

RAPID HEALTH TRANSITIONS: GBD 2010 RESULTS

In most countries in the Middle East and North Africa, loss of healthy life, or DALYs, from non-communicable diseases are rising, while DALYs from communicable, newborn, nutritional, and maternal causes are declining. To help decision-makers establish health service priorities within countries when faced with limited resources, we will explore changes in disease burden around the globe, in the Middle East and North Africa region, and in specific countries in this section. In another section entitled "Using GBD to assess countries' health progress," we will compare how well countries are performing in health relative to other countries in the region using a metric called age-standardized rates.

In terms of disease burden at the global level, GBD 2010 found that the leading causes of DALYs have evolved dramatically over the past 20 years. Figure 1 shows the changes in the global 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 353% and 18%, 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.

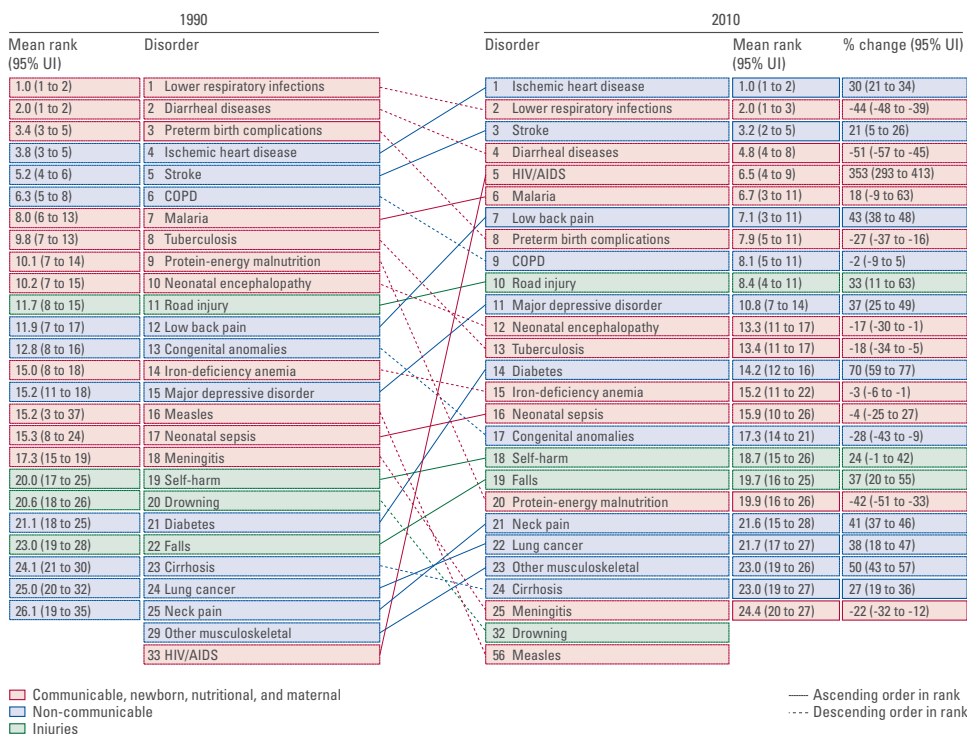
To provide a closer look at the epidemiological changes occurring at the regional level, Figure 2 shows how the leading causes of premature death and disability have changed over time in the Middle East and North Africa. The trends observed in the region generally mirror the global trends seen in Figure 1; there was an increase in burden caused by non-communicable diseases and a drop in most communicable, newborn, nutritional, and maternal causes with the exception of neonatal sepsis.

Some causes, however, increased more dramatically between 1990 and 2010 in the Middle East and North Africa than in most other parts of the world. In the region, low back pain and diabetes increased by 77% and 87%, respectively, between 1990 and 2010, whereas these causes increased by 43% and 70% at the global level. The

disease burden caused by drug use disorders increased by 123% and ranked 20th in 2010, while it was not among the top 25 causes of DALYs globally. As countries in the Middle East and North Africa have become more developed, DALYs from road injuries grew 46%, although its rank was unchanged from 1990 to 2010 at eighth.

While the trends in the Middle East and North Africa were largely consistent with the global patterns, certain non-communicable diseases were much more prominent causes of premature death and disability in the region compared to the world as a whole. Depression ranked fifth in this region, but ranked eleventh globally. In the Middle East and North Africa, anxiety disorders were the 13th cause of premature death and disability, but did not rank among the top 25 causes of DALYs at the global level. It is worth noting that, within the region, both depression and anxiety

Figure 1: Global disability-adjusted life year ranks, top 25 causes, and percentage change, 1990-2010

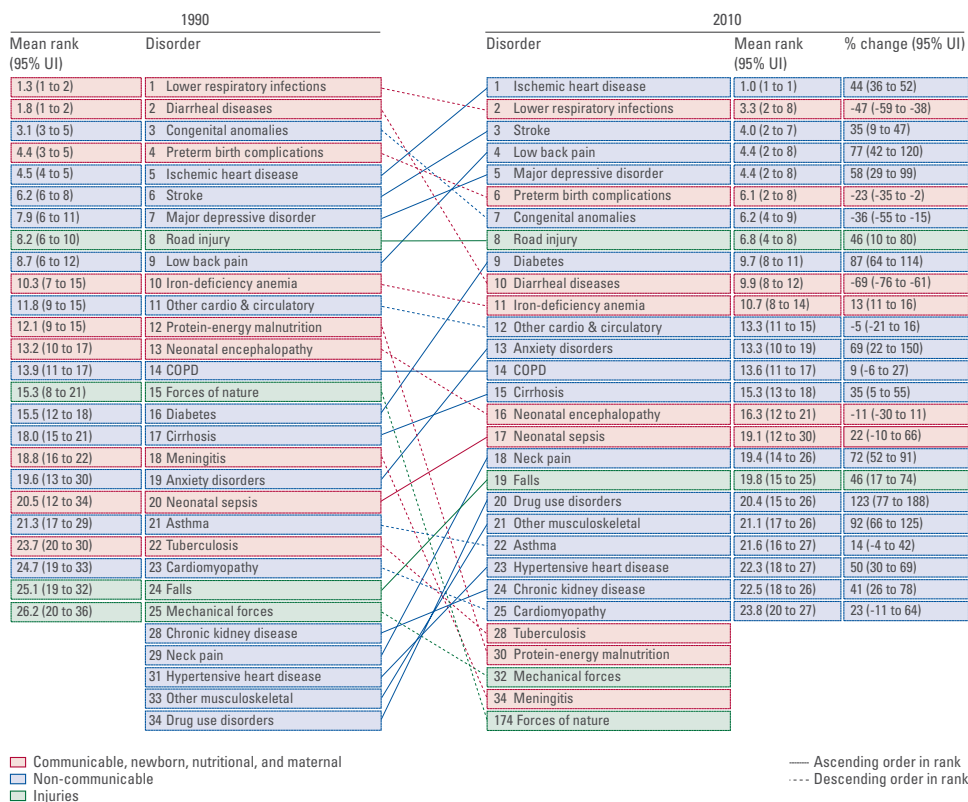


Note: Solid lines indicate a cause that has moved up in rank or stayed the same. Broken lines indicate a cause that has moved down in rank. The causes of DALYs are color coded, with blue for non-communicable diseases, green for injuries, and red for communicable, newborn, nutritional, and maternal causes of DALYs. COPD: Chronic obstructive pulmonary disease. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdarrowdiagram>.

ranked more prominently in the high-income countries, such as Bahrain, Qatar, and the United Arab Emirates, than in their low- and middle-income peers. Another cause that ranked higher in the Middle East and North Africa compared to the world overall was cirrhosis. Cirrhosis was the 24th leading cause of DALYs globally, but ranked 15th in this region.

Conversely, the region performed well in some areas when compared to the world as a whole. For example, the burden from malaria increased globally by 18% and appeared in the top 10 causes of disease burden in 2010, but it decreased by 3% in the Middle East and North Africa where it did not rank in the top 50 in the same year. Similarly, diarrhea decreased by 69% in the region to a rank of 10th, compared to a smaller decrease of 51% globally and a higher rank of fourth.

Figure 2: Disability-adjusted life year ranks, top 25 causes, and percentage change in the Middle East and North Africa, 1990-2010



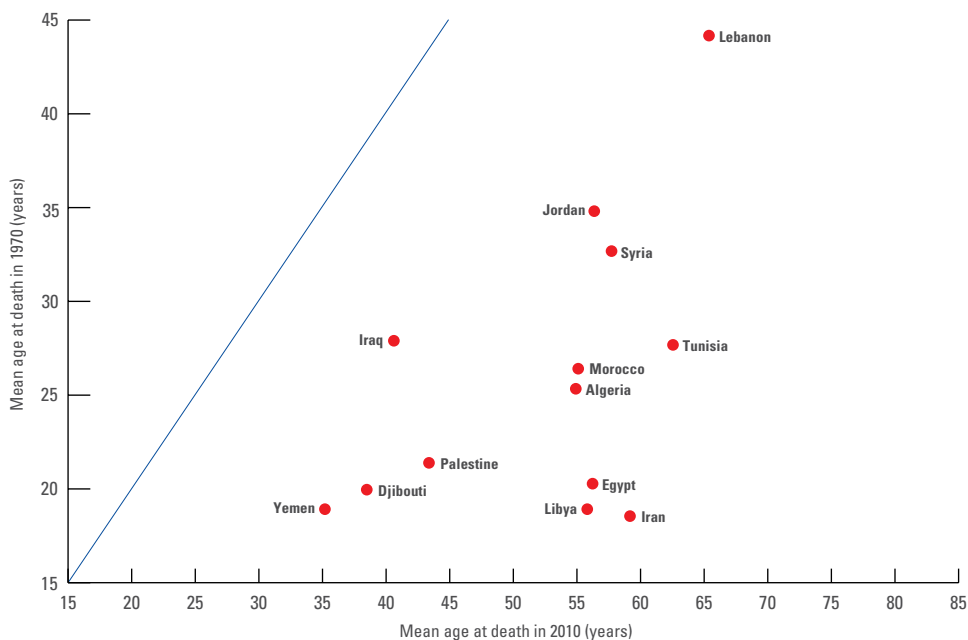
Note: Solid lines indicate a cause that has moved up in rank or stayed the same. Broken lines indicate a cause that has moved down in rank. The causes of DALYs are color coded, with blue for non-communicable diseases, green for injuries, and red for communicable, newborn, nutritional, and maternal causes.

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

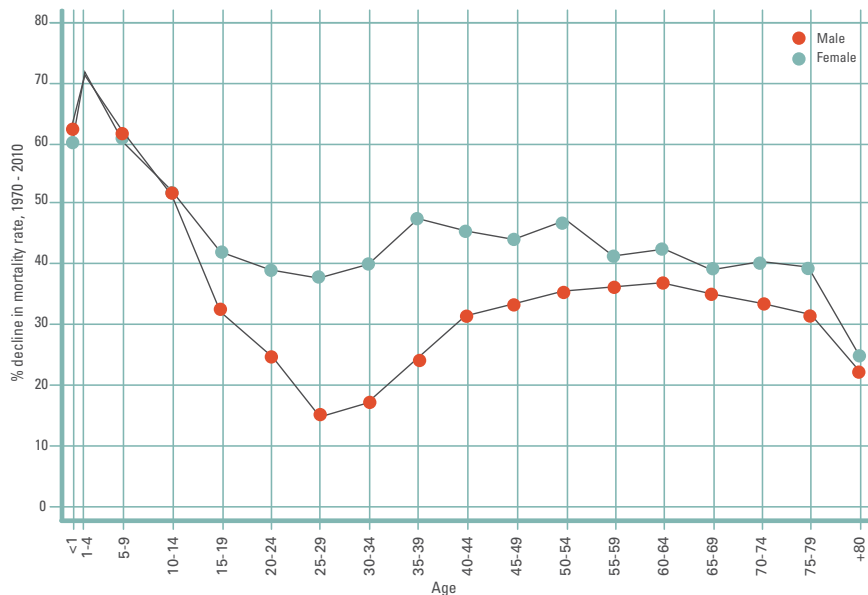
In much of the world, GBD 2010 found that people are living to older ages than ever before, and the entire population is getting older. Since 1970, the average age of death has increased 20 years. Figure 3 illustrates the dramatic changes that have occurred during this period in the Middle East and North Africa, where the average age of death increased by 30 years or more.

Overall, between 1970 and 2010, the countries of the Middle East and North Africa made progress in extending the lives of their populations. There were variations, however, in the size of the increases in average age of death across the countries of the region. In Djibouti, Iraq, and Yemen, the average age of death increased by less than 20 years during the period 1970 to 2010, but it increased by more than 35 years in Egypt, Iran, and Libya during this same period. In the region, Lebanon and Tunisia had the highest average ages of death (65 and 63, respectively), while Djibouti and Yemen had the lowest average age of death (38 and 35, respectively).

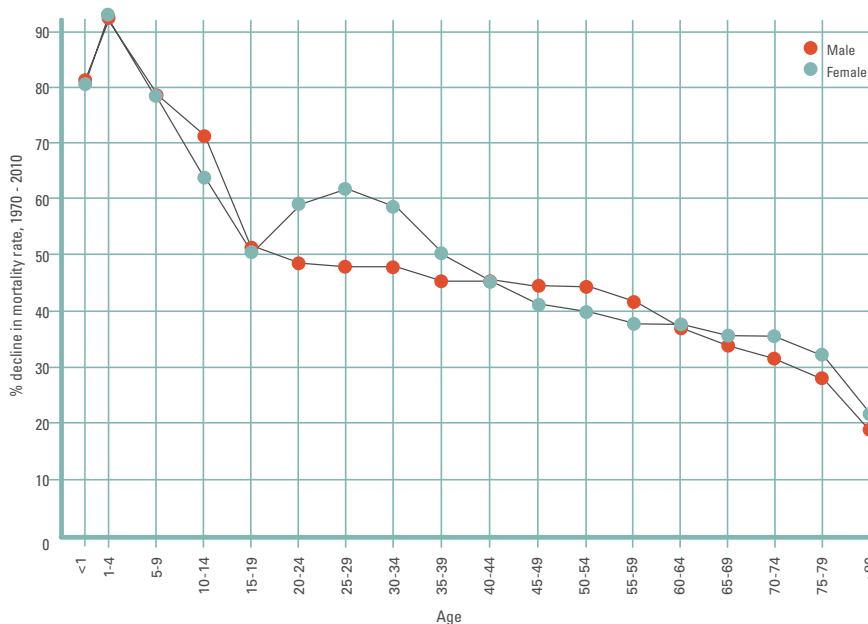
Figure 3: Average age of death for countries in the Middle East and North Africa, 1970 compared with 2010



Note: Countries falling on the right side of the 45-degree-angle line had a higher average age of death in 2010 compared to 1970. Palestine is the GBD equivalent of the West Bank and Gaza in the World Bank classification system.

Figure 4: Global decline in age-specific mortality rate, 1970-2010

Note: Higher values indicate greater declines in mortality; lower values indicate smaller declines in mortality.

Figure 5: Decline in age-specific mortality rate in the Middle East and North Africa, 1970-2010

Note: Higher values indicate greater declines in mortality; lower values indicate smaller declines in mortality.

Another way to understand changes in global demographic trends is to explore reductions in mortality rates by sex and age group. Figure 4 shows how death rates have declined globally 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 and 54, most likely due to the persistence of higher mortality from injuries, as well as alcohol and tobacco use, among men.

Figure 5 depicts the decline in mortality rates in the Middle East and North Africa. Unlike the global picture, declines in mortality among men in the age groups 10 to 14 and 45 to 59 years surpassed the declines among women.

LEADING CAUSES OF DEATH ARE SHIFTING TO NON-COMMUNICABLE DISEASES

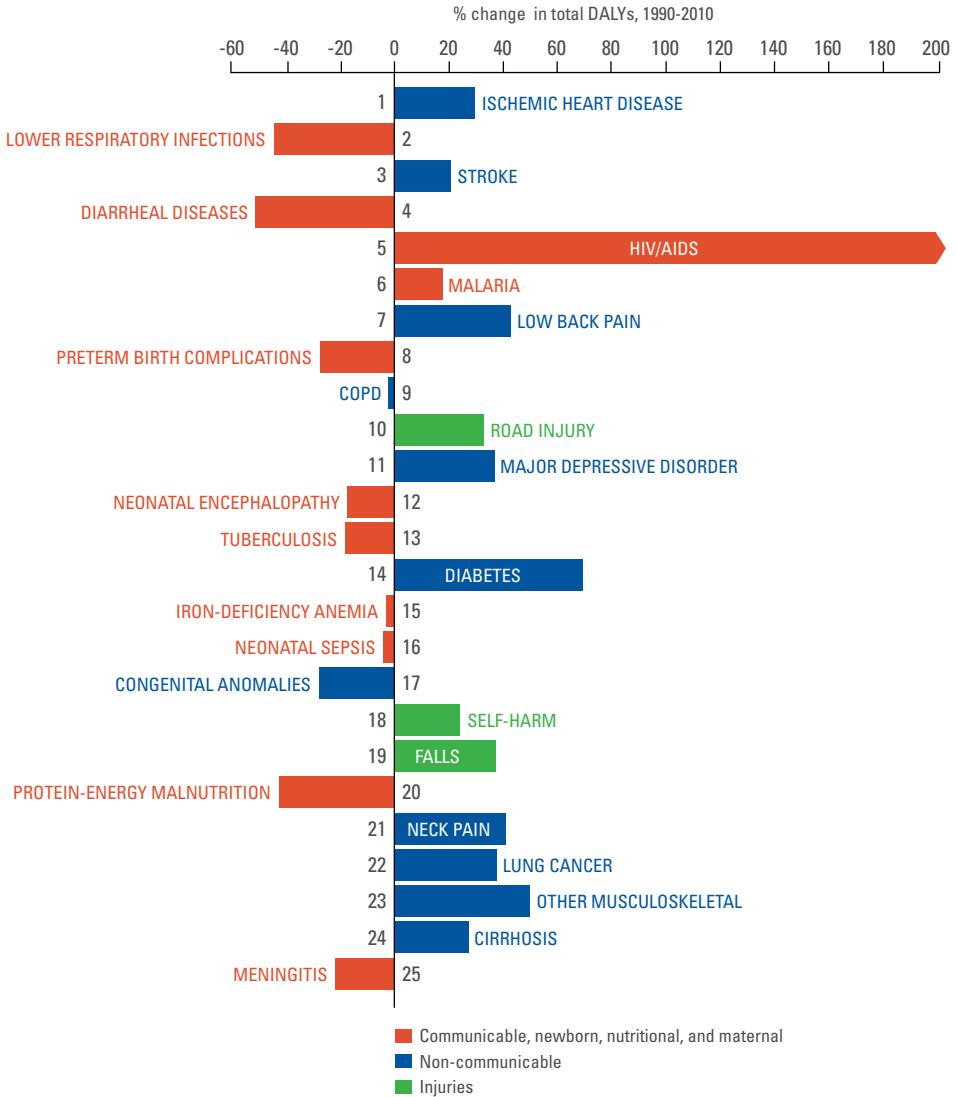
In part because many people are living longer lives and the population is growing older, the leading causes of death have changed. Worldwide, the number of people dying from non-communicable diseases, such as ischemic heart disease and diabetes, has grown 30% since 1990. To a lesser extent, overall population growth also contributed to this increase in deaths from non-communicable diseases.

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 6 shows global changes in the 25 leading causes of DALYs between 1990 and 2010, ordered from highest to lowest ranking cause from top to bottom.

Figure 7 shows that, among non-communicable diseases, diabetes, anxiety, drug use disorders, and low back and other musculoskeletal disorders increased the most in the Middle East and North Africa between 1990 and 2010. Similar country-specific figures can be found in the Annex, both for countries included in the World Bank region of Middle East and North Africa as well as high-income Gulf Cooperation Council countries and Malta.

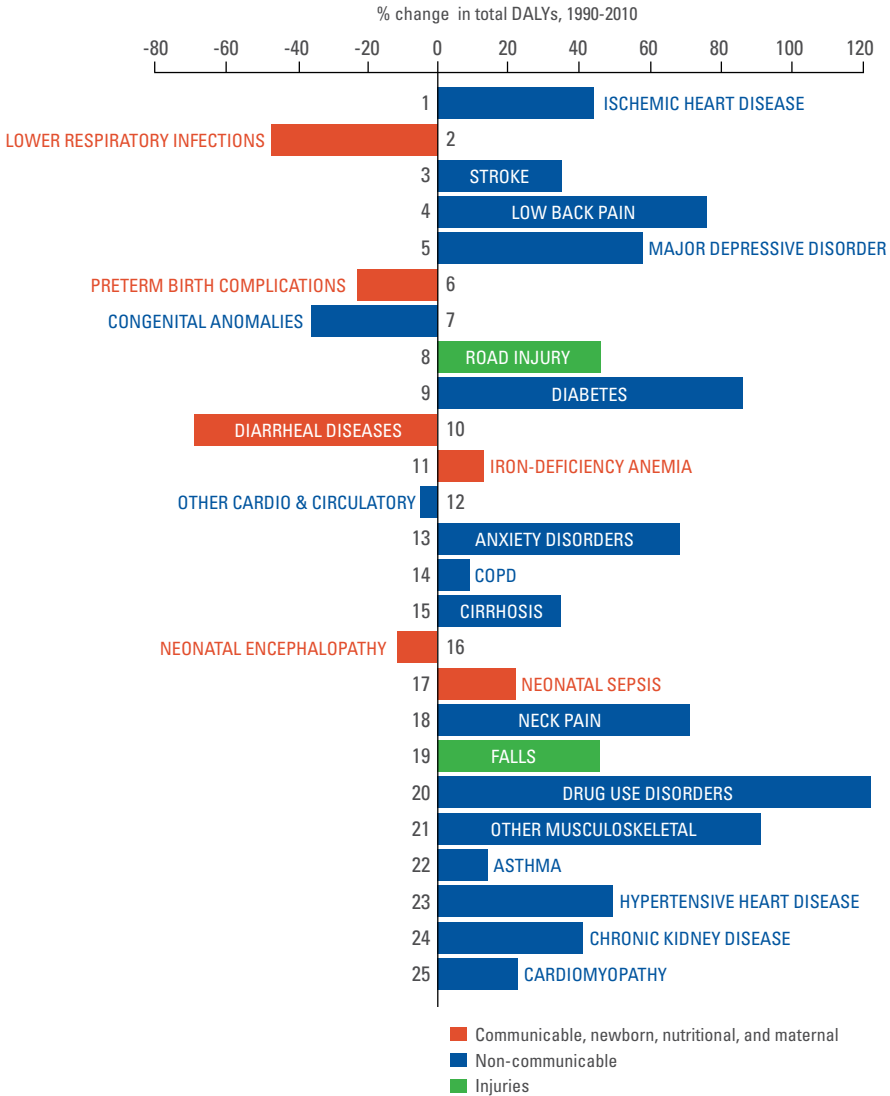
There are notable differences in the trends seen in low- and middle-income countries compared to their high-income peers. Road traffic injuries, for example, generally ranked higher in 2010 in high-income countries, such as Oman and Saudi Arabia, where they were the leading causes of DALYs, compared to Iraq and Morocco, where they were not in the top ten causes. Similarly, depression, anxiety, drug use disorders, and migraines caused more health loss in high-income Bahrain, Qatar, and the United Arab Emirates than in their lower-income neighbors Djibouti and Iraq, among others.

Conversely, many communicable, nutritional, newborn, and maternal conditions had higher rankings in the low- and middle-income countries of the Middle East and North Africa compared to the higher-income countries in the region. Preterm birth

Figure 6: Global shifts in leading causes of DALYs, 1990-2010

Note: The leading 25 causes of DALYs are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs have increased since 1990. Bars on the left show the percent by which DALYs have decreased. Pointed arrows indicate causes that have increased by a greater amount than shown on the x-axis.

Figure 7: Shifts in leading causes of DALYs in the Middle East and North Africa, 1990-2010



Note: The leading 25 causes of DALYs are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs have increased since 1990. Bars on the left show the percent by which DALYs have decreased.

complications were the leading cause of DALYs in Algeria and Palestine in 2010, whereas they ranked 16th and 18th in the United Arab Emirates and Qatar, respectively. Congenital anomalies ranked in the top five in a number of low- and middle-income countries in the region, including Iran, Iraq, Jordan, Palestine, and Syria, and it generally caused much less disease burden in the high-income countries of Bahrain (13th), the United Arab Emirates (17th), Qatar (10th), and Malta (20th).

It is also important to note, however, that some causes of health loss are universal across countries of every income level in the Middle East and North Africa. Ischemic heart disease, stroke, low back pain, and self-harm are among the conditions that had similar rankings in countries across the income spectrum in 2010.

In many countries, non-communicable diseases account for the majority of DALYs. Figure 8 shows the percent of healthy years lost, or DALYs, 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 shows the important role played by non-communicable diseases in the Middle East and North Africa and other parts of the world. Among countries in the region, Syria had the highest percentage of DALYs due to non-communicable diseases (76%), while Djibouti had the lowest percentage of DALYs from these conditions (35%).

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 20 causes of DALYs in Syrian females between 1990 and 2010. The causes are organized by ranking from top to bottom. Most non-communicable diseases rose over time, while most communicable, newborn, nutritional, and maternal conditions fell during this period. Among the top five causes in 2010, low back pain increased the most (109%), followed by depression and iron-deficiency anemia, which grew 60% and 30% each. Among communicable, nutritional, newborn, and maternal conditions, lower respiratory infections and preterm birth complications experienced the most dramatic declines, falling by 68% and 36%, respectively.

Figure 10 shows declines in DALYs among Syrian males from communicable, newborn, and nutritional conditions coupled with increases in non-communicable diseases between 1990 and 2010. Out of all the non-communicable diseases shown in this figure, drug use disorders, other musculoskeletal disorders, and diabetes increased the most over the period (128%, 128%, and 120%, respectively). Other leading causes of DALYs, such as ischemic heart disease, increased by 29%, while depression and low back pain grew by 63% and 98%, respectively. In addition to displaying the rising prominence of non-communicable diseases, this figure shows that injuries are among the most dominant causes of healthy life lost in males in Syria. DALYs caused by road injuries ranked sixth in 2010, while falls ranked 13th.

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

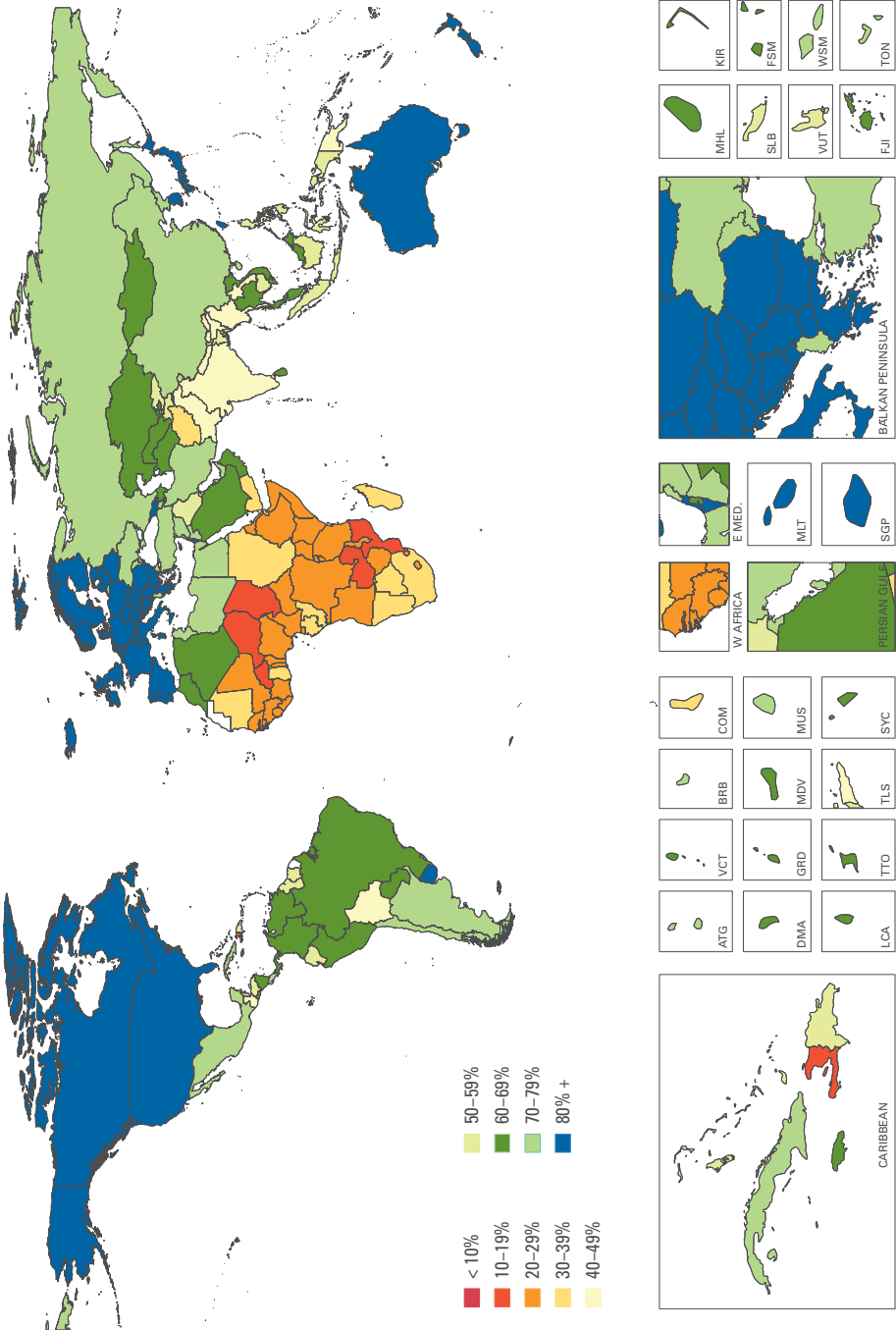
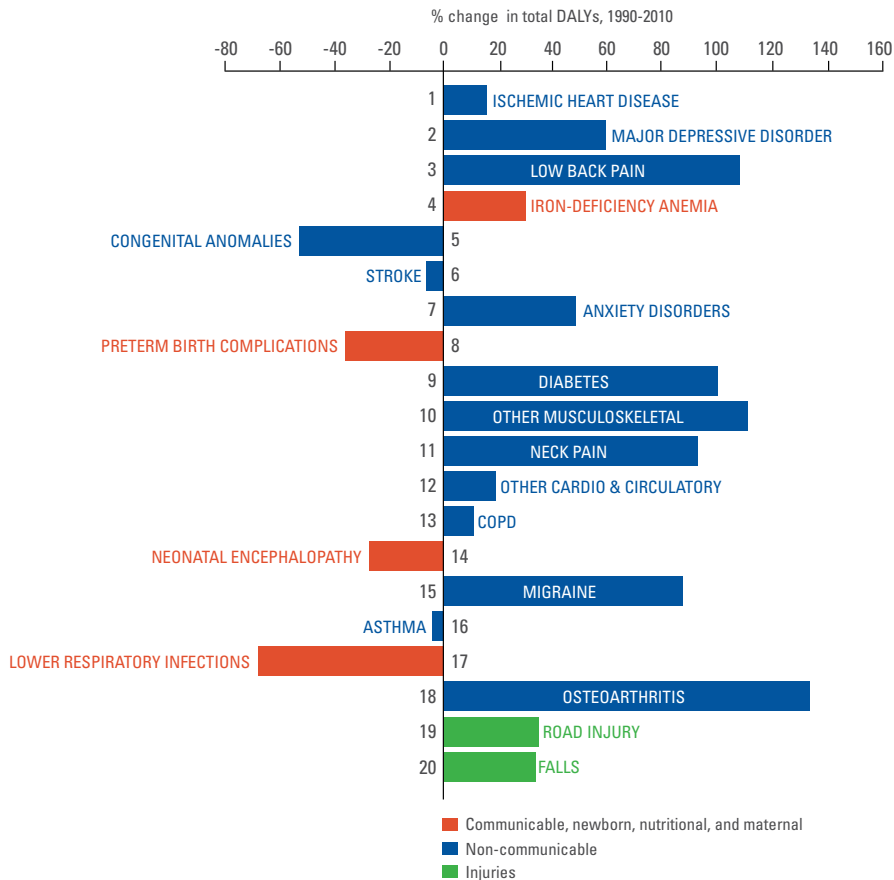
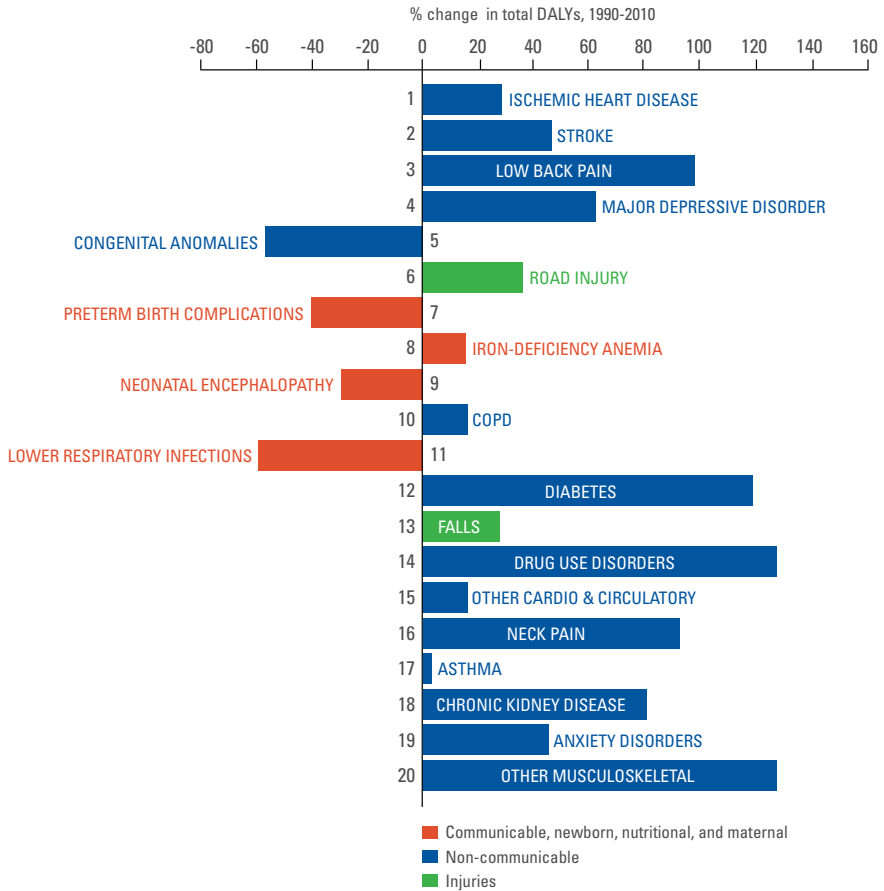


Figure 9: Shifts in leading causes of DALYs for females, Syria, 1990-2010



Note: The leading 20 causes of DALYs are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs have increased since 1990. Bars on the left show the percent by which DALYs have decreased.

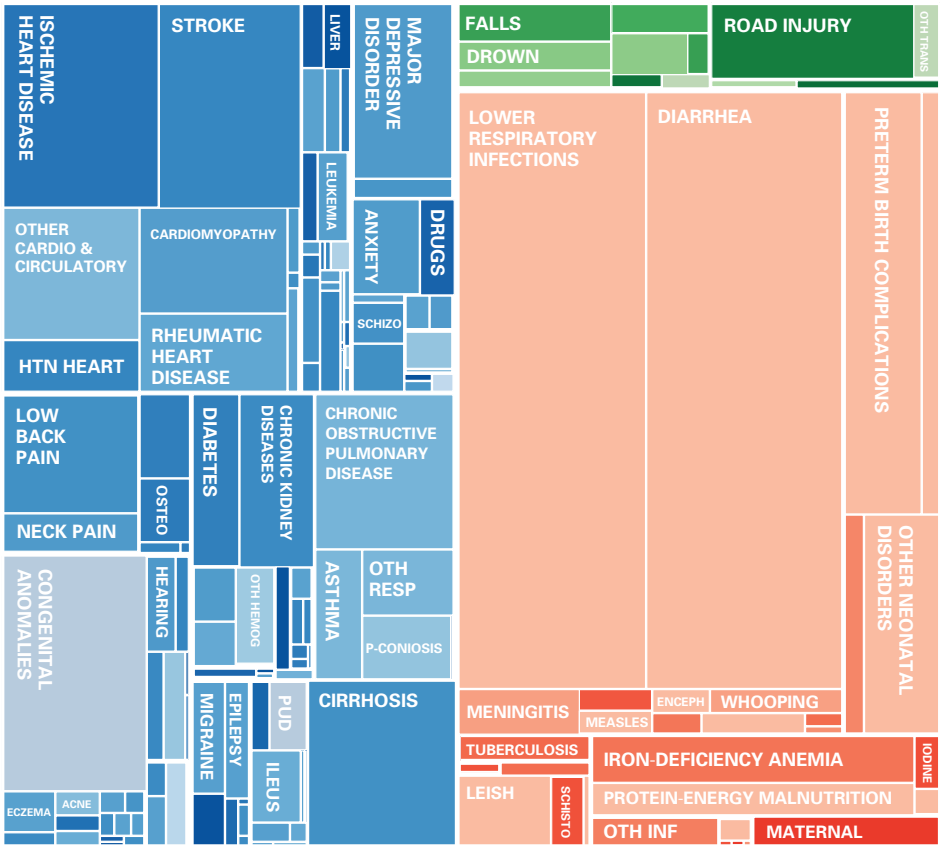
Figure 10: Shifts in leading causes of DALYs for males, Syria, 1990-2010

Note: The leading 20 causes of DALYs are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs have increased since 1990. Bars on the left show the percent by which DALYs have decreased.

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 DALYs, or numbers of healthy years lost, are shown in boxes. The size of each box represents the percentage of total DALYs due to a specific cause. As an example, Figures 11a and 11b show how DALYs have changed in Egypt between 1990 and 2010. In 1990, non-communicable diseases accounted for 48.5% of DALYs in both sexes, while communicable, nutritional, maternal, and newborn causes accounted for 46.2%. By 2010, they represented 72.5% and 19.8% of total disease burden, respectively. Premature death and disability from most communicable, newborn, nutritional, and maternal causes decreased during this period, with the exception of HIV/AIDS and hepatitis. DALYs from many non-communicable causes rose. Increases occurred in causes such as ischemic heart disease (110% increase), stroke (105% increase), low back pain (63% increase), cirrhosis (40% increase), and diabetes (28% increase). In 2010, ischemic heart disease caused 9.4% of total DALYs in the country, the largest percentage caused by any non-communicable cause. In addition to non-communicable disease burden, health loss from injuries, such as road traffic injuries and falls, increased by 55% and 42%, respectively, while DALYs from fire-related injuries declined 45% between 1990 and 2010.

Examining broader cause groups using another visualization, GBD Cause Patterns, reveals trends in diseases, disabilities, and deaths at the country, regional, and global levels. In Iraq, for example, it becomes apparent that there was a spike in DALYs caused by war and disaster in 2005, particularly among people starting in the age group 10 to 14 through the 70 to 74 age group, as shown in Figure 12. By 2010, however, the number of DALYs caused by war and disaster in Iraq had returned to a level that was more consistent with other countries in the region, as combat operations by the Iraqi and foreign militaries concluded.

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

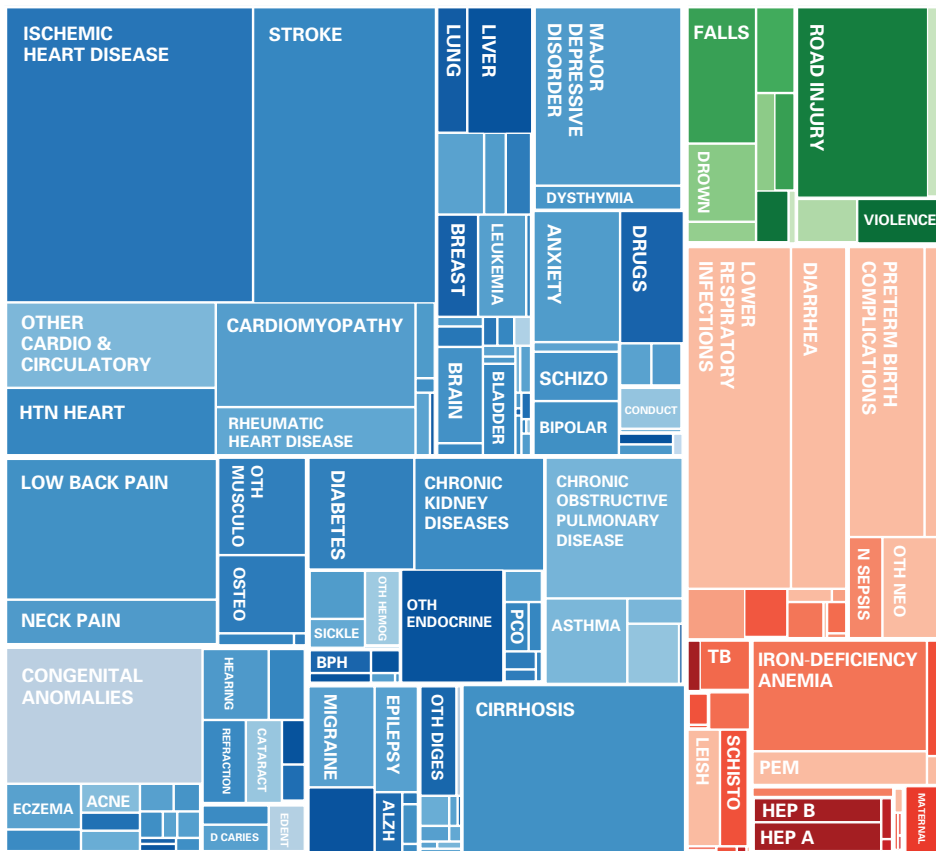


Annual % change, 2005 to 2010, DALYs per 100,000



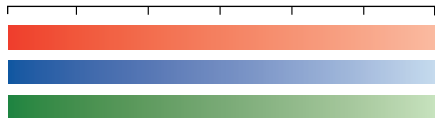
Note: The size of each box in this square pie chart represents the percentage of total DALYs caused by a particular disease or injury. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcompare>.

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



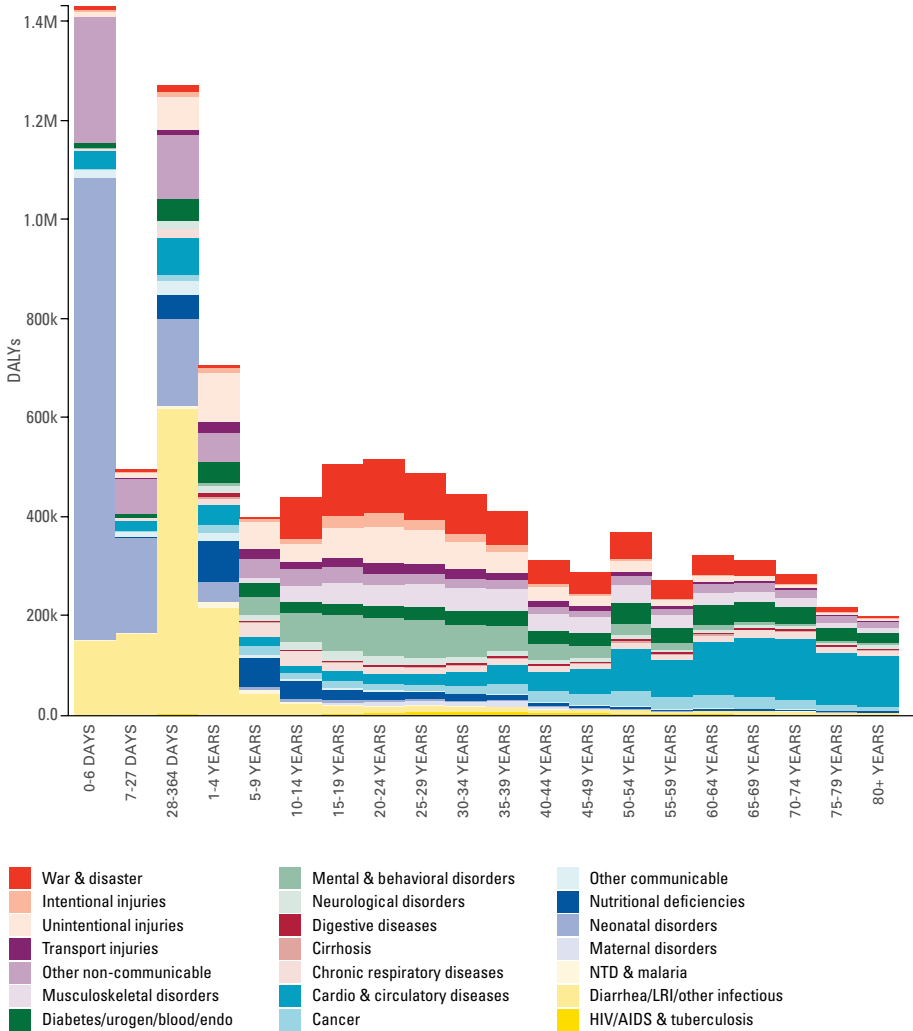
Annual % change, 2005 to 2010, DALYs per 100,000

3% 2% 1% 0% -1% -2% -3%



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

Note: The size of each box in this square pie chart represents the percentage of total DALYs caused by a particular disease or injury. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcompare>.

Figure 12: DALY patterns by broad cause group and age in Iraq, 2005

Note: The size of the colored portion in each bar represents the number of DALYs attributable to each cause for a given age group. The height of each bar shows total DALYs for a given age group in 2005. The causes are aggregated. For example, musculoskeletal disorders include low back pain and neck pain. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcausepattern>.

DISABILITY INCREASES IN MIDDLE- AND HIGH-INCOME COUNTRIES

Most countries in the world have succeeded in reducing deaths early in life. To a growing extent, 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.

DALYs (healthy years lost) are calculated by adding together YLDs (years lived with disability) and YLLs (years of life lost, also known as years lost to premature death). Between 1990 and 2010, YLDs increased as a percentage of total DALYs in all areas of the world except Eastern Europe, southern sub-Saharan Africa, and the Caribbean. This disability transition has been most dramatic in parts of Latin America, the Middle East, North Africa, and many areas in Asia. The percentage of burden from YLDs also increased in sub-Saharan Africa with the exception of the southern part of the region.

Figure 13 tells a detailed story about the different conditions that caused disability globally in 2010. 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, were 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.

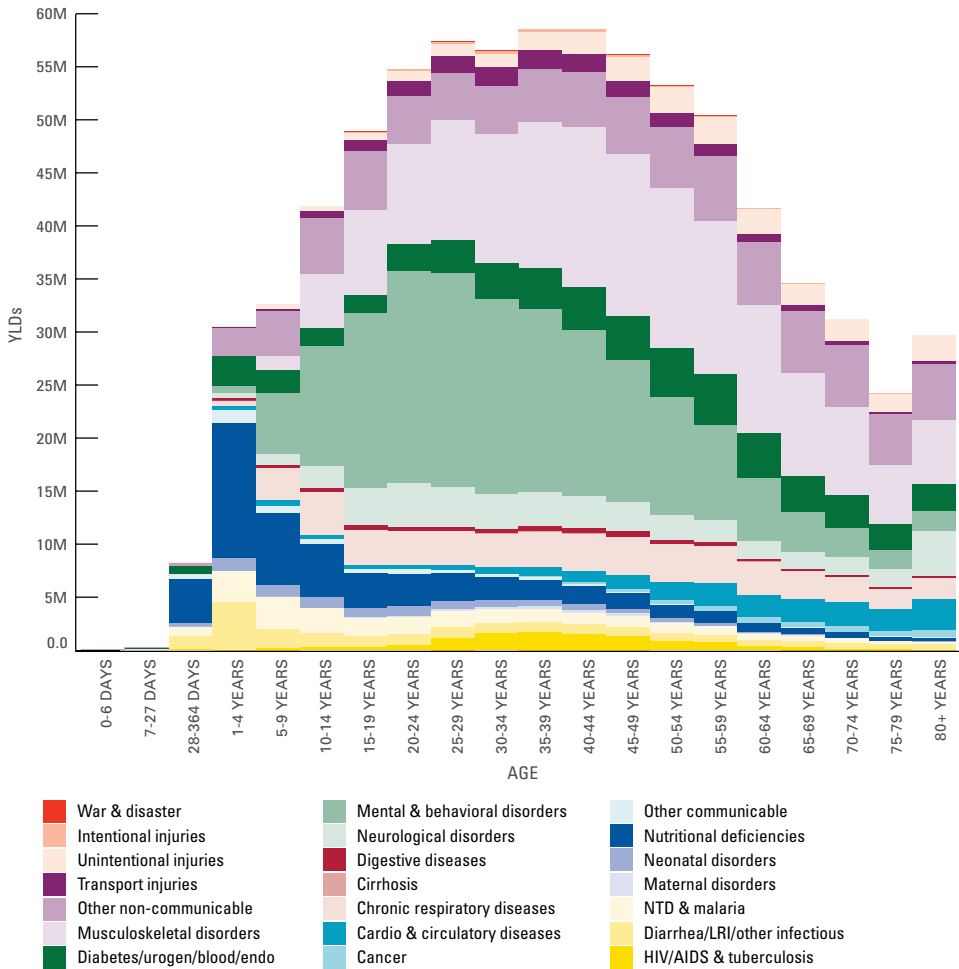
Figure 14 tells a similar story about the causes of disability in the Middle East and North Africa. In this region, however, there was no uptick in YLDs in the 80 and older age group as was seen at the global level. Yet another difference is that the peak age group for disability due to transport was 35 to 39 globally, whereas it was 25 to 29 in the Middle East and North Africa region. Disability due to transport includes causes such as road injuries.

Another way to view the world’s health challenges is by comparing how different conditions rank. Figure 15 ranks the leading causes of disability globally and each of the six World Bank regions, using color coding to indicate how high a condition ranks in a region. Low back pain caused the most disability in East Asia and the Pacific, Europe and Central Asia, and in the Middle East and North Africa. 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 ranked in the top 10 causes of disability in most regions. Another musculoskeletal disorder, osteoarthritis, appeared in the top 20 causes of disability in every region.

Depression played a large role in causing disability worldwide and is one of the top three causes of disability in every region. This disorder can cause fatigue, decreased ability to work or attend school, and suicide. Anxiety, a different type of mental disorder, was one of the top 10 causes of disability in all regions, but ranked highest in

Figure 13: Global disability patterns by broad cause group and age, 2010

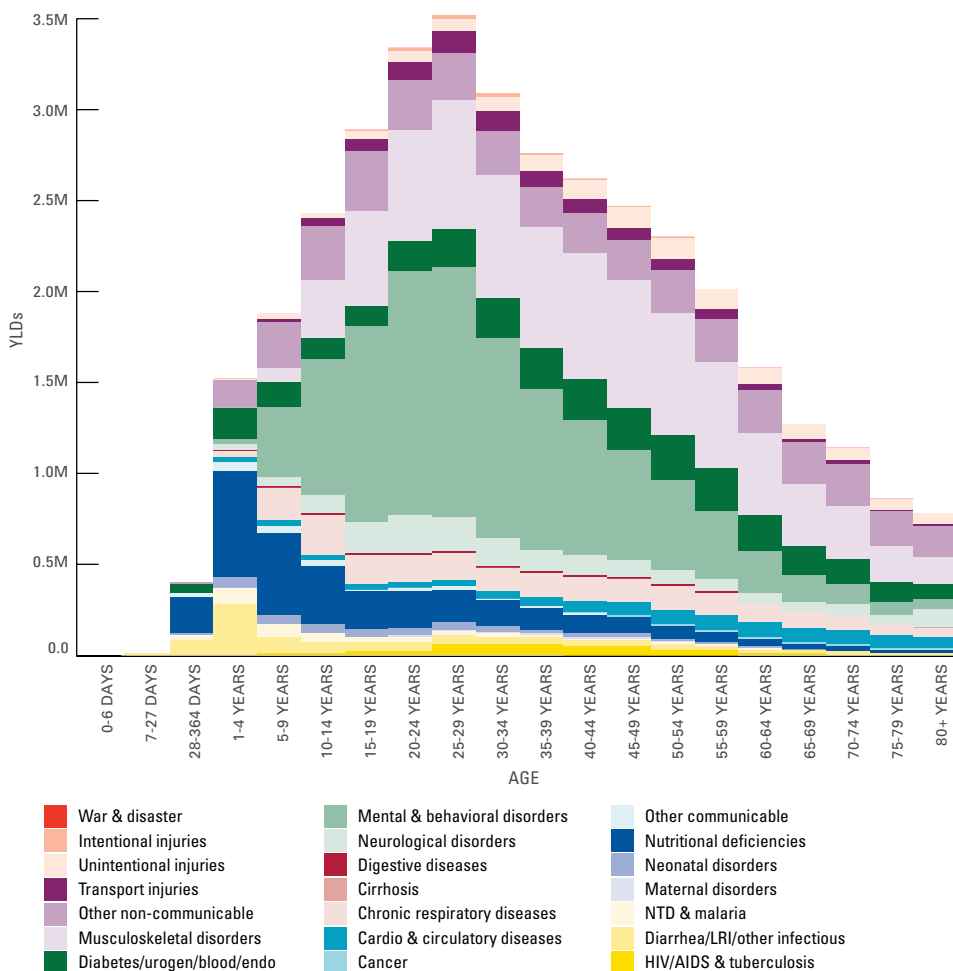


Note: The size of the colored portion in each bar represents the number of YLDs attributable to each cause for a given age group. The height of each bar shows total YLDs for a given age group in 2010. The causes are aggregated. For example, musculoskeletal disorders include low back pain and neck pain. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcausepattern>.

Latin America and the Caribbean and the Middle East and North Africa. Additionally, two other mental disorders, schizophrenia and bipolar disorder, appeared among the top 20 causes of disability in many regions.

While mental and musculoskeletal disorders ranked high among causes of disability across regions, Figure 15 also reveals substantial regional variation among other causes. Iron-deficiency anemia was the leading cause of disability in sub-Saharan Africa and South Asia, but was less important as a cause of disability in the other

Figure 14: Disability patterns by broad cause group and age in the Middle East and North Africa, 2010



Note: The size of the colored portion in each bar represents the number of YLDs attributable to each cause for a given age group. The height of each bar shows total YLDs for a given age group in 2010. The causes are aggregated. For example, musculoskeletal disorders include low back pain and neck pain.

regions. 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, was among the top five causes of disability in East Asia and Pacific, South Asia, and sub-Saharan Africa and was the eighth-leading cause of disability in the Middle East and North Africa.

In the Middle East and North Africa, many of the leading causes of disability are similar to global rankings, but key differences merit further discussion. Among the six

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

	GLOBAL	EAST ASIA & PACIFIC	EUROPE & CENTRAL ASIA	LATIN AMERICA & CARIBBEAN	MIDDLE EAST & NORTH AFRICA	SOUTH ASIA	SUB-SAHARAN AFRICA
LOW BACK PAIN	1	1	1	2	1	2	3
MAJOR DEPRESSIVE DISORDER	2	2	2	1	2	3	2
IRON-DEFICIENCY ANEMIA	3	6	5	5	3	1	1
NECK PAIN	4	3	3	3	6	7	6
COPD	5	5	11	13	8	4	4
OTHER MUSCULOSKELETAL	6	4	4	6	7	8	11
ANXIETY DISORDERS	7	10	7	4	4	6	5
MIGRAINE	8	11	8	7	12	5	13
DIABETES	9	7	6	10	5	10	23
FALLS	10	9	9	16	11	12	25
OSTEOARTHRITIS	11	8	10	11	9	19	18
DRUG USE DISORDERS	12	17	16	9	10	9	17
OTHER HEARING LOSS	13	12	13	15	16	11	12
ASTHMA	14	23	21	8	13	14	10
ALCOHOL USE DISORDERS	15	13	12	12	37	15	34
ROAD INJURY	16	16	14	21	14	13	22
BIPOLAR DISORDER	17	15	17	17	15	16	20
SCHIZOPHRENIA	18	14	18	18	18	22	29
DYSTHYMIA	19	18	19	19	19	20	26
EPILEPSY	20	20	22	14	20	26	14
ISCHEMIC HEART DISEASE	21	19	15	24	23	31	40
ECZEMA	22	22	23	20	21	21	21
DIARRHEAL DISEASES	23	25	28	22	17	23	15
ALZHEIMER'S DISEASE	24	34	20	26	39	49	62
TUBERCULOSIS	25	21	30	42	22	17	24

1-10
 11-20
 21-30
 31-50
 51-90

Note: In this figure, shading is used to indicate the ranking of each cause of disability in a particular region.

World Bank regions, diabetes ranked highest as a cause of years lived with disability in the Middle East and North Africa. While diabetes ranked ninth globally, it ranked fifth in the Middle East and North Africa. Also, while anxiety disorders ranked as the seventh leading cause of disability worldwide, it ranked fourth as a cause of disability in the Middle East and North Africa.

There was variation in the importance of other causes of disability in the Middle East and North Africa compared to global trends. Drug use disorders were the 12th cause of disability globally, but ranked 10th in the region. Alcohol use disorders, however, ranked much lower in the Middle East and North Africa; it was 15th globally and 37th in the region. Diarrheal diseases also ranked higher in the region compared to the world as a whole. Diarrheal diseases were the 23rd leading cause of disability globally, but ranked 17th in the Middle East and North Africa. Country-level disability rankings can be viewed on IHME's website: <http://ihmeuw.org/gbdheatmap>.

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

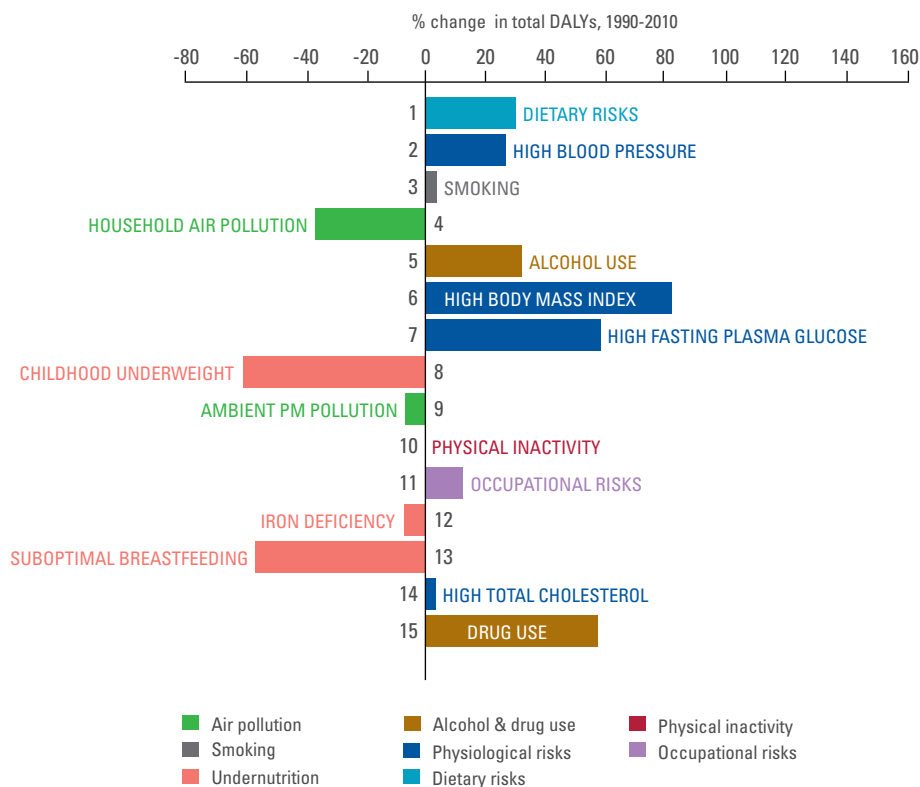
Data on potentially avoidable causes of health loss, or risk factors, can help policy-makers and donors prioritize prevention strategies to achieve maximum health gains. GBD tools estimate the number of deaths, premature deaths, years lived with disability, and DALYs (or years of life lost) attributable 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 15 leading global risk factors for 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%, respectively, from 1990 to 2010. Childhood underweight is commonly used to measure malnutrition, and was formerly the leading risk factor for DALYs in 1990, but ranked eighth in 2010. DALYs attributable to 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 ranked as the third leading cause of disability globally.

As most risk factors for communicable diseases in children have declined, many risks associated with non-communicable diseases have grown. As the leading global risk factor for DALYs in 2010, dietary risks increased 30% between 1990 and 2010. Dietary risks include components such as high sodium intake and lack of fruit, nuts and seeds, and whole grain intake. GBD found the diseases linked to dietary risks and physical inactivity were primarily cardiovascular diseases as well as cancer and diabetes. While 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 have 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.

Figure 16: Global shifts in rankings of DALYs for top 15 risk factors, 1990-2010

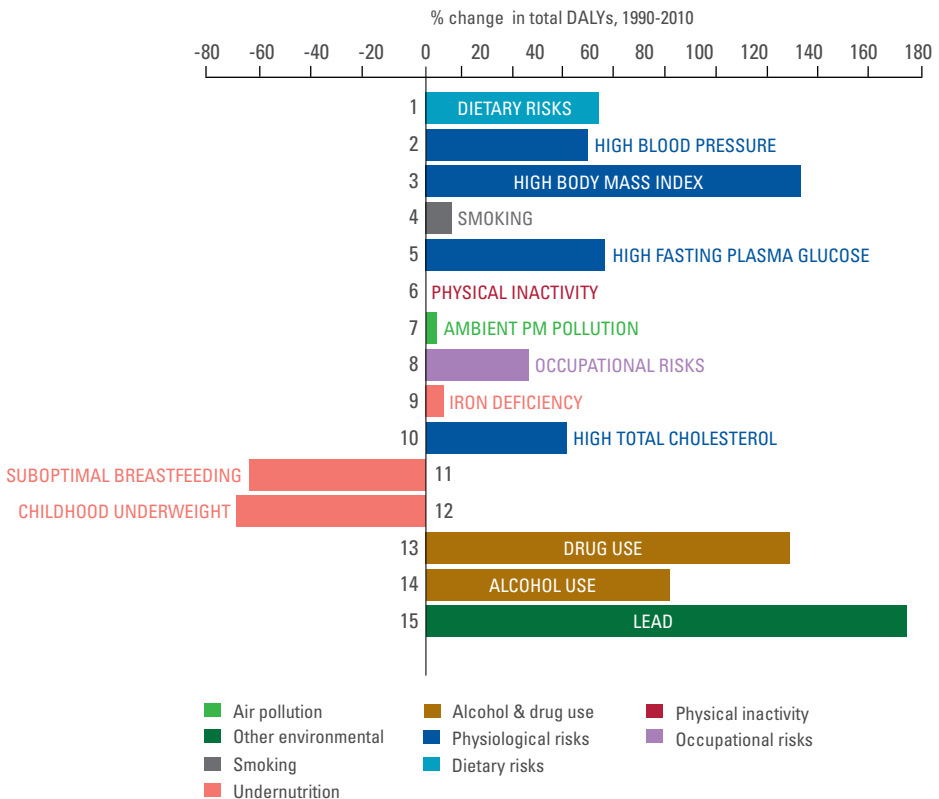


Note: The leading 15 risk factors are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs attributable to different risk factors have increased since 1990. Bars on the left show the percent by which DALYs attributable to different risk factors have decreased. Attributable DALYs were not quantified for physical inactivity for 1990.

The second leading global risk factor, high blood pressure, increased by 27% as a cause of DALYs 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.

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

Figure 17: Shifts in rankings of DALYs in the Middle East and North Africa for top 15 risk factors, 1990-2010



Note: The leading 15 risk factors are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs attributable to different risk factors have increased since 1990. Bars on the left show the percent by which DALYs attributable to different risk factors have decreased. Ambient PM air pollution: ambient particulate matter air pollution. Attributable DALYs were not quantified for physical inactivity for 1990.

worldwide than childhood underweight in 2010, whereas childhood underweight was a much more prominent risk factor than high BMI in 1990.

Similarly, Figure 17 depicts changes in the top 15 leading risk factors for DALYs in the Middle East and North Africa between 1990 and 2010. While the trends in the region are largely consistent with the global trends, there are a few notable exceptions. Drug use and alcohol use, for example, increased globally by 57% and 32%, respectively, and increased more sharply in the region by 133% and 89%. Conversely, the health risks associated with household air pollution declined more steeply in the region compared to the world as a whole; it decreased by 37% globally and 73% in the Middle East and North Africa.

Global and regional rankings of risk factors mask important differences across countries. Figure 18 shows the leading risk factors for DALYs in the Middle East and North Africa in 2010. Dietary risks, high blood pressure, high BMI, smoking, and high fasting plasma glucose (an indicator of diabetes) ranked in the top five risk

Figure 18: Rankings of DALYs attributable to leading risk factors across countries in the Middle East and North Africa, 2010

	ALGERIA	DJIBOUTI	EGYPT	IRAN	IRAQ	JORDAN	LEBANON	LIBYA	MOROCCO	PALESTINE	SYRIA	TUNISIA	YEMEN	GLOBAL
DIETARY RISKS	1	3	1	1	1	2	1	1	2	1	1	1	3	1
HIGH BLOOD PRESSURE	2	2	2	2	3	4	3	2	4	2	2	2	4	2
SMOKING	6	6	4	5	6	5	4	6	5	5	4	4	7	3
HOUSEHOLD AIR POLLUTION	21	10	20	22	19	20	24	23	18	17	22	21	6	4
ALCOHOL USE	14	11	11	12	15	13	14	14	13	15	11	13	16	5
HIGH BODY MASS INDEX	3	9	3	3	2	1	2	3	1	3	3	3	8	6
HIGH FASTING PLASMA GLUCOSE	4	8	9	6	4	3	5	4	3	4	5	5	10	7
CHILDHOOD UNDERWEIGHT	15	1	15	17	11	18	19	15	14	16	15	14	1	8
AMBIENT PM POLLUTION	9	7	5	7	7	7	7	7	9	7	7	7	9	9
PHYSICAL INACTIVITY	5	13	6	4	8	6	6	5	6	6	6	6	11	10
OCCUPATIONAL RISKS	8	12	7	9	12	10	10	9	7	9	10	9	12	11
IRON DEFICIENCY	7	5	10	11	9	8	9	10	8	8	9	10	5	12
SUBOPTIMAL BREASTFEEDING	12	4	12	15	5	14	16	13	10	13	16	16	2	13
HIGH TOTAL CHOLESTEROL	11	18	8	8	10	9	8	8	12	11	8	8	15	14
DRUG USE	10	14	14	10	13	11	11	11	11	10	12	11	17	15
INTIMATE PARTNER VIOLENCE	13	15	16	13	14	12	12	12	15	12	14	12	20	16
LEAD	16	21	13	14	16	16	15	17	16	14	13	15	19	17
SANITATION	23	19	24	19	21	25	25	25	19	25	24	23	14	18
VITAMIN A DEFICIENCY	22	16	22	25	22	23	23	21	24	22	20	25	18	19
ZINC DEFICIENCY	19	17	18	21	17	19	22	20	22	19	19	22	21	20
CHILDHOOD SEXUAL ABUSE	17	20	17	16	20	15	17	16	17	18	17	17	22	21
UNIMPROVED WATER	20	22	23	24	18	24	18	18	21	21	21	24	13	22
LOW BONE MINERAL DENSITY	18	23	19	18	23	17	13	19	20	20	18	18	23	23
OZONE	24	24	21	23	24	21	21	22	25	24	23	19	24	24
RADON	25	25	25	20	25	22	20	24	23	23	25	20	25	25

1-5 6-10 11-15 16-20 21-25

Note: In this figure, shading is used to indicate the ranking of each risk factor in a particular region. Palestine is the GBD equivalent of the West Bank and Gaza in the World Bank classification system. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdheatmap>.

factors in many countries. There was some variation in certain countries, however. In Djibouti and Yemen, for example, childhood underweight was the leading risk factor, but it did not appear in the top 10 for any other country. Similarly, Djibouti and Yemen were the only countries in the region where high BMI was not among the top five risks. Egypt stood out as the only country where outdoor air pollution, also known as ambient particulate matter pollution, appeared in the top five risks, and low bone mineral density ranked relatively high in Lebanon compared to other countries in the region. Physical inactivity and smoking were among the top 10 risk factors in nearly all of the region's countries. In contrast to other countries shown in Figure 18, risk factors for illness in children, such as suboptimal breastfeeding and iron deficiency, remained among the top five risk factors in Djibouti and Yemen.

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 19 shows the number of DALYs attributable to tobacco smoking, including second-hand smoke, that contributed to different diseases in Lebanon in 2010. The percentage of DALYs that could be averted by reducing this risk factor is shown in dark shading.

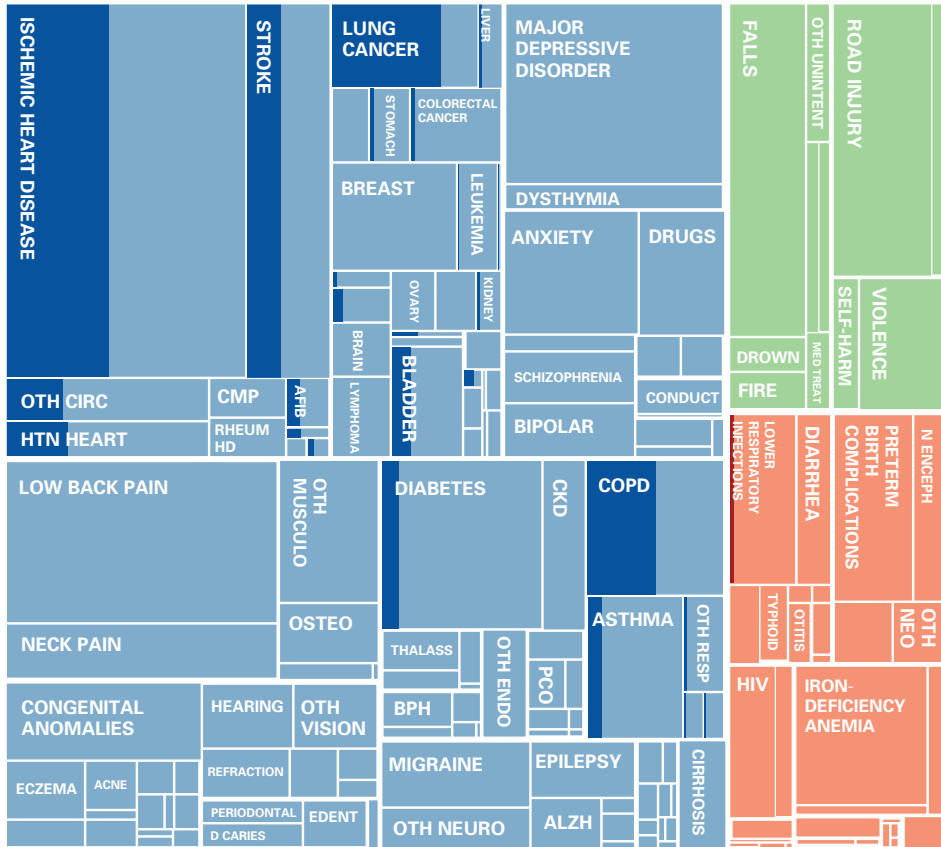
The figure indicates how reductions in tobacco smoking could prevent substantial amounts of premature death and disability from ischemic heart disease, lung cancer, and stroke, as indicated by the portion of these causes that are shaded in dark blue. Reductions in smoking could also reduce DALYs from COPD, asthma, and diabetes.

Dietary risks include elements such as low consumption of fruits, nuts and seeds, and whole grains, as well as high salt intake. Figure 20 shows how many DALYs in Iran could be averted by improving people's diets. Substantial numbers of premature deaths and disability from ischemic heart disease and stroke could be prevented, as indicated by the portion of these causes shaded in dark blue. Reduction of dietary risks could also reduce DALYs from diabetes and some cancers.

Figure 21 shows the number of DALYs attributable to suboptimal breastfeeding in children from 1 month to 11 months old in Yemen.

This figure can be used to understand the number of years of healthy life that could potentially be gained by ensuring that all Yemeni 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 6 months of age until age 2. More than 75% 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.

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



DALYs attributable to risk factor

Communicable, newborn, nutritional, and maternal

Non-communicable

Injuries

DALYs not attributable to risk factor

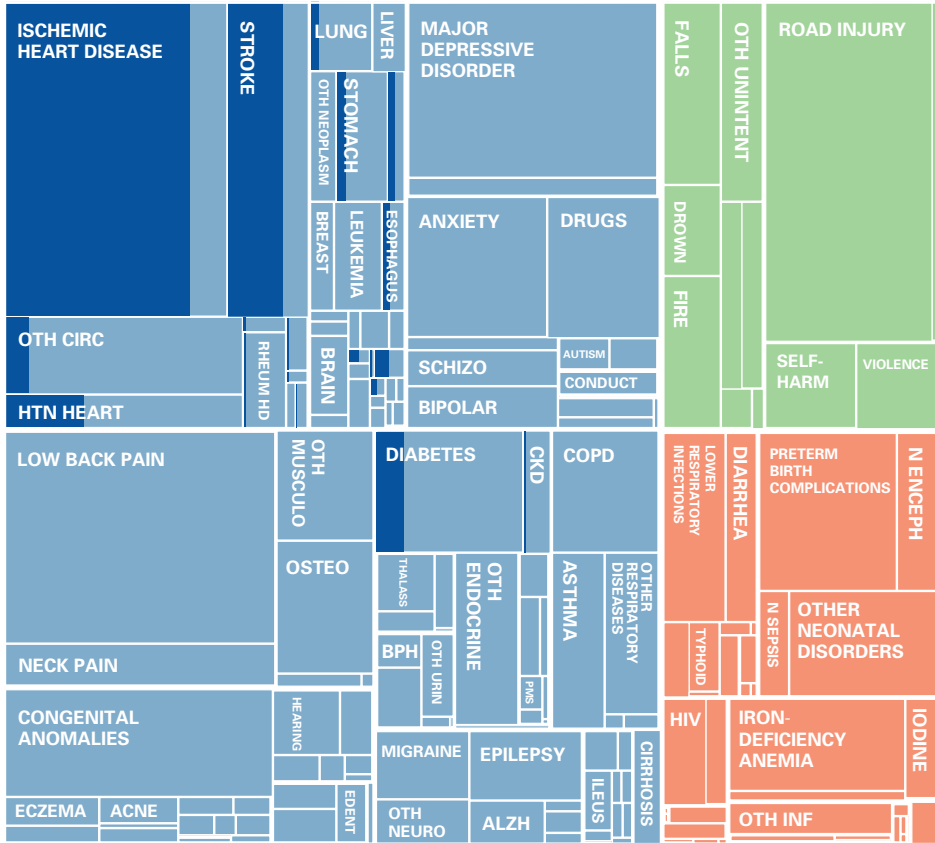
Communicable, newborn, nutritional, and maternal

Non-communicable

Injuries

Note: The size of each box represents the percentage of total DALYs caused by a particular disease or injury, and the proportion of each cause attributable to the risk factor is shaded. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcompare>.

Figure 20: DALYs attributable to dietary risks, both sexes, all ages, Iran, 2010



DALYs attributable
to risk factor

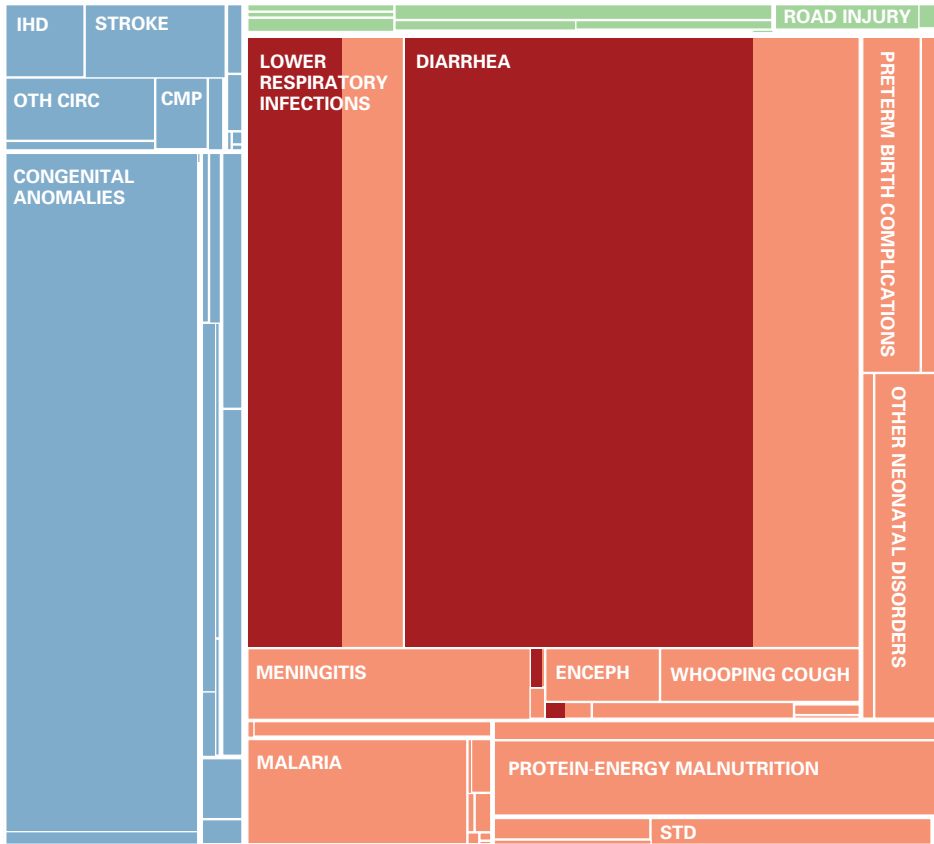
- Communicable, newborn, nutritional, and maternal
- Non-communicable
- Injuries

DALYs not attributable
to risk factor

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

Note: The size of each box represents the percentage of total DALYs caused by a particular disease or injury, and the proportion of each cause attributable to the risk factor is shaded. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcompare>.

Figure 21: DALYs attributable to suboptimal breastfeeding, both sexes, ages 1-11 months, Yemen, 2010



DALYs attributable to risk factor

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

DALYs not attributable to risk factor

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

Note: The size of each box represents the percentage of total DALYs caused by a particular disease or injury, and the proportion of each cause attributable to the risk factor is shaded. To view an interactive version of this figure, visit IHME's website: <http://ihmeuw.org/gbdcompare>.