Latin America, disability accounted for 41% of healthy years lost in 2010 and 25% in 1990.

Figure 13: Shift in burden by region from premature mortality to years lived with disability, 1990 and 2010

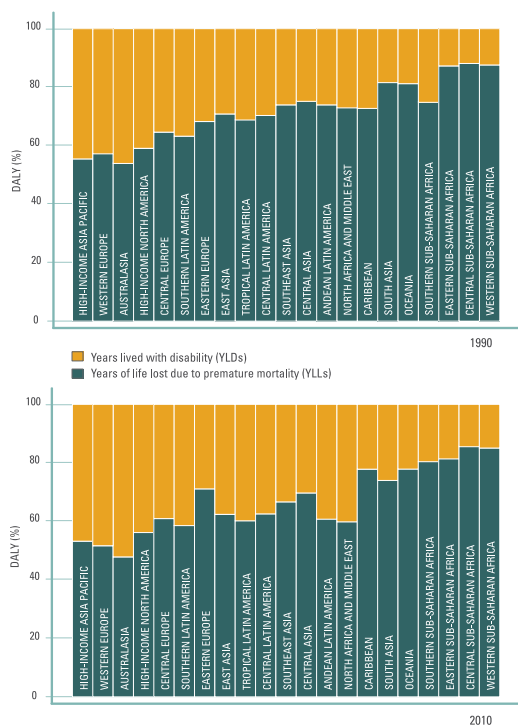
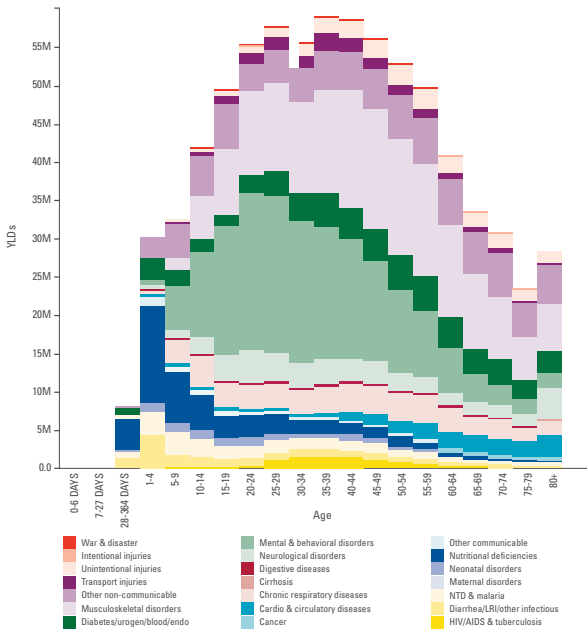


Figure 14 tells a more detailed story about the different conditions that cause disability globally. It is important to keep in mind that these estimates reflect both how many individuals suffer from a particular condition as well as the severity of that condition. Mental and behavioral disorders, such as depression, anxiety, and drug use, are the primary drivers of disability worldwide and caused over 40 million years of disability in 20- to 29-year-olds. Musculoskeletal conditions, which include low back pain and neck pain, accounted for the next largest number of years lived with disability. People aged 45 to 54 were most impacted by these conditions, as musculoskeletal disorders caused over 30 million years of disability in each of these age groups. These findings have far-reaching implications for health systems.

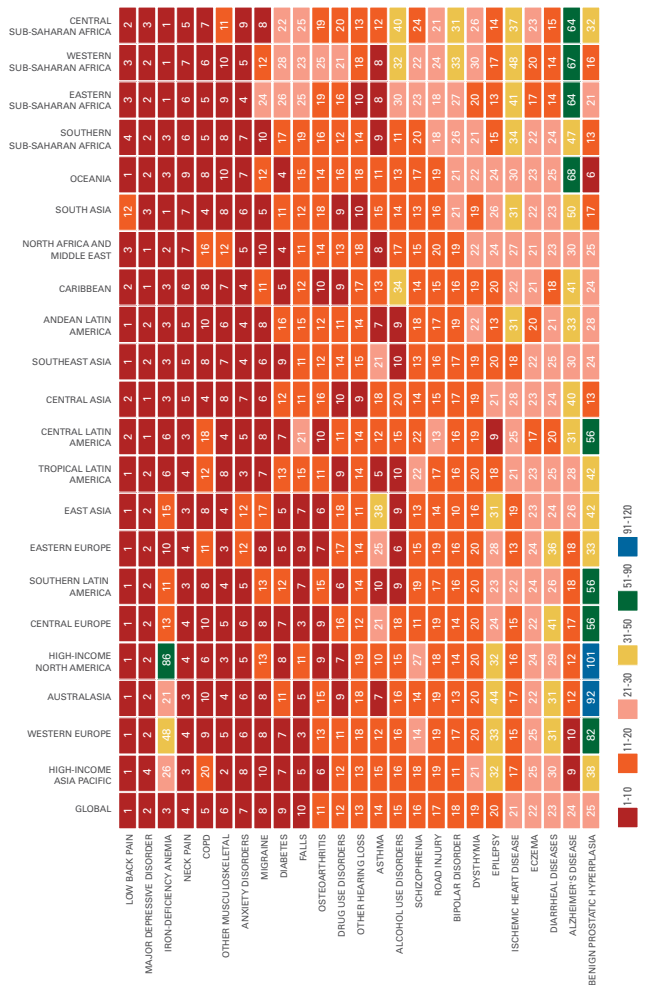
Figure 14: Global disability patterns by broad cause group and age, 2010



Another way to view the world's health challenges is by comparing how different conditions rank. Figure 15 ranks the leading causes of disability by region, using color coding to indicate how high a condition ranks in a region. Low back pain causes the most disability in many regions of the world. This condition can inhibit people's ability to perform different types of work both inside and outside the home and impair their mobility. In addition to low back pain, neck pain and other musculoskeletal disorders rank in the top 10 causes of disability in most regions. Another musculoskeletal disorder, osteoarthritis, appears in the top 20 causes of disability in every region except central sub-Saharan Africa.

Depression is a major cause of disability across regions and is one of the top three causes of disability in every region except high-income Asia Pacific, where it ranked fourth. This disorder can cause fatigue, decreased ability to work or attend school, and suicide. Anxiety, a different type of mental disorder, is one of the top 10 causes of disability in most regions. Additionally, two other mental disorders, schizophrenia and bipolar disorder, appear among the top 20 causes of disability in many regions.

Figure 15: Rankings of leading causes of disability by region, 2010



While mental and musculoskeletal disorders rank high among causes of disability across regions, Figure 15 also reveals substantial regional variation among other causes. Iron-deficiency anemia is a more important cause of disability in developing regions than in developed ones, and is the primary cause of disability in eastern, central, and western sub-Saharan Africa. Iron-deficiency anemia can lead to fatigue and lowered ability to fight infection, and may decrease cognitive ability.

Chronic obstructive pulmonary disease (COPD), a term used to describe emphysema and other chronic respiratory diseases, causes shortness of breath and difficulty breathing and ranks among the top five causes of disability in South and Southeast Asia and most of sub-Saharan Africa.

In many other regions, COPD appears in the list of the top 10 causes. COPD is caused by potentially modifiable risk factors like smoking, second-hand smoke, and air pollution. To further aid decision-makers as they shape health policy, GBD has developed analytic tools to estimate the number of premature deaths and disability, or DALYs, attributable to different risk factors. These tools are explored in the following section.

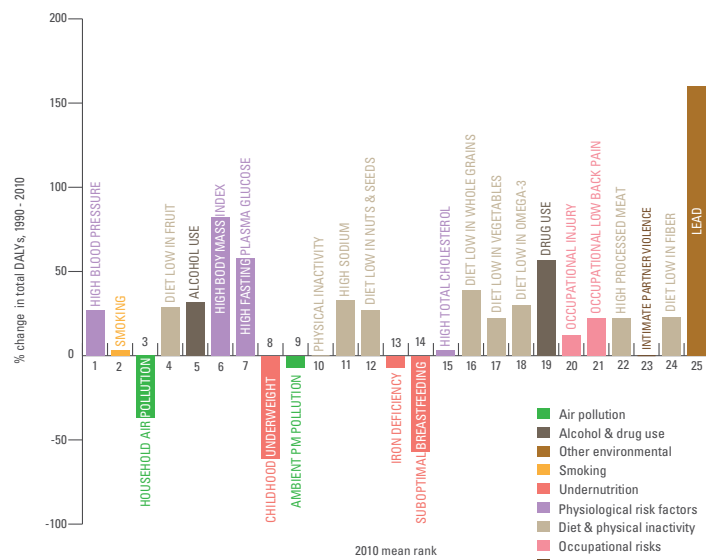
Using GBD tools to identify leading causes of disability, such as mental and behavioral disorders and musculoskeletal disorders, can help guide health system planning and medical education. Decision-makers can use GBD's findings to ensure that health care systems are designed to address the primary drivers of disability in a cost effective way.

THE GLOBAL RISK FACTOR TRANSITION

Data on potentially avoidable causes of health loss, or risk factors, can help policymakers and donors prioritize prevention strategies to achieve maximum health gains. GBD tools estimate the number of deaths, premature deaths, years lived with disability, and DALYs attributable to 67 risk factors worldwide. This study benefited from the availability of new data, such as newly available epidemiologic evidence about the health impacts of different risk factors; population, nutrition, health, and medical examination surveys; and high-resolution satellite data on air pollution.

Figure 16 shows changes in the 25 leading global risk factors for premature death and disability, or DALYs, between 1990 and 2010. Over this period, many risk factors that primarily cause communicable diseases in children declined. Examples of these risk factors are childhood underweight and suboptimal breastfeeding, which dropped by 61% and 57% from 1990 to 2010, respectively. Childhood underweight is commonly used to measure malnutrition, and was formerly the leading risk factor for DALYs in 1990, but ranked eighth in 2010. Household air pollution, which contributes to lower respiratory tract infections in children, dropped by 37% between 1990 and 2010. Unlike other risk factors that primarily cause DALYs from communicable diseases, progress in reducing premature death and disability from iron deficiency was much lower, declining by just 7% between 1990 and 2010. Slow progress in reducing iron deficiency helps explain why iron-deficiency anemia ranks as the third leading cause of disability globally.

Figure 16: Rankings of global DALYs for top 25 risk factors, 1990-2010



Note: Attributable DALYs were not quantified for physical inactivity and intimate partner violence for 1990.

As most risk factors for communicable diseases in children have declined, many risks associated with non-communicable diseases have grown. DALYs from high blood pressure increased by nearly 30% between 1990 and 2010. High blood pressure is a major risk factor for cardiovascular and circulatory diseases. DALYs attributable to another risk factor for non-communicable diseases, tobacco smoking, increased slightly by 3% between 1990 and 2010. Smoking increases the risk of chronic respiratory diseases, cardiovascular and circulatory diseases, and cancer. DALYs attributable to another substance, alcohol use, increased 32% during this period. Alcohol use contributes to cardiovascular and circulatory diseases, cirrhosis, and cancer. In addition to being a contributor to non-communicable diseases, alcohol increases the risk of injuries.

GBD 2010 measured the health effects of different aspects of diet and physical inactivity. Together, all 15 dietary and physical inactivity risk factors measured in the study accounted for 10% of DALYs globally. Diets low in fruits ranked as the fourth leading cause of DALYs in 2010. The other risk factors responsible for the largest number of DALYs were physical inactivity and diets high in sodium, low in nuts and seeds, low in whole grains, low in vegetables, and low in seafood omega-3 fatty acids. GBD found the main diseases linked to poor diets and physical inactivity are primarily cardiovascular diseases as well as cancer and diabetes. While the focus of many public health messages about diet have stressed the importance of eating less saturated fat, GBD 2010's findings indicate that these messages should emphasize a broader range of dietary components.

GBD 2010 used the most recent data available on the effects of different dietary risk factors. It is important to note that these data are constantly evolving as new studies on diet are conducted. Compared to data on the negative health impacts of smoking, which has been well understood for decades, the scientific evidence surrounding dietary risk factors is much newer. Future updates of GBD will incorporate new data on risk factors as they emerge.

High body mass index (BMI) was another major contributor to DALYs in 2010 and was the sixth leading risk factor. High BMI is typically used as an indicator of overweight and obesity. It increased by a dramatic 82% over the period 1990 to 2010. High BMI is a leading risk factor for cardiovascular and circulatory diseases as well as diabetes. It is striking that high BMI was a more important cause of poor health worldwide than childhood underweight in 2010, whereas childhood underweight was a much more prominent risk factor than high BMI in 1990.

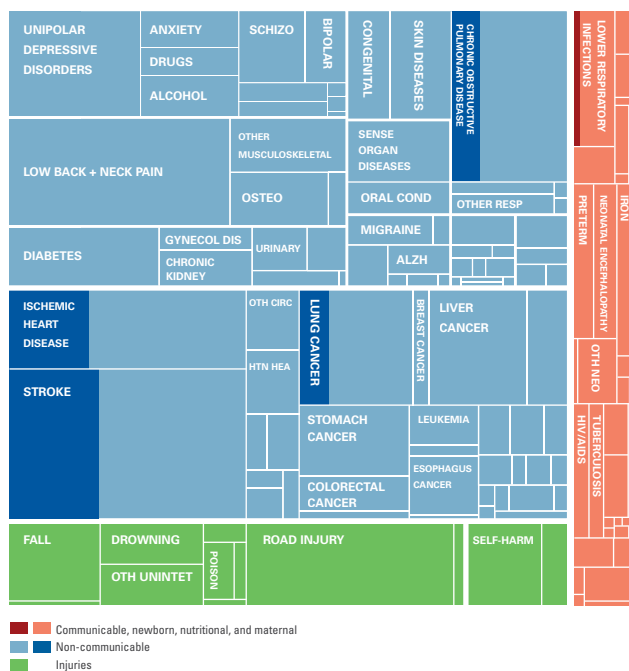
Global rankings of risk factors mask important differences across countries and regions. The leading risk factors in sub-Saharan Africa differ greatly from other regions of the world. For example, Figure 17 shows the leading risks in central and eastern sub-Saharan African countries. In contrast to the global risk factor ranking, childhood underweight was the leading cause of premature death and disability, or DALYs, in most of these countries. Causes of communicable diseases in children dominate in these regions, such as suboptimal breastfeeding, household air pollution, and iron deficiency. Risk factors for non-communicable diseases also feature prominently in certain countries, such as Uganda, where alcohol is the top cause of DALYs, and the Congo, where high blood pressure is the second-highest cause. The rankings of risk factors among wealthier countries in this region, such as Gabon, Mauritius, and the Seychelles, exhibit very different patterns from other nations.

Figure 17: Rankings of DALYs attributable to leading risk factors, central and eastern sub-Saharan Africa, 2010



In addition to allowing users to explore how different risk factors rank across countries, decision-makers can use GBD visualization tools to understand how many DALYs could potentially be averted by addressing different risk factors. Figure 18 shows the number of DALYs attributable to outdoor air pollution for each cause, also known as ambient particulate matter (PM) air pollution, in China. The percentage of DALYs that could be averted by reducing this risk factor is shown in dark shading.

Figure 18: DALYs attributable to ambient particulate matter air pollution, both sexes, all ages, China, 2010

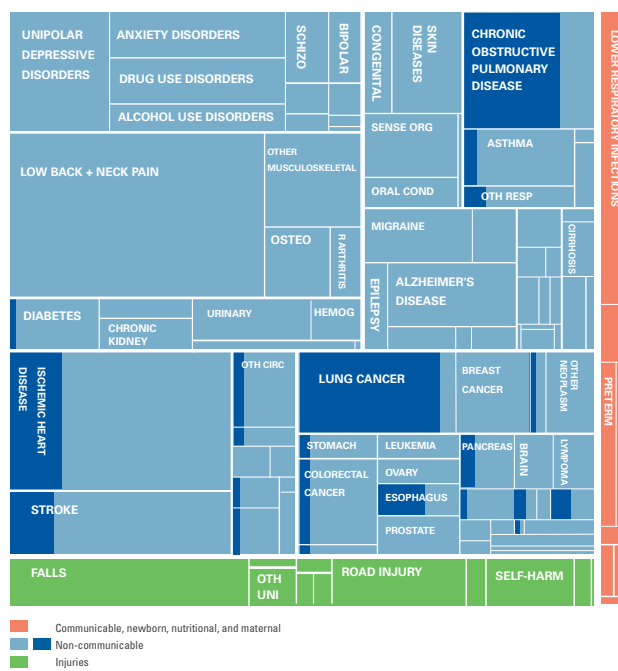


Note: The proportion of each cause attributable to the risk factor is shaded dark.

The figure indicates how reducing exposure to air pollution could prevent substantial amounts of premature death and disability from ischemic heart disease and stroke, as indicated by the portion of these causes that are shaded in dark blue. Lower levels of air pollution could also reduce DALYs from lung cancer and COPD.

Figure 19 shows how, in the UK, many DALYs could be averted by eliminating tobacco smoking, including second-hand smoke.

Figure 19: DALYs attributable to tobacco smoking and second-hand smoke, both sexes, all ages, United Kingdom, 2010

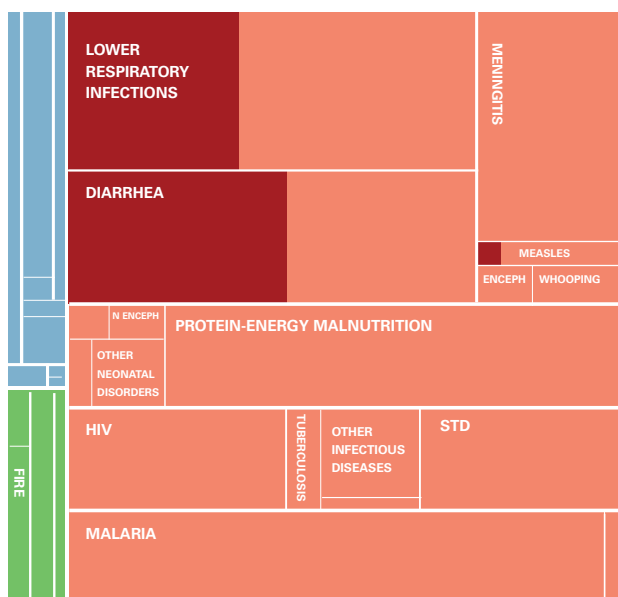


Note: The proportion of each cause attributable to the risk factor is shaded dark.

Most COPD and lung cancer is caused by tobacco smoking and second-hand smoke, as indicated by the dark blue portion of the boxes representing these causes. Substantial numbers of healthy years lost from ischemic heart disease, stroke, and esophageal cancer could also be prevented by reducing exposure to these risk factors.

Figure 20 shows the number of DALYs attributable to suboptimal breastfeeding in children from one month to 1 year old in Zambia.

Figure 20: DALYs attributable to suboptimal breastfeeding, both sexes, ages 1-11 months, Zambia, 2010



■ Communicable, newborn, nutritional, and maternal
■ Non-communicable
■ Injuries

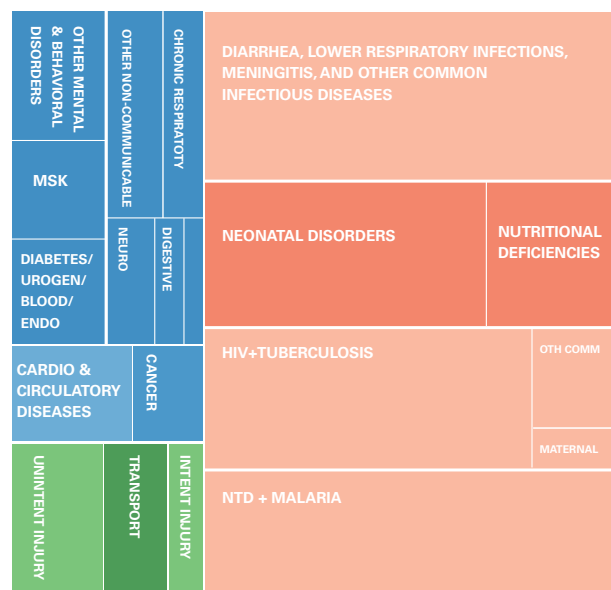
Note: The proportion of each cause attributable to the risk factor is shaded dark.

This figure can be used to understand the number of years of healthy life that could potentially be gained by ensuring that all Zambian children in this age group are adequately breastfed. Adequate breastfeeding is defined as exclusive breastfeeding of children for the first six months of life, and continued breastfeeding after the child reaches six months of age until age 2. Half of the DALYs attributable to diarrhea could potentially be prevented in this age group, as indicated by the dark shading in the boxes representing this cause. Adequate breastfeeding would also greatly reduce illness from lower respiratory infections among these children.

TREMENDOUS PROGRESS IN SUB-SAHARAN AFRICA, BUT MAJOR CHALLENGES REMAIN FOR MDGs 4, 5, AND 6

The rapid transition away from communicable, maternal, newborn, and nutritional conditions toward non-communicable diseases at the global level has not been universal. Communicable diseases that primarily affect children and young adults remain top causes of premature death and disability, or DALYs, in sub-Saharan Africa, as shown in Figure 21.

Figure 21: Causes of DALYs, both sexes, all ages, sub-Saharan Africa, 2010



■ Communicable, newborn, nutritional, and maternal
■ Non-communicable
■ Injuries

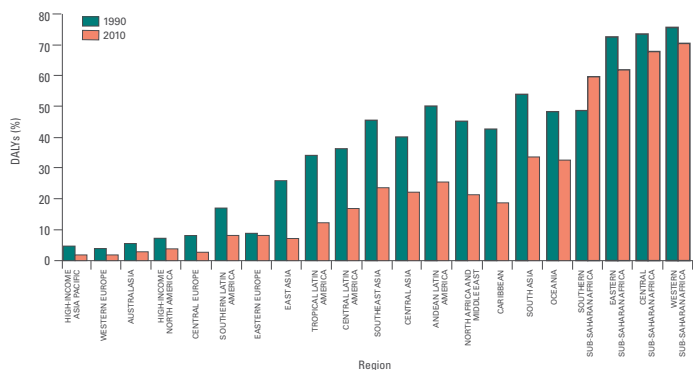
In 2010, in sub-Saharan Africa nearly 20% of DALYs were caused by diarrhea, lower respiratory infections, meningitis, and other common infectious diseases. Neglected tropical diseases and malaria accounted for nearly 15% of total DALYs. HIV/AIDS,

tuberculosis, newborn disorders, and nutritional deficiencies are also responsible for a large portion of the premature death and disability in this region.

As 2015 is fast approaching, the Millennium Development Goals (MDGs) remain highly relevant for sub-Saharan Africa. MDGs 4, 5, and 6 accounted for 60% to 70% of DALYs in this area of the world in 2010, as shown in Figure 22. MDG 4 is intended to reduce by two-thirds, between 1990 and 2015, the under-5 mortality rate, while MDG 5 aims to reduce by three-quarters the maternal mortality ratio. The purpose of MDG 6 is to halt and begin reversing the spread of HIV/AIDS in that same period. In other regions, MDGs 4, 5, and 6 accounted for less than 40% of DALYs and, in some, the percentage was less than 20%.

The considerable differences between sub-Saharan Africa and other regions of the world highlight how GBD 2010 findings could be used to guide the establishment of region- and country-specific goals in the post-2015 era.

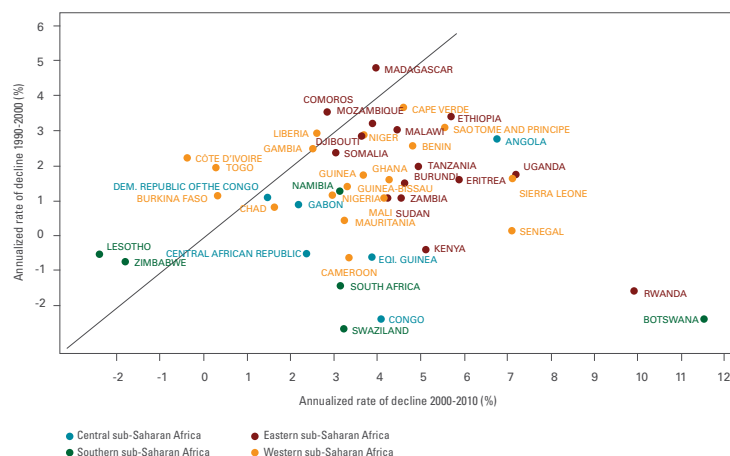
Figure 22: Percent DALYs related to Millennium Development Goals 4, 5, and 6 as a proportion, by region, 1990 and 2010



Despite the fact that disease patterns in sub-Saharan Africa have changed less than in other parts of the world over the past 20 years, most African countries have made impressive progress in reducing mortality rates for children under the age of 5. Figure 23 shows the annualized rate of decline in under-5 mortality in sub-Saharan African countries between 1990 and 2000 compared to 2000 to 2010. All countries that appear on the right side of the diagonal line had accelerated declines in child mortality rates between 2000 and 2010. Countries such as Botswana, Rwanda, Senegal, Sierra Leone, and Uganda made the most rapid progress out of all the sub-Saharan African countries. Other countries including Angola, Eritrea, Kenya, Republic

of the Congo, and Swaziland also made substantial strides in this area. In contrast to the majority of countries in sub-Saharan Africa, multiple countries in western sub-Saharan Africa had higher rates of decline in under-5 mortality between 1990 and 2000 compared to 2000 and 2010, such as Burkina Faso, Côte d'Ivoire, Liberia, and Togo. Unlike other countries in the "HIV corridor" that extends from Kenya to South Africa, rates of under-5 mortality in Lesotho and Zimbabwe increased in the later period compared to the earlier period.

Figure 23: Annualized rate of decline in under-5 mortality, 1990-2000 compared to 2000-2010



While HIV/AIDS has exacted a devastating toll on many countries in sub-Saharan Africa, increasing by 328% in terms of healthy years lost from 1990 to 2010, the epidemic appears to have peaked in 2004. The number of years lost to premature death and disability declined by 22% between 2005 and 2010. This success is largely attributable to the massive scale-up in antiretroviral therapy over the past decade. Another encouraging area of progress is the reduction in the number of deaths from malaria in sub-Saharan Africa. Figure 24 shows how malaria deaths in children under 5 in sub-Saharan Africa started to decline rapidly in 2005. That same year, the number of malaria deaths in the over-5 age group in this region also began a steep decline. Increased availability of insecticide-treated bed nets and artemisinin combination therapy contributed to these declines. These interventions have been financed primarily by the Global Fund to Fight AIDS, Tuberculosis and Malaria

(GFATM) as well as the US President's Malaria Initiative. GBD 2010 echoes findings of past IHME research studies in highlighting the life-saving role of development assistance in sub-Saharan Africa.

Reduction of maternal deaths in sub-Saharan African countries is yet another positive finding of GBD 2010. Between 2005 and 2010, maternal mortality declined by 11.4%. Delving deeper into trends at the country level, Rwanda stands out as a major success story. While other countries in sub-Saharan Africa have made progress in saving mother's lives, Rwanda is the only country on track to achieve MDG 5. Between 1990 and 2010, Rwanda reduced maternal deaths by 61%, as seen in Figure 25.

Figure 24: Trends in malaria deaths by age within Africa and outside Africa, 1980-2010

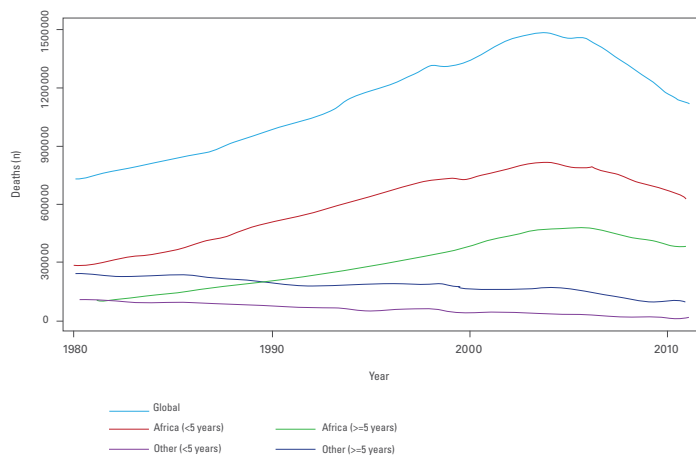
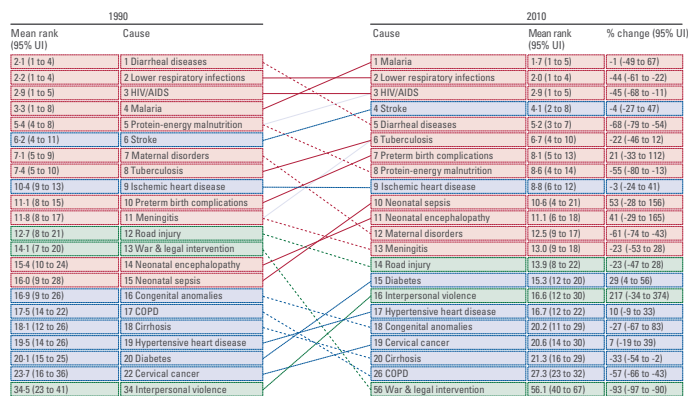


Figure 25: Change in leading causes of death among females, all ages, Rwanda, 1990 and 2010



■ Communicable, newborn, nutritional, and maternal
■ Non-communicable
■ Injuries
 — Ascending order in rank
 ... Descending order in rank

Most countries in sub-Saharan Africa have made tremendous strides in reducing child mortality between 1990 and 2010. The success of the fight against malaria has contributed to this reduction in child deaths. Finally, while the devastating impact of HIV/AIDS appears to be declining, many challenges remain in combating this disease. GBD 2010 findings highlight the important role of continuing donor health funding in addressing MDGs 4, 5, and 6. Future updates of GBD will closely monitor developments in health in this and other regions.