

Preventing  
**CHRONIC DISEASES**  
a vital investment



**World Health  
Organization**



PUBLIC HEALTH AGENCY of CANADA  
AGENCE DE SANTÉ PUBLIQUE du CANADA

*part two*

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# URGENT REACTION

This part of the report reveals the extent of the chronic disease pandemic, its relationship to poverty, and its adverse impact on countries' macroeconomic development. A new global goal for reducing chronic disease death rates over the next 10 years is also introduced.

## *key messages*

- » **Chronic disease risks and deaths are increasing rapidly, especially in low and middle income countries**
- » **This growing threat is an underappreciated cause of poverty and hinders the macroeconomic development of many countries**

## *face to face*

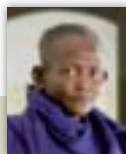
WITH **CHRONIC DISEASE**



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# 1 Chronic diseases: causes and health impacts

The disease profile of the world is changing at an astonishingly fast rate, especially in low and middle income countries. Long-held notions about the nature of chronic diseases, their occurrence, the risk factors underlying them and the populations at risk are no longer valid.

- » **Chronic diseases will take the lives of over 35 million people in 2005, including many young people and those in middle age**
- » **The total number of people dying from chronic diseases is double that of all infectious diseases (including HIV/AIDS, tuberculosis and malaria), maternal and perinatal conditions, and nutritional deficiencies combined**
- » **80% of chronic disease deaths occur in low and middle income countries and half are in women**
- » **Without action to address the causes, deaths from chronic diseases will increase by 17% between 2005 and 2015**

The great epidemics of tomorrow are unlikely to resemble those that have previously swept the world, thanks to progress in infectious disease control. The risk of outbreaks – a new influenza pandemic, for example – will require constant vigilance. But it is the looming epidemics of heart disease, stroke, cancer and other chronic diseases that for the foreseeable future will take the greatest toll in deaths and disability.

It is vitally important that the impending chronic disease pandemic is recognized, understood and acted on urgently.

## WHAT ARE CHRONIC DISEASES?

The main chronic diseases discussed in this report are: cardiovascular diseases, mainly heart disease and stroke; cancer; chronic respiratory diseases; and diabetes.

There are many other chronic conditions and diseases that contribute significantly to the burden of disease on individuals, families, societies and countries. Examples include mental disorders, vision and hearing impairment, oral diseases, bone and joint disorders, and genetic disorders. Some will be presented as case studies in this publication to highlight the wide variety of chronic diseases that require continuing attention from all sectors of society. Mental and neurological disorders are important chronic conditions that share a unique set of distinguishing features, and which were reviewed recently by the World Health Organization (7).

## TERMINOLOGY

Part of the confusion that surrounds chronic diseases is that they appear under different names in different contexts. Sometimes the term “non-communicable diseases” is used to make the distinction from infectious or “communicable” diseases. Yet several chronic diseases have an infectious component to their cause, such as cervical cancer and liver cancer. “Lifestyle-related” diseases is a term sometimes used to emphasize the contribution of behaviour to the development of chronic diseases. In fact, these diseases are heavily influenced by environmental conditions and are not the result of individual choices alone; “lifestyles” are, of course, equally important for communicable diseases.

For this report, the term “chronic diseases” is preferred because it suggests important shared features:

- » the chronic disease epidemics take decades to become fully established – they have their origins at young ages;
- » given their long duration, there are many opportunities for prevention;
- » they require a long-term and systematic approach to treatment;
- » health services must integrate the response to these diseases with the response to acute, infectious diseases.

## HEART DISEASE

There are many forms of heart disease. Coronary heart disease, also known as coronary artery disease or ischaemic heart disease, is the leading cause of death globally. This is the form of heart disease considered in this report and it will be referred to simply as heart disease. It is caused by disease of the blood vessels (atherosclerosis) of the heart, usually as part of the process which affects blood vessels more generally. Heart disease, although known for centuries, became common in the early decades of the 20th century in high income countries. The epidemics have now spread worldwide.

## STROKE

Stroke is a disease of the brain caused by interference to the blood supply. Stroke and heart disease are the main cardiovascular diseases. There are several types of strokes and the acute events are usually caused by the same long-term disease processes that lead to heart disease; a small proportion of acute events are caused by a blood vessel bursting. Stroke is the main cardiovascular disease in many east Asian countries.

## CANCER

Cancer describes a range of diseases in which abnormal cells proliferate and spread out of control. Other terms used are tumours and neoplasms. There are many types of cancer and all organs of the body can become cancerous. Tobacco is the main preventable cause of cancer. The causes of many other cancers are also known, including cervical cancer, skin cancer and oral cancer.

## CHRONIC RESPIRATORY DISEASES

Diseases of the lung take many forms. This report focuses on chronic obstructive pulmonary disease and asthma. Chronic obstructive pulmonary disease is caused by airflow limitation that is not fully reversible; asthma is caused by reversible obstruction of the airways.

## DIABETES

Diabetes is characterized by raised blood glucose (sugar) levels. This results from a lack of the hormone insulin, which controls blood glucose levels, and/or an inability of the body's tissues to respond properly to insulin (a state called insulin resistance). The most common type of diabetes is type 2, which accounts for about 90% of all diabetes

and is largely the result of excessive weight and physical inactivity. Until recently, this type of diabetes was seen only in adults but is now occurring in obese children. The usual childhood form of diabetes (type 1 diabetes) is caused by an absolute lack of insulin and not by obesity. Without insulin, type 1 diabetes is rapidly fatal.

## CHRONIC DISEASE PROFILES

This section summarizes the impact of chronic diseases in different populations around the world. Detailed projections for 2005 are presented for males and females of all ages. The data presented are estimated by WHO using standard methods to maximize cross-country comparability; they are not necessarily the official statistics of Member States. For more information on methods of projections for deaths and burden of disease, see Annex 1.

Chronic diseases are projected to take the lives of 35 million people in 2005, which is double the estimate for all infectious diseases combined. Of these chronic disease deaths, 16 million will occur in people under 70 years of age, and 80% will occur in low and middle income countries. Approximately half of the chronic disease deaths occur in females.

## THE GLOBAL SITUATION

### DEATHS

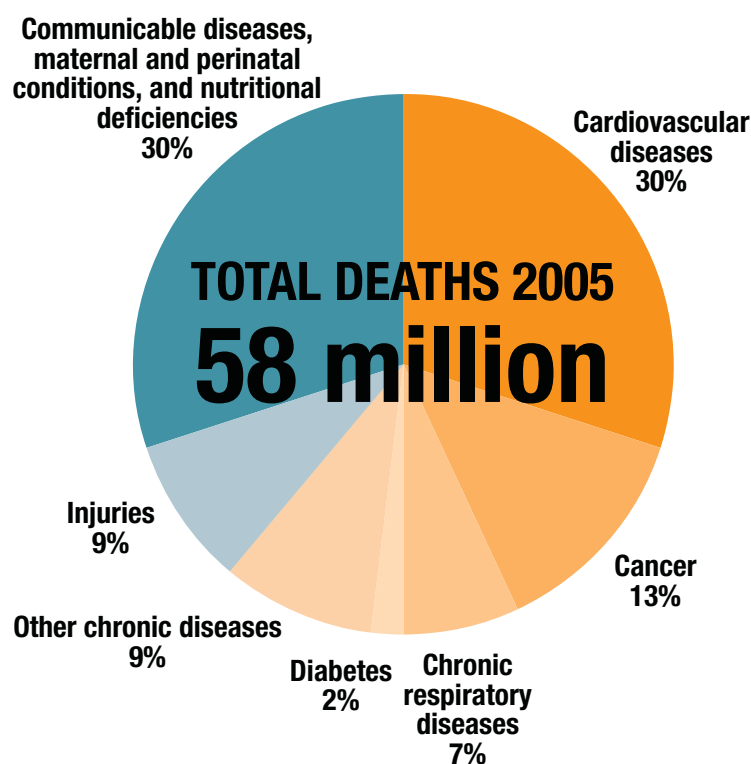
Approximately 58 million deaths are expected to occur in 2005. It is projected that 35 million – or 60% – of all deaths will be caused by chronic diseases. To put these numbers into perspective, around 17 million deaths – approximately 30% – will be due to infectious diseases (including HIV/AIDS, tuberculosis and malaria), maternal and perinatal conditions, and nutritional deficiencies combined. An additional 5 million deaths – 9% of the total – are expected to result from violence and injuries.

It is often assumed that chronic disease deaths are restricted to older people, but this is not the case. Approximately 16 million chronic disease deaths occur each year in people under 70 years of age. Moreover, chronic disease deaths occur at much earlier ages in low and middle income countries than in high income countries.

The figure on the next page shows the main causes of death worldwide for all ages. Cardiovascular diseases (mainly heart disease and stroke) are the leading cause of death, responsible for 30% of all deaths.

Cancer and chronic respiratory diseases are the other leading causes of chronic disease deaths. The contribution of diabetes is underestimated because although people may live for years with diabetes, their deaths are usually recorded as being caused by heart disease or kidney failure.

## Projected main causes of death, worldwide, all ages, 2005



The number and rates of projected chronic disease deaths in males and females for four age groups are shown in the table on the facing page. The number of deaths is similar in males and females. The death rates for all chronic diseases rise with increasing age but almost 45% of chronic disease deaths occur prematurely, under the age of 70 years.

## Projected chronic disease deaths,\* worldwide, numbers and rates by age and sex, 2005

Age group	Number of deaths (millions)			Death rates per 100 000		
	Males	Females	Total	Males	Females	Total
0–29	0.8	0.8	1.6	48	47	48
30–59	4	3	7	372	251	311
60–69	4	3	7	2328	1533	1911
70 and over	9	11	20	6981	6102	6467
<b>Total all ages</b>	18	17	35	556	543	549

\* Shown to rounded numbers. Components may not add to total exactly owing to rounding.

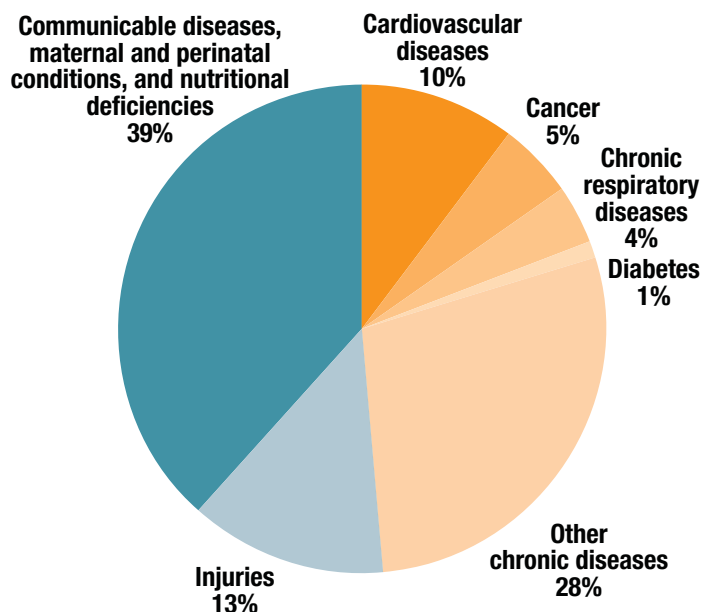
### BURDEN OF DISEASE

As well as a high death toll, chronic diseases also cause disability, often for decades of a person’s life. The most widely used summary measure of the burden of disease is the disability adjusted life year (or DALY), which combines the number of years of healthy life lost to premature death with time spent in less than full health. One DALY can be thought of as one lost healthy year of life.

The projected global burden of disease for all ages, as measured by DALYs, is shown in the figure on the right, along with the burden of the leading chronic diseases. Approximately half of the burden of disease will be caused by chronic diseases, 13% by injuries and 39% by communicable diseases, maternal and perinatal conditions, and nutritional deficiencies combined. Cardiovascular diseases are the leading contributor, among the chronic diseases, to the global burden of disease.

The estimated burden of chronic diseases in men and women and for the four age groups is shown in the table on the next page.

## Projected main causes of global burden of disease (DALYs), worldwide, all ages, 2005



The number of DALYs caused by chronic disease is greatest in adults aged 30–59 years, and the rates increase with age. Overall, the burden of disease rates are similar in men and women. Approximately 86% of the burden of chronic disease occurs in people under the age of 70 years.

### Projected global chronic disease burden (DALYs),\* worldwide, numbers and rates by age and sex, 2005

Age group	DALYs (millions)			DALYs per 100 000		
	Males	Females	Total	Males	Females	Total
<b>0–29</b>	112	108	220	6 263	6 380	6 320
<b>30–59</b>	163	143	305	14 088	12 508	13 304
<b>60–69</b>	53	48	101	30 718	25 451	27 965
<b>70 and over</b>	44	55	99	34 570	30 953	32 457
<b>Total all ages</b>	372	354	725	11 470	11 053	11 263

\* Shown to rounded numbers. Components may not add to total exactly owing to rounding.

### VISUAL IMPAIRMENT

Visual impairment and blindness are examples of chronic conditions whose impact is not captured by death data. In 2002, more than 161 million people were visually impaired, of whom 124 million people had low vision and 37 million were blind as a result of eye diseases. More than 80% of all blindness is in people 50 years of age or older, and women have a significantly higher risk than men.

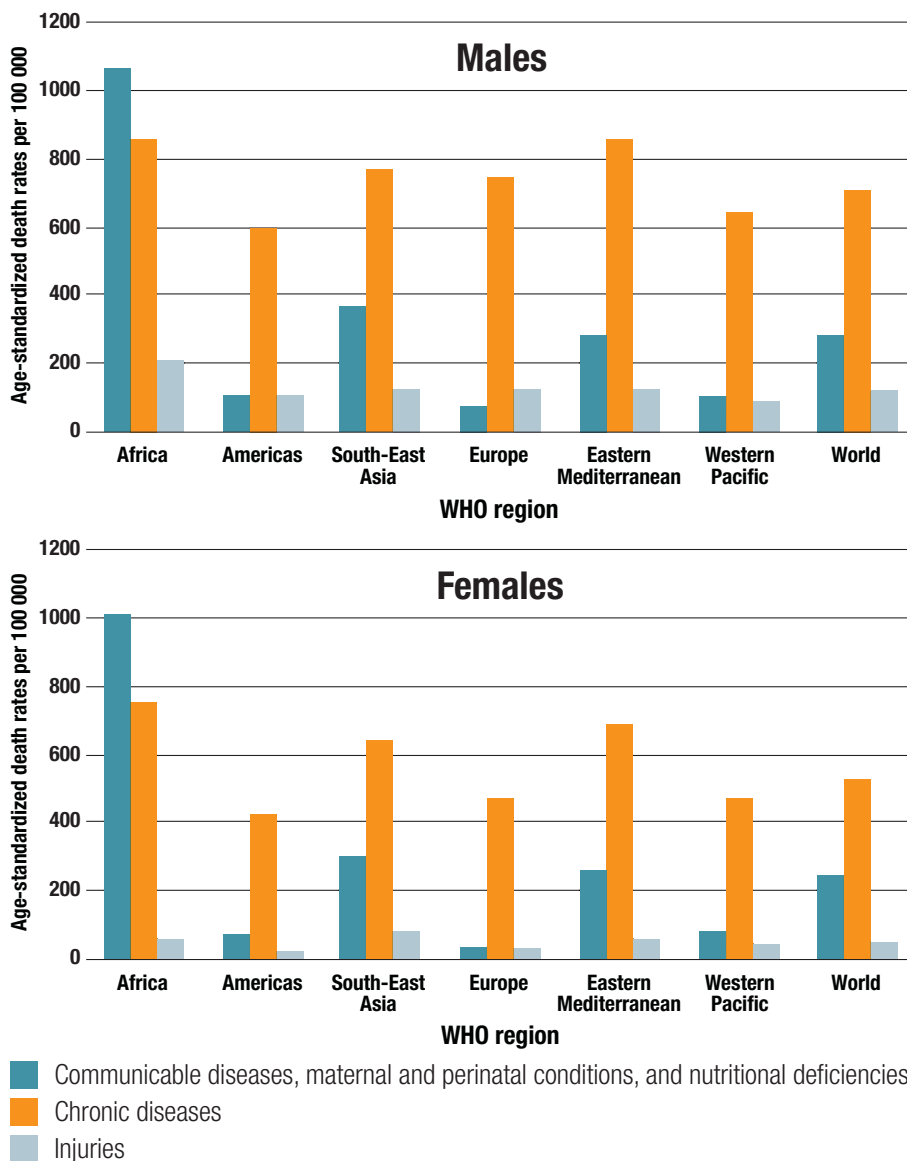
The highest prevalence of blindness is in the African Region where it reaches 9% among people aged 50 years and older. The lowest prevalence of blindness occurs in the highest income countries of the Americas, South-East Asia and Europe, where it is between 0.4% and 0.6% of people aged 50 years and older.

## THE REGIONAL SITUATION

### DEATHS

Chronic disease is the leading cause of death in males and females in all WHO regions except Africa, as shown in the figure below.<sup>1</sup>

### Projected main causes of death by WHO region, all ages, 2005

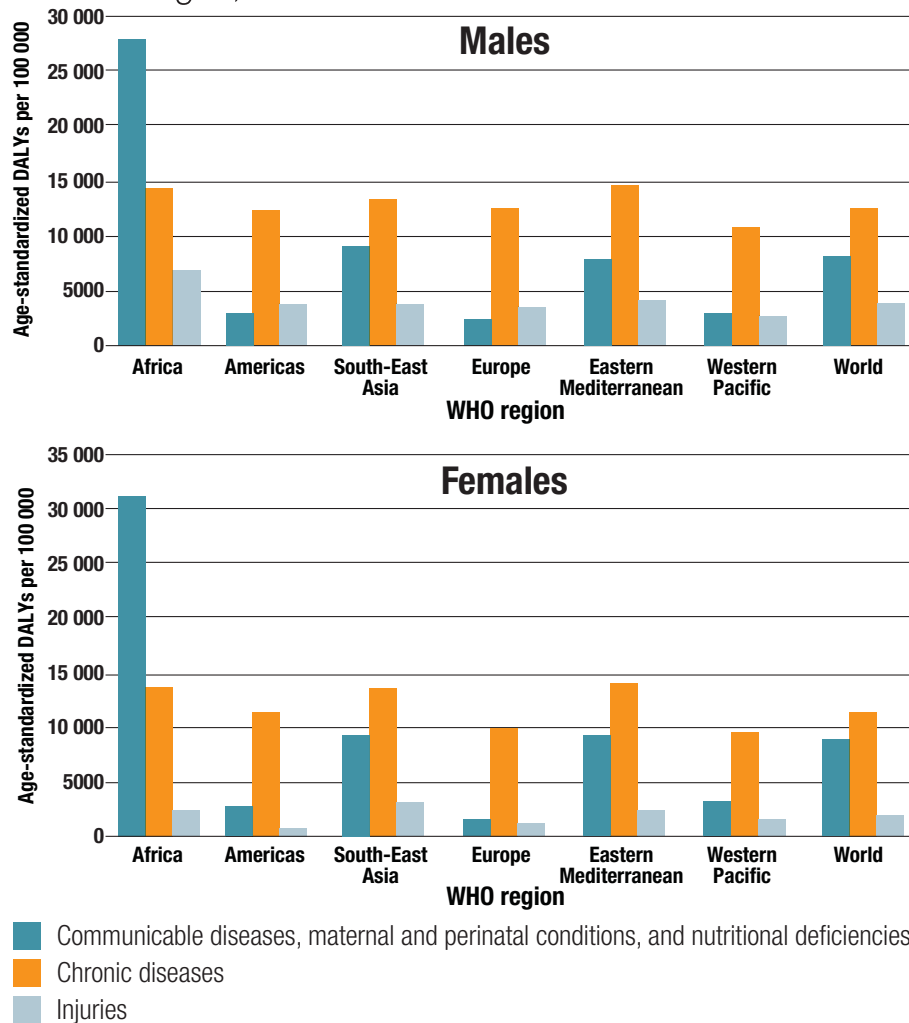


<sup>1</sup> For a full list of countries by WHO region, see Annex 2.

## BURDEN

Chronic diseases are the leading cause of the burden of disease in all regions except Africa; HIV/AIDS is a major contributor in Africa (see figure below).

### Projected main causes of the burden of disease (DALYs) by WHO region, all ages, 2005



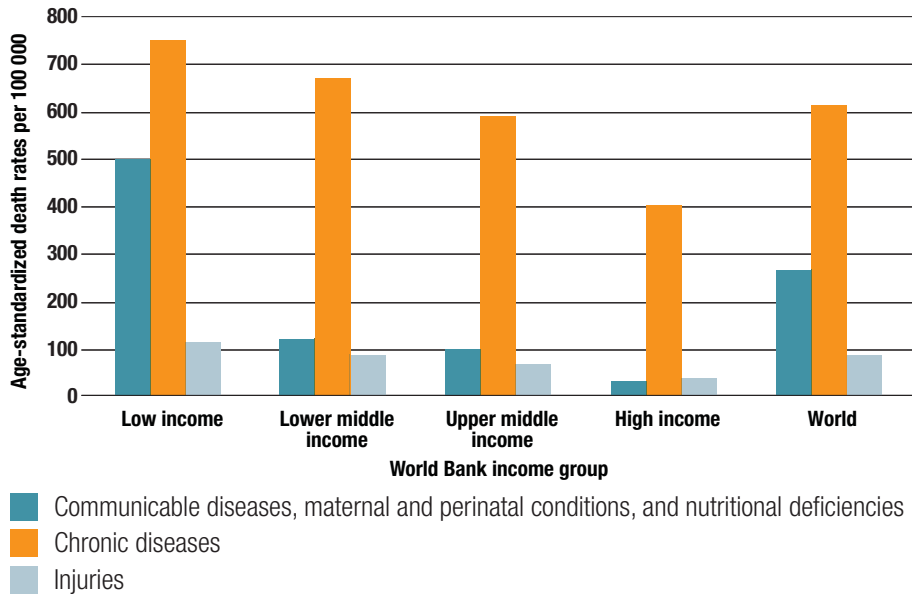
### THE PATTERN BY COUNTRY INCOME GROUPING

The World Bank categorizes countries into four broad income groupings, based on each country's gross national income (GNI) per capita: low income, middle income (subdivided into lower middle and upper middle) or high income. A full listing of countries is given in Annex 3.

## DEATHS

For chronic diseases, the impact is clear: 80% of all chronic disease deaths occur in low and middle income countries, where most of the world's population lives, and the rates are higher than in high income countries. Deaths from chronic diseases occur at earlier ages in low and middle income countries than in high income countries. The figure on the right shows that the age-standardized death rates for chronic diseases are higher in low and middle income countries than in high income countries.

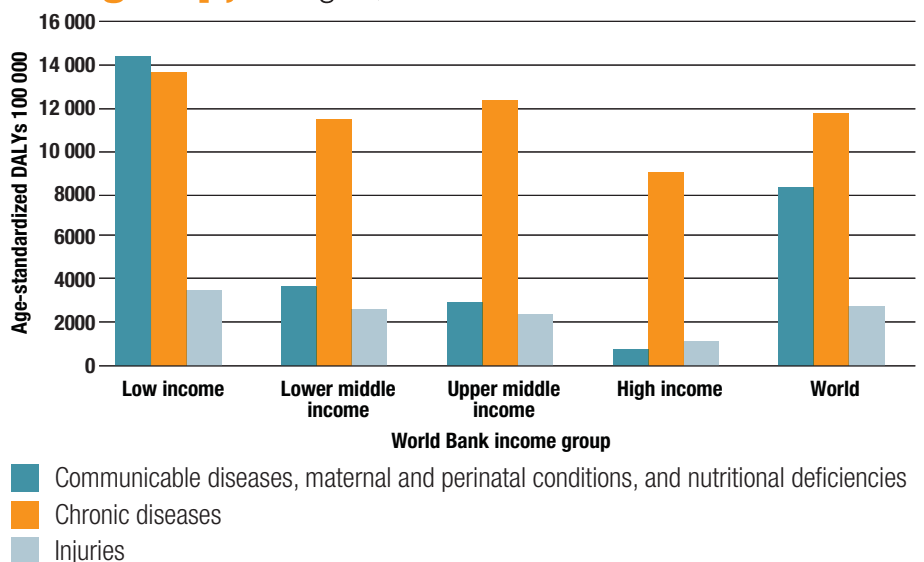
### Projected main causes of death by World Bank income group, all ages, 2005



## BURDEN

Chronic diseases contribute considerably to the disease burden in all income groups. The age-standardized rates are lowest in high income countries.

### Projected main causes of burden of disease (DALYs) by World Bank income group, all ages, 2005



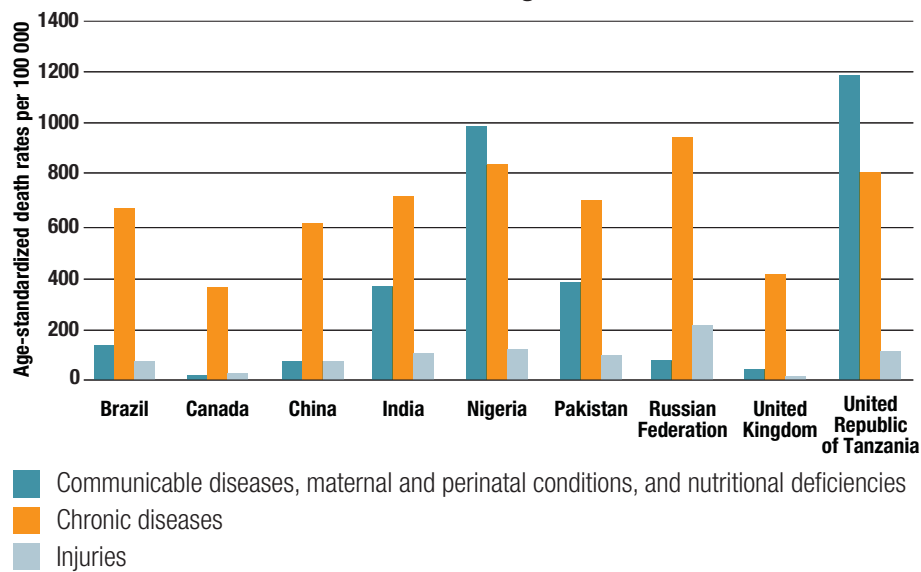
## COUNTRY PROFILES

## DEATHS

The main projected causes of death in 2005 are shown for the nine selected countries in the figure below. Chronic disease death rates are higher than those from communicable diseases, maternal and perinatal conditions,

### Projected main causes of death

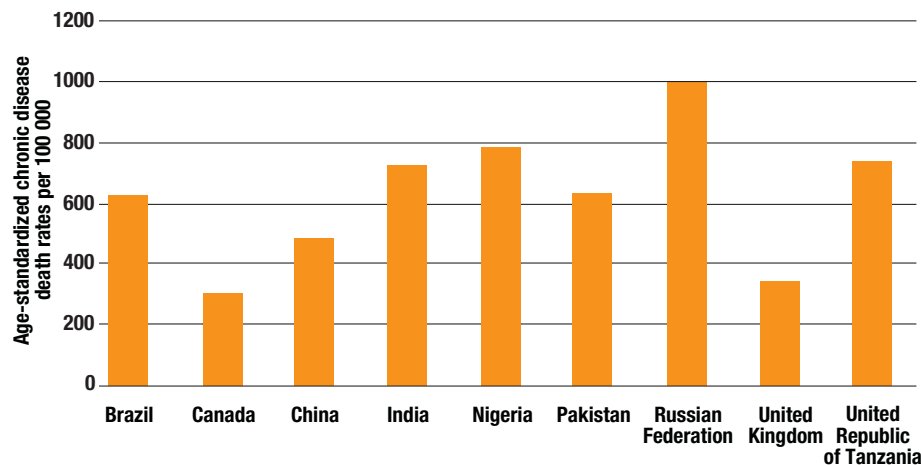
in selected countries, all ages, 2005



and nutritional deficiencies combined, in all countries except the United Republic of Tanzania and, to a lesser extent, Nigeria.

Remarkably, in low and middle income countries the high death rates in middle-aged people are much higher than those in high income countries (see figure below). This situation is very different from that in Canada and the United Kingdom, where chronic disease deaths now predominantly occur among people in the oldest age group. The death rates in middle-aged people in the Russian Federation are four times those in Canada.

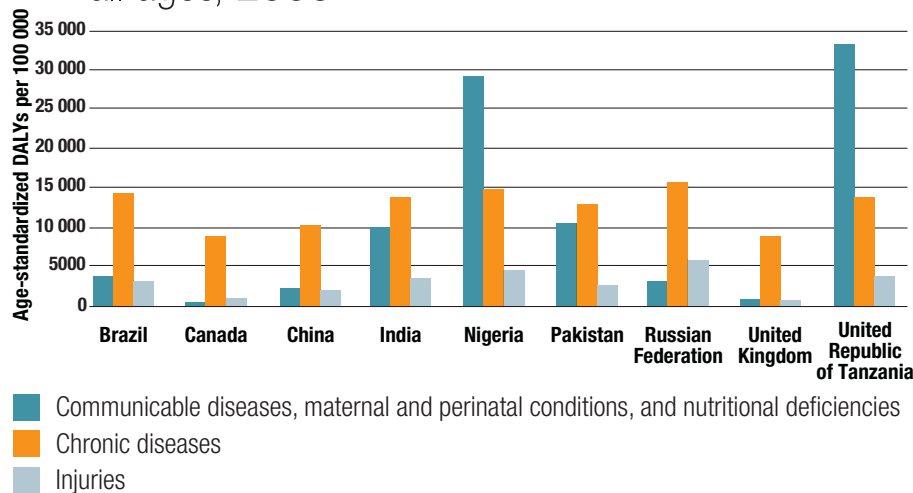
### Projected chronic disease death rates by country, among people aged 30–69 years, 2005



## BURDEN

Chronic diseases are the leading cause of the burden of disease in all countries except Nigeria and the United Republic of Tanzania.

### Projected main causes of burden of disease (DALYs) in selected countries, all ages, 2005



## SUMMARY

Chronic diseases are the leading cause of death and disease burden worldwide, in all WHO regions except Africa, and in all of the selected countries except Nigeria and the United Republic of Tanzania. Chronic diseases are the leading cause of death in all World Bank income groups. The death and burden of disease rates are similar in men and women and increase with age. Among the selected countries, chronic disease death rates are higher in low and middle income countries than in high income countries. Some 45% of chronic disease deaths and 86% of the burden of chronic diseases occur in people under 70 years of age.

*face to face* WITH CHRONIC DISEASE:

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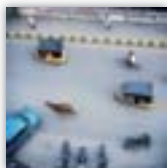
Around 5 million people die each year as a result of tobacco use.

SH



K. SRIDHAR REDDY

HOUR



**K. SRIDHAR REDDY** was on the telephone to his wife when the photographer entered his hospital room. “I’m sorry, it’s rush hour, I’ll be with you in a minute,” he excused himself. Sridhar’s wife runs their restaurant while he’s undergoing chemotherapy treatment at the Chennai Cancer Institute. “It’s my lifeline,” the 52-year-old says, looking at his mobile phone.

Name	K. Sridhar Reddy
Age	52
Country	India
Diagnosis	Cancer

Sridhar had a first malignant tumour removed from his right cheek last year and a second one from his throat earlier

this year. It’s his third hospitalization so far. “Renowned oncologists work here, I’m paying a high price, but I know I’m in good hands,” he says, before having a severe coughing fit.

Actually, his doctor doesn’t sound as optimistic. Cancer has spread to Sridhar’s lungs and liver. “His tobacco use and drinking habits are to blame,” the oncologist says, and gives him a year to live at best. Sridhar has been chewing tobacco since his teenage years and drinking alcohol every day for more than 20 years. “Too much stress,” Sridhar explains.

Below the surface, Sridhar knows that the future doesn’t look bright. He has been borrowing money to pay for his medical bills and now worries that he will never be able to repay the loans.

Sadly, Sridhar died only a short time after he was interviewed.

## THE CAUSES OF CHRONIC DISEASES

This section summarizes the extensive evidence on the causes of the chronic disease epidemics. The evidence comes from a full range of studies – laboratory, clinical and population-based – conducted in all regions of the world. The causes (risk factors) of chronic diseases are known; a small set of common risk factors are responsible for most of the main chronic diseases and these risk factors are the same in men and women and in all regions.

## THE COMMON CAUSES OF THE MAIN CHRONIC DISEASES

### COMMON MODIFIABLE RISK FACTORS

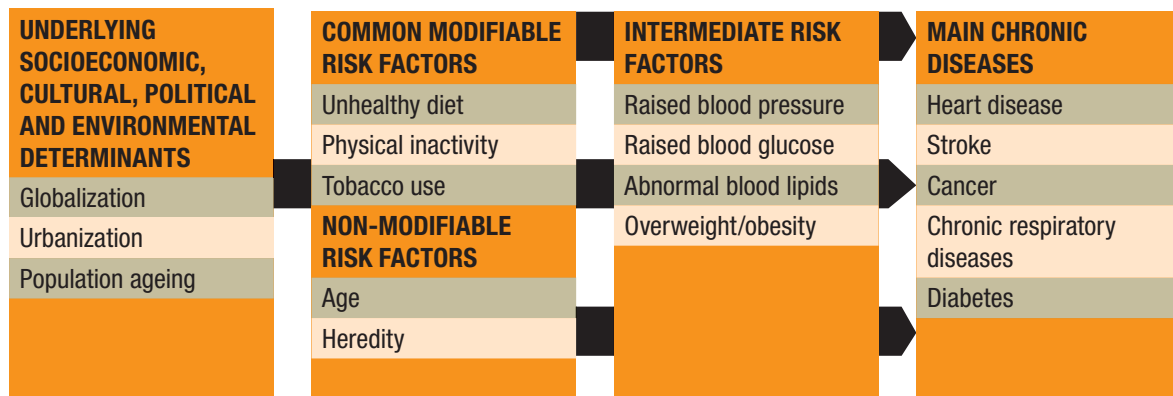
The causes of the main chronic disease epidemics are well established and well known. The most important modifiable risk factors are:

- » unhealthy diet and excessive energy intake;
- » physical inactivity;
- » tobacco use.

These causes are expressed through the intermediate risk factors of raised blood pressure, raised glucose levels, abnormal blood lipids (particularly low density lipoprotein – LDL cholesterol), and overweight (body mass index  $\geq 25$  kg/m<sup>2</sup>) and obesity (body mass index  $\geq 30$  kg/m<sup>2</sup>).

The major modifiable risk factors, in conjunction with the non-modifiable risk factors of age and heredity, explain the majority of new events of heart disease, stroke, chronic respiratory diseases and some important cancers. The relationship between the major modifiable risk factors and the main chronic diseases is similar in all regions of the world.

## Causes of chronic diseases



## OTHER RISK FACTORS

Many more risk factors for chronic diseases have been identified, but they account for a smaller proportion of chronic disease.

Harmful alcohol use is an important contributor to the global burden of disease. It has been estimated to result in 3% of global deaths and 4% of the global burden of disease, almost half of which being the result of unintentional and intentional injuries. The relationship of alcohol use to chronic disease is complex. The health consequences of excessive alcohol use include liver cirrhosis (damage to liver cells); pancreatitis (inflammation of the pancreas); and various cancers, including cancer of the liver, mouth, throat, larynx and esophagus. On the other hand, current evidence from epidemiological and experimental studies suggests that a very low consumption of alcohol has a protective effect against the development of cardiovascular diseases. This protective effect only becomes important as the risk of cardiovascular disease increases in middle-aged and older people. At younger ages the adverse effects of alcohol use, especially violence and injuries, outweigh the benefits.

Other risk factors for chronic disease include infectious agents that are responsible for cervical and liver cancers, and some environmental factors such as air pollution, which contribute to a range of chronic diseases including asthma and other chronic respiratory diseases. Psychosocial and genetic factors also play a role.

## CHILDHOOD RISK: A WORRYING TREND

There is now extensive evidence from many countries that conditions before birth and in early childhood influence health in adult life. For example, low birth weight is now known to be associated with increased rates of high blood pressure, heart disease, stroke and diabetes (2).

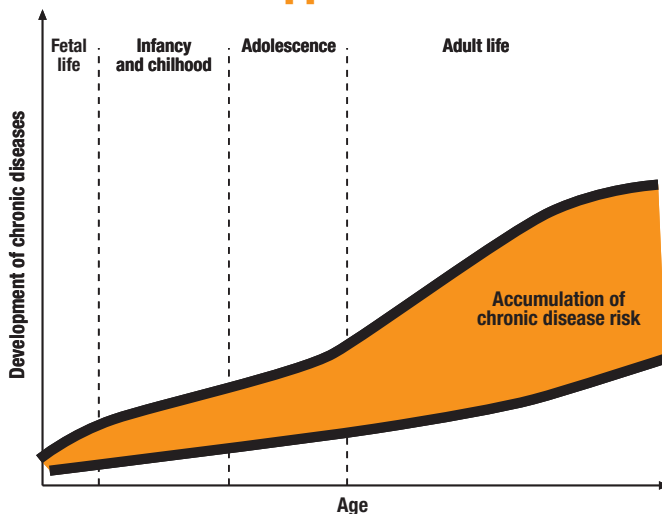
Children cannot choose the environment in which they live, including their diet, living situation, and exposure to tobacco smoke. They also have a very limited ability to understand the long-term consequences of their behaviour. Yet it is precisely during this crucial phase that many health behaviours are shaped. Young tobacco smokers, for example, may acquire the habit and become dependent well before reaching adulthood.

Rates of tobacco use among 13–15 year-olds are higher than previously expected. According to the Global Youth Tobacco Survey and Global School-based Student Health Survey, current tobacco use among males in this age group is 29% in India, 21% in Brazil, and 14% in China. Many children begin smoking before the age of 10 years.

Childhood obesity is associated with a higher chance of premature death and disability in adulthood. Worryingly, approximately 22 million children under the age of five years are obese. While affecting every country, overweight and obesity in children are particularly common in North America, the United Kingdom, and south-western Europe. In Malta and the United States, over a quarter of children aged 10–16 years are overweight. In the United Kingdom, the prevalence of overweight in children aged 2 to 10 years rose from 23% to 28% between 1995 and 2003.

Obesity is a known risk factor for type 2 diabetes. Until recently type 2 diabetes was mainly a disease of adults. The first cases of type 2 diabetes in young people were recognized in the United States in the 1970s. Fifteen years ago, they accounted for less than 3% of all cases of new-onset diabetes in children and adolescents, whereas today they account for up to 45% of new-onset cases. Subsequent studies conducted in Asia and Europe have revealed a similar pattern, and, more recently, reports on type 2 diabetes in children and adolescents have begun to mount worldwide (3).

### A life course approach to chronic diseases



### RISK ACCUMULATION

Ageing is an important marker of the accumulation of modifiable risks for chronic disease: the impact of risk factors increases over the life course. A key lesson from many wealthy countries is that it is possible to delay deaths from chronic diseases by several decades, thereby avoiding deaths among middle-aged people. Successful interventions in middle and older age will reap major short-term benefits. In the longer term, interventions early in life have the potential to reduce substantially the chronic disease pandemic.

## UNDERLYING DETERMINANTS

The underlying determinants of chronic diseases – the “causes of the causes” – are a reflection of the major forces driving social, economic and cultural change – globalization, urbanization, population ageing, and the general policy environment. The role of poverty is described in the next chapter.

Globalization refers to the increasing interconnectedness of countries and the openness of borders to ideas, people, commerce and financial capital. Globalization drives chronic disease population risks in complex ways, both directly and indirectly. The health-related advantages of globalization include the introduction of modern technologies, such as information and communication technologies for health-care systems.

The negative health-related effects of globalization include the trend known as the “nutrition transition”: populations in low and middle income countries are now consuming diets high in total energy, fats, salt and sugar. The increased consumption of these foods in these countries is driven partly by shifts in demand-side factors, such as increased income and reduced time to prepare food. Supply-side determinants include increased production, promotion and marketing of processed foods and those high in fat, salt and sugar, as well as tobacco and other products with adverse effects on population health status. A significant proportion of global marketing is now targeted at children and underlies unhealthy behaviour.

The widespread belief that chronic diseases are only “diseases of affluence” is incorrect. Chronic disease risks become widespread much earlier in a country’s economic development than is usually realized. For example, population levels of body mass index and total cholesterol increase rapidly as poor countries become richer and national income rises. They remain steady once a certain level of national income is reached, before eventually declining (see next chapter) (4).

In the second half of the 20th century, the proportion of people in Africa, Asia and Latin America living in urban areas rose from 16% to 50%. Urbanization creates conditions in which people are exposed to new products, technologies, and marketing of unhealthy goods, and in which they adopt less physically active types of employment. Unplanned urban sprawl can further reduce physical activity levels by discouraging walking or bicycling.

As well as globalization and urbanization, rapid population ageing is occurring worldwide. The total number of people aged 70 years or more worldwide is expected to increase from 269 million in 2000 to 1 billion

in 2050. High income countries will see their elderly population (defined as people 70 years of age and older) increase from 93 million to 217 million over this period, while in low and middle income countries the increase will be 174 million to 813 million – more than 466%.

The general policy environment is another crucial determinant of population health. Policies by central and local government on food, agriculture, trade, media advertising, transport, urban design and the built environment shape opportunities for people to make healthy choices. In an unsupportive policy environment it is difficult for people, especially those in deprived populations, to benefit from existing knowledge on the causes and prevention of the main chronic diseases.

## THE HEALTH IMPACT OF THE MAIN RISK FACTORS

The contribution of risk factors to death and disease is estimated by calculating the current “attributable” mortality and burden of disease (DALYs) caused by past exposure to the main risk factors over and above the minimum possible risk factor exposure.

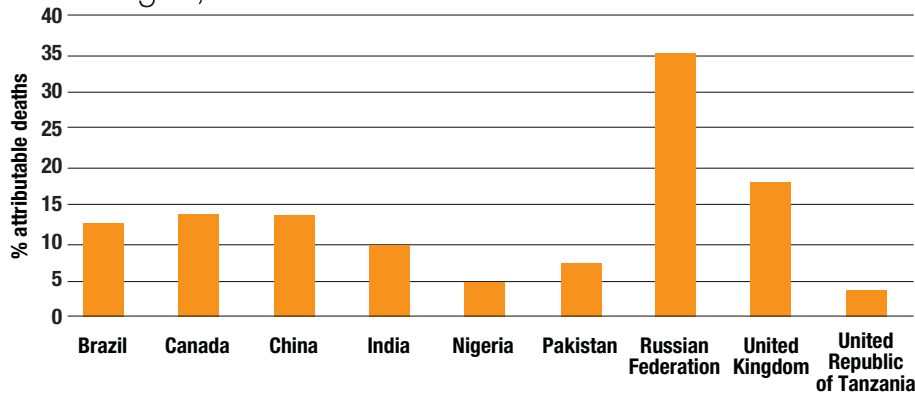
Chronic disease risk factors are a leading cause of the death and disease burden in all countries, regardless of their economic development status. The leading risk factor globally is raised blood pressure, followed by tobacco use, raised total cholesterol, and low fruit and vegetable consumption. The major risk factors together account for around 80% of deaths from heart disease and stroke (5).

Each year at least:

- » 4.9 million people die as a result of tobacco use;
- » 1.9 million people die as a result of physical inactivity;
- » 2.7 million people die as a result of low fruit and vegetable consumption;
- » 2.6 million people die as a result of being overweight or obese;
- » 7.1 million people die as a result of raised blood pressure;
- » 4.4 million people die as a result of raised total cholesterol levels (5).

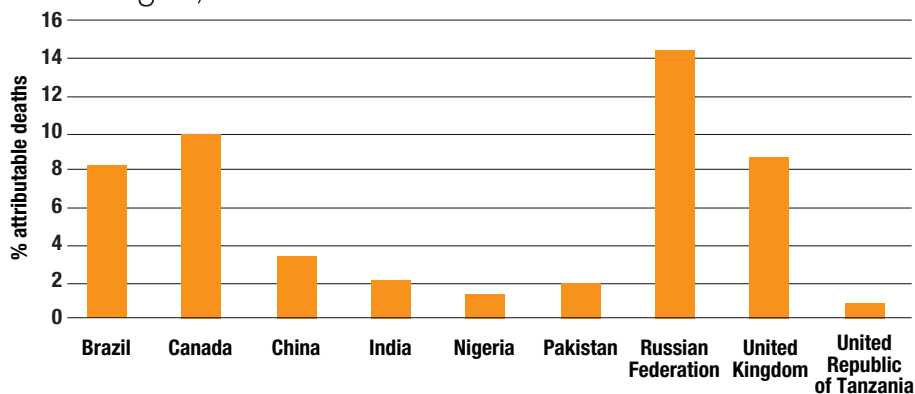
Further analyses using 2002 death estimates show that among the nine selected countries, the proportion of deaths from all causes of disease attributable to raised systolic blood pressure (greater than 115 mm Hg) is highest in the Russian Federation with similar patterns in men and women, representing more than 5 million years of life lost. A similar picture emerges when the contribution of the risk factors to the burden of disease (DALYs) is estimated.

## Percent attributable deaths from raised blood pressure by country, all ages, 2002



The proportion of deaths attributed to raised body mass index (greater than 21 kg/m<sup>2</sup>) for all causes is highest in the Russian Federation, accounting for over 14% of total deaths, followed by Canada, the United Kingdom, and Brazil, where it accounts for 8–10% of total deaths. The pattern is similar for men and women and for the attributable burden of disease (DALYs).

## Percent of attributable deaths from raised body mass index by country, all ages, 2002



The estimates of mortality and burden of disease attributed to the main modifiable risk factors, as illustrated above, show that in all nine countries raised blood pressure and raised body mass index are of great public health significance, most of all in the Russian Federation.

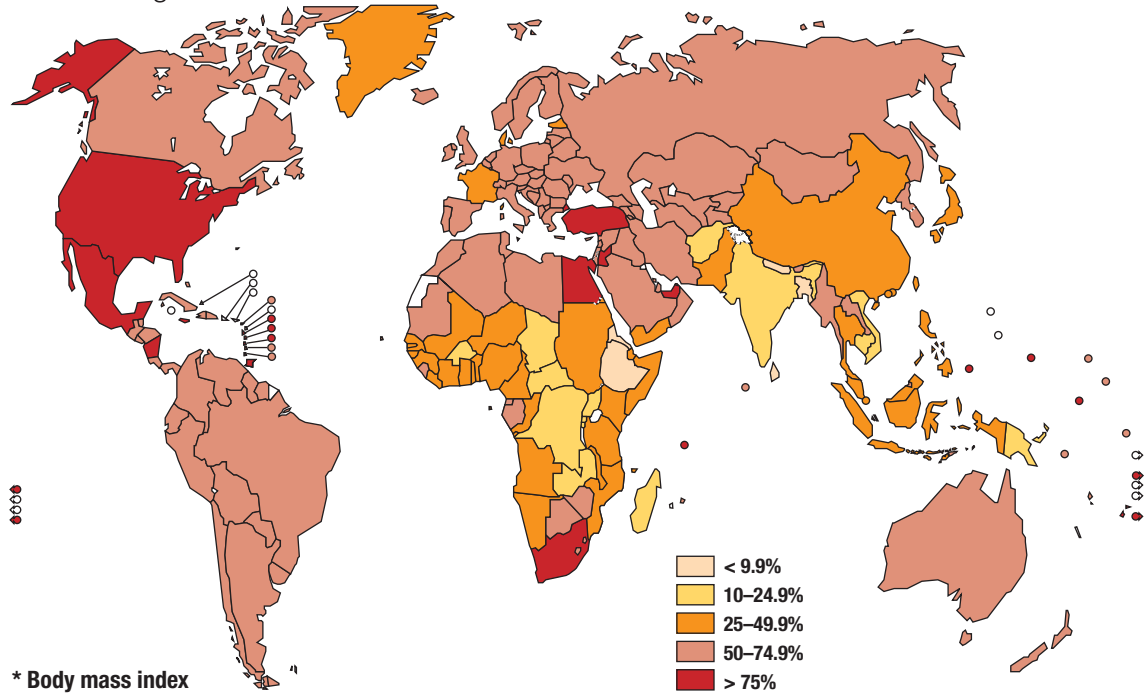
## **RISK FACTOR PROJECTIONS CASE STUDY: OVERWEIGHT AND OBESITY**

This section describes the patterns of overweight and obesity projected for 2005 to 2015 globally, regionally, and in the selected countries. The data come from the WHO Global InfoBase (6) which collects, stores, and disseminates data on the major chronic disease risk factors, and uses methods developed for the Comparative Risk Assessment Study (5, 7). Projections for other risk factors are available on the WHO Global InfoBase.

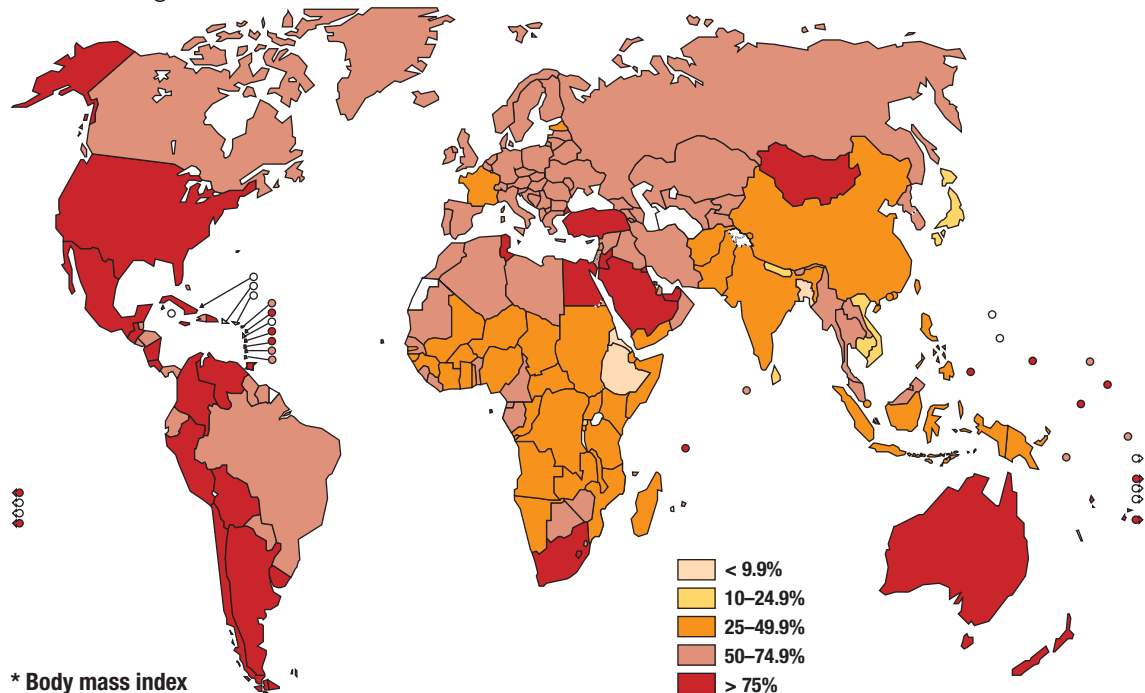
### **GLOBAL PROFILE**

Globally, in 2005, it is estimated that over 1 billion people are overweight, including 805 million women, and that over 300 million people are obese. Maps of the worldwide prevalence of overweight in adult women for 2005 and 2015 are shown opposite. If current trends continue, average levels of body mass index are projected to increase in almost all countries. By 2015, it is estimated that over 1.5 billion people will be overweight.

### Projected prevalence of overweight (BMI\* $\geq 25$ kg/m<sup>2</sup>), women aged 30 and above, 2005



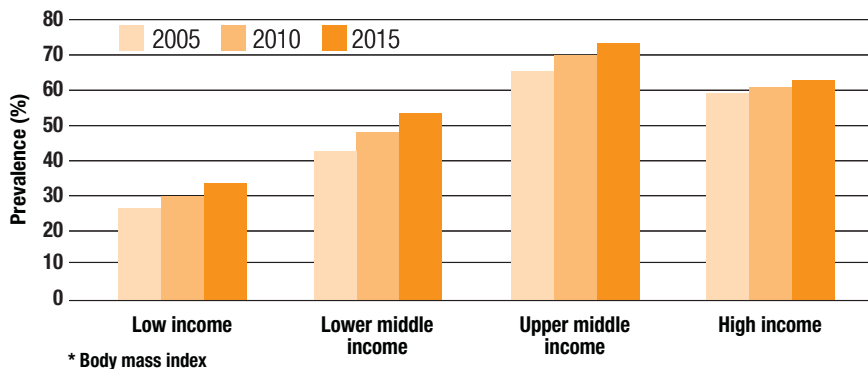
### Projected prevalence of overweight (BMI\* $\geq 25$ kg/m<sup>2</sup>), women aged 30 and above, 2015



## PROJECTIONS BY COUNTRY INCOME GROUP

### BODY MASS INDEX

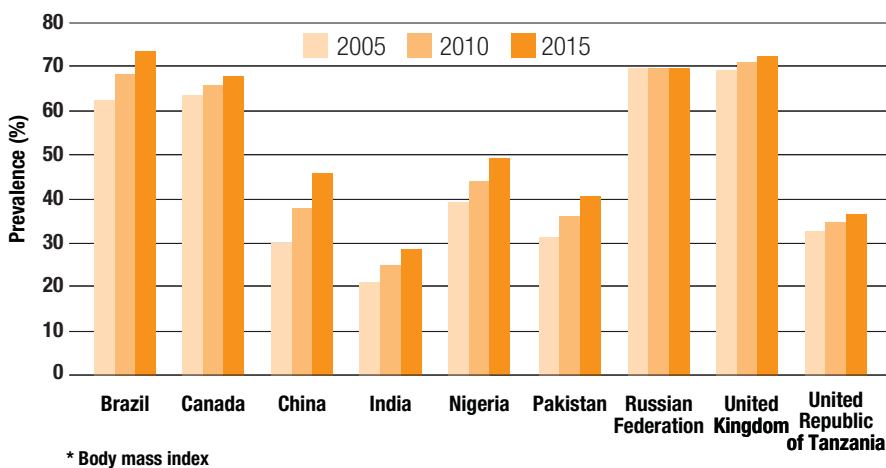
**Projected prevalence of overweight (BMI\*  $\geq 25$  kg/m<sup>2</sup>), women aged 30 years or more, by World Bank income group, 2005–2015**



In both men and women, there is expected to be a steady increase in average body mass index, and associated overweight and obesity levels will rise regardless of income grouping. The largest increase is projected to be in women from upper middle income countries. This group has already overtaken women in high income countries.

## COUNTRY PROFILES

**Projected prevalence of overweight (BMI\*  $\geq 25$  kg/m<sup>2</sup>), women aged 30 years or more, selected countries, 2005–2015**



Once associated only with high income countries, overweight and obesity are now also prevalent in low and middle income countries. A rapid increase in overweight is expected in all of the selected countries except the United Republic of Tanzania, although clear differences remain between countries and between men and women. The highest projected prevalence of overweight in women in the selected countries in 2015 will be in Brazil,

followed by the United Kingdom, the Russian Federation and Canada. The most rapid increase, albeit from a low level, is expected in Chinese women.

## PROJECTIONS OF FUTURE DEATHS

In this section, death projections for 2015 are presented for the world population, by country income group and for the nine selected countries. The projections are based on current country-level comparable estimates for 2002, and take into account expected changes in death rates associated with continued economic development, projected trends in HIV/AIDS and population ageing. For more information, see Annex 1.

In general, deaths from chronic diseases are projected to increase between 2005 and 2015, while at the same time deaths from communicable diseases, maternal and perinatal conditions, and nutritional deficiencies combined are projected to decrease. The projected increase in the burden of chronic diseases worldwide is largely driven by population ageing, supplemented by the large numbers of people who are now exposed to chronic disease risk factors.

There will be a total of 64 million deaths in 2015:

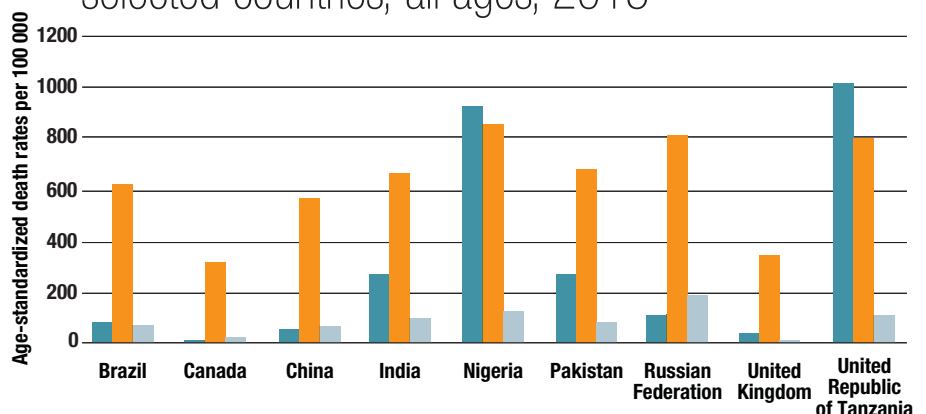
- » 17 million people will die from communicable diseases, maternal and perinatal conditions, and nutritional deficiencies combined;
- » 41 million people will die from chronic diseases;
- » Cardiovascular diseases will remain the single leading cause of death, with an estimated 20 million people dying, mainly from heart disease and stroke;
- » Deaths from chronic diseases will increase by 17% between 2005 and 2015, from 35 million to 41 million.

### SELECTED COUNTRIES

Overall, death rates in the nine selected countries are projected to decrease for communicable diseases, maternal and perinatal conditions and nutritional deficiencies. The exception is HIV/AIDS, for which substantial increases are projected to occur between 2005 and 2015 in all countries except Canada and the United Kingdom.

In all countries except Nigeria and the United Republic of Tanzania, chronic diseases will be the leading cause of death in 2015.

### Projected main causes of death, selected countries, all ages, 2015



- Communicable diseases, maternal and perinatal conditions, and nutritional deficiencies
- Chronic diseases
- Injuries

## **A VISION FOR THE FUTURE: REDUCING DEATHS AND IMPROVING LIVES**

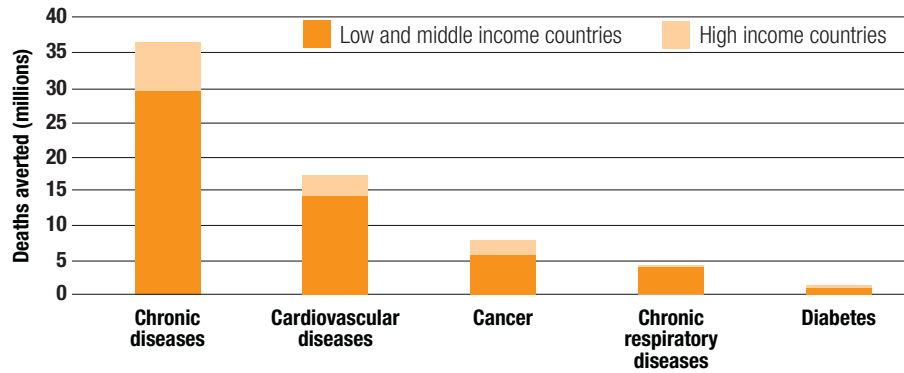
Recent progress in public health has helped people in many parts of the world to live longer and healthier lives. There is abundant evidence of how the use of existing knowledge has led to major improvements in the life expectancy and quality of life of middle-aged and older people. Yet as this chapter has shown, approximately four out of five chronic disease deaths now occur in low and middle income countries. People in these countries are also more prone to dying prematurely than those in high income countries.

The results presented in this chapter suggest that a global goal for preventing chronic disease is needed to generate the sustained actions required to reduce the disease burden. The target for this proposed goal is an additional 2% reduction in chronic disease death rates annually over the next 10 years to 2015. The indicators for the measurement of success towards this goal are the number of chronic disease deaths averted and the number of healthy life years gained.

This target was developed based on the achievements of several countries, such as Poland, which achieved a 6–10% annual reduction in cardiovascular deaths during the 1990s (8). Similar results have been realized over the past three decades in a number of countries in which comprehensive programmes have been introduced, such as Australia, Canada, New Zealand, the United Kingdom, and the United States (9–11).

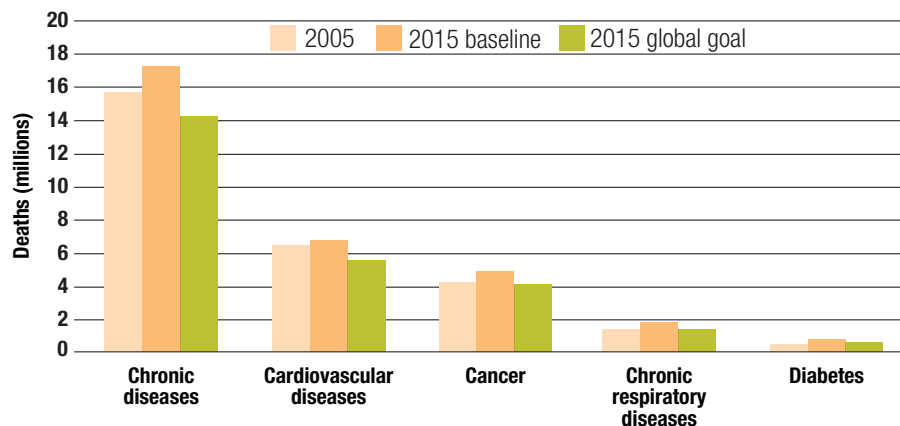
This global goal aims to reduce death rates in addition to the declines already projected for many chronic diseases – and would result in 36 million chronic disease deaths averted by 2015. This represents an increase of approximately 500 million life years gained for the world over the 10-year period. Cardiovascular diseases and cancers are the diseases for which most deaths would be averted. Most of the deaths averted from specific chronic diseases would be in low and middle income countries as demonstrated by the top figure, opposite (12).

## Projected cumulative deaths averted by achieving the global goal, by World Bank income group, 2006–2015



Every death averted is a bonus, but the goal contains an additional positive feature: almost half of these averted deaths would be in men and women under 70 years of age (see figure below). Extending their lives for the benefit of the individuals concerned, their families and communities is in itself the worthiest of goals. It also supports the overall goal of chronic disease prevention and control, which is to delay mortality from these diseases and to promote healthy ageing of people everywhere.

## Chronic disease deaths, projected from 2005 to 2015 and with global goal scenario, for people aged 70 years or less



This goal is ambitious and adventurous, but it is neither extravagant nor unrealistic. The means to achieve it, based on the evidence and best practices from countries that have already made such improvements, such as the United Kingdom and the other countries referred to above, are outlined in Parts Three and Four of this report.

# CONCLUSION

Confusion and long-held misunderstandings about the nature of chronic diseases, their prevalence, the populations at risk, and the risk factors themselves are barriers to progress and prevention. What might have been true – or thought to be true – 30, 20 or even 10 years ago is no longer the case.

The health of the world is generally improving, with fewer people dying from infectious diseases and therefore in many cases living long enough to develop chronic diseases. Increases in the causes of chronic diseases, including unhealthy diet, physical inactivity and tobacco use are leading to people developing chronic diseases at younger ages in the increasingly urban environments of low and middle income countries. Disturbing evidence of this impact in many of these countries is steadily growing. They are ill equipped to handle the demands for care and treatment that chronic diseases place on their health systems and so people die at younger ages than in high income countries.

Individuals and their families in all countries struggle to cope with the impact of chronic diseases, and it is the poorest who are the most vulnerable. The links between chronic diseases and poverty are examined in the next chapter.

# 2 Chronic diseases and poverty

- » **The chronic disease burden is concentrated among the poor**
- » **Poor people are more vulnerable for several reasons, including increased exposure to risks and decreased access to health services**
- » **Chronic diseases can cause poverty in individuals and families, and draw them into a downward spiral of worsening disease and poverty**
- » **Investment in chronic disease prevention programmes is essential for many low and middle income countries struggling to reduce poverty**

Chronic diseases and poverty are interconnected in a vicious cycle. This chapter explains how, in almost all countries, it is the poorest people who are most at risk of developing chronic diseases and dying prematurely from them. Poor people are more vulnerable for several reasons, including greater exposure to risks and decreased access to health services.

Poverty and worsening of already existing poverty are also caused by chronic diseases. Once again, it is people and families who are already poor who are most likely to suffer, because chronic diseases are likely to ruin a family's economic prospects. Poverty can be divided into *extreme* (when households cannot meet basic needs for survival), *moderate* (in which basic needs are barely met), and *relative* poverty (in which household income is less than a proportion of average national income). All of these poverty types adversely affect health. Poverty is found in every country, but unlike moderate and relative poverty, extreme poverty occurs mainly in low income countries (13).

Wealth enables people to avoid most of the risks of developing chronic disease, and to obtain access to health care. However, even within high income countries, psychosocial factors, for example lack of social support and perceived lack of control, are strongly related to the risk of chronic diseases (14). At the same time, in some countries, evidence clearly links growing national income with increases in obesity and high cholesterol levels across the population. Alarming, the evidence also reveals that this trend occurs at an earlier stage of socioeconomic development than has been previously assumed. As countries develop economically, some risk factors appear to affect wealthier populations first, although they quickly concentrate among the poor.

## FROM POVERTY TO CHRONIC DISEASES

Poverty and social exclusion increase the risks of developing a chronic disease, developing complications and dying. The resulting health inequalities have been widening over the past two decades. In some countries at an early stage of economic development, wealthy members of society report more chronic disease than poorer members – it is unclear, however, whether this is because they develop more chronic diseases, or because they survive with them longer owing to their ability to access health services. In all countries, poor people are more likely to die after developing a chronic disease. In most countries, health inequalities have been widening over recent decades (15, 16).

### WHY THE POOR ARE MORE VULNERABLE

The poor are more vulnerable to chronic diseases because of material deprivation and psychosocial stress, higher levels of risk behaviour, unhealthy living conditions and limited access to good-quality health care (see sidebar figure on the next page). Once disease is established, poor people are more likely to suffer adverse consequences than

wealthier people. This is especially true of women, as they are often more vulnerable to the effects of social inequality and poverty, and less able to access resources.

## WIDENING GAPS IN HIGH INCOME COUNTRIES

The gap between rich and poor has been widening in many wealthy countries in recent years. In Denmark, England and Wales, Finland, Italy, Norway, and Sweden inequalities in mortality increased between the 1980s and the 1990s. These widening inequalities have been attributed to two important changes.

The first is that cardiovascular disease death rates declined among wealthy members of these societies, explaining about half of the widening gap. This might have been a result of faster changes in health behaviour in these groups and/or better access to health-care interventions.

Second, widening inequalities in other causes of death (lung cancer, breast cancer, respiratory disease, gastrointestinal disease and injuries) resulted from increasing rates of mortality among poorer groups. Rising rates of lung cancer and deaths from chronic respiratory disease indicate the delayed effects of rising tobacco use among poorer members of society (16).

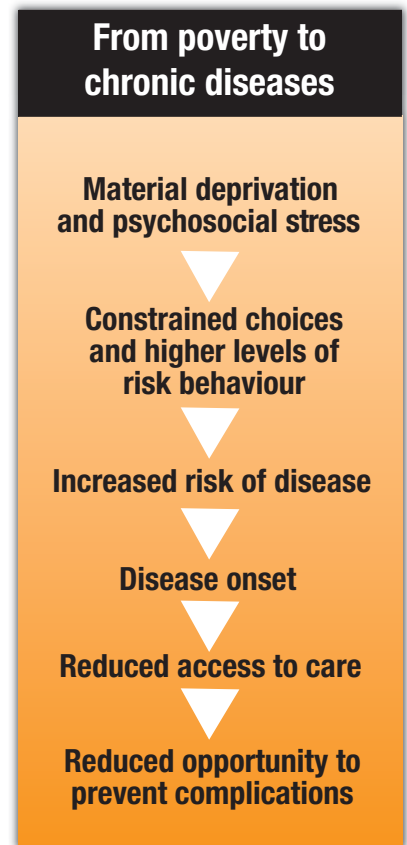
## HIGHER LEVELS OF RISK BEHAVIOUR

The immediate cause of inequalities in chronic diseases is the existence of higher levels of risk factors among the poor. The poor and people with less education are more likely to use tobacco products, consume energy-dense and high-fat food, be physically inactive, and be overweight or obese (17).

This social and economic difference in risk factor prevalence is particularly striking in high income countries, but is also rapidly becoming a prominent feature of low and middle income countries (18, 19).

Poor people and those with less education are more likely to maintain risk behaviour for several reasons. These include inequality of opportunities, such as general education; psychosocial stress; limited choice of consumption patterns; inadequate access to health care and health education; and vulnerability to the adverse effects of globalization.

Aggressive marketing of harmful products, such as tobacco, sustain the demand for these products among those who have fewer opportunities to substitute unhealthy habits with healthier and often more expensive options.



## SPOTLIGHT RISK FACTORS IN THE UNITED REPUBLIC OF TANZANIA

The United Republic of Tanzania demonstrates a mixed picture with regard to risk factors. Higher social and economic status is associated with higher body mass index, but lower systolic blood pressure and lower prevalence of tobacco use. This finding supports the idea that as countries develop economically, different risk factors affect different social and economic classes at different rates (19).

In middle and high income countries, the poor tend to be more obese than the wealthy, which has been viewed as something of a paradox. It is likely that several factors contribute to this relationship, but one explanation is that “energy-dense” foods, such as fried or processed foods, tend to cost less on a per-calorie basis when compared with fresh fruit and vegetables (20).

## COMMUNITY DEPRIVATION

Economic deprivation often leads to reduced access to the requirements of a healthy life, including affordable, nutritious foods, adequate housing and health care, and a good social support network such as family, friends and community groups. Many people live in areas that cause them to be concerned for their safety, thereby reducing opportunities for outdoor physical activities. People living in disadvantaged communities marked by sprawling development are likely to walk less and weigh more than others. People from deprived communities suffer more from cardiovascular diseases than residents of more affluent communities, even taking into account other known risk factors (21, 22).

## POOR ACCESS TO QUALITY HEALTH CARE AND MEDICATIONS

Inadequate access to good-quality health services, including diagnostic and clinical prevention services, is a significant cause of the social and economic inequalities in the burden of chronic diseases. The poor face several health-care barriers including financial constraints, lack of proximity and/or availability of transport to health-care centres, and poor responsiveness from the health-care system (23, 24).

Financial considerations can act as barriers to health-care access. Some people are unable to afford out-of-pocket charges for health care and might forfeit their wages by missing work. Transport costs can also prevent people from seeking care, especially those who must travel long distances to health centres. The poor usually have much more limited access to prescription drugs (25).

Even when health services are subsidized by the government or provided free in low and middle income countries, it is the wealthier who gain more from such services. Findings from South Africa, for example, showed that among people with high blood pressure, the wealthiest 30% of the population was more than twice as likely to have received treatment as the poorest 40% (26).

In rural areas, health workers and health centres are more dispersed, and health services might be of lower quality than in urban health centres.

The poor and marginalized are often confronted with insufficient responsiveness from the health-care system. Communication barriers may significantly decrease effective access to health services and inhibit the degree to which a patient can benefit from such services. Migrants, for example, often face language and other cultural barriers.

### GENDER INEQUALITY

Social inequality, poverty and inequitable access to resources, including health care, result in a high burden of chronic diseases among women worldwide, particularly very poor women.

In general, women tend to live longer with chronic disease than men, though they are often in poor health. The costs associated with health care, including user fees, are a barrier to women's use of services. Women's income is lower than that of men, and they have less control over household resources. They may not be able to pay for treatment unless there is agreement from senior members (whether male or female) of the household. Women's workload in the home and their caregiving roles when other family members are ill are also significant factors in delaying decisions to seek treatment. In areas where women have limited mobility, they may be unable to travel to health centres (27).

### SPOTLIGHT AFFORDABILITY OF MEDICINES IN THE RUSSIAN FEDERATION

In 1994, the main obstacle to obtaining medicines in the Russian Federation was unavailability, for both rural and urban populations. Almost 75% of people who could not obtain medicines reported unavailability as the main reason, and only 20–25% could not afford them. However, since then the situation has changed dramatically: availability of medicines has significantly improved but they have become far less affordable. By 2000, 65–70% of people who could not obtain medicines reported unaffordability as the main reason, while unavailability accounted for only 20% of the access gap (29).

### SPOTLIGHT BLINDNESS IN WOMEN

In low and middle income countries, the leading causes of blindness – cataract and trachomatous trichiasis – occur more frequently in women. Population-based surveys of blindness in Africa, Asia and many high income countries suggest that women account for 65% of all blind people worldwide. At the same time, women do not have equal access to surgery for eye diseases. Cataract blindness could be reduced by about 13% if women received cataract surgery at the same rate as men. Women are more likely to wait until they are blind to undergo surgery. The decision to delay treatment is often influenced by the cost of the surgery, inability to travel to a surgical facility, differences in the perceived value of surgery (cataract is often viewed as an inevitable consequence of ageing and women are less likely to experience support within the family to seek care), and lack of access to health information (28).

## FROM CHRONIC DISEASES TO POVERTY

The previous section illustrated that the poor are more likely both to develop chronic diseases and to suffer more from the negative consequences of chronic disease. This section describes how chronic diseases cause poverty and draw individuals and their families into a downward spiral of worsening disease and impoverishment.

### THE CYCLE OF POVERTY

An important cause of poverty in low and middle income countries is the death or severe illness of a family's primary income earner. Out of 125 case studies summarized in the World Bank's publication *Voices of the poor crying out for change*, illness, injury or death was the most common trigger of households' impoverishment (32). In Bangladesh, for example, of those households that moved into the status "always poor", all reported death or severe disabling diseases as one of the main causes.

Chronic diseases inflict an enormous direct and indirect economic burden on the poor, and push many people and their families into poverty. Existing knowledge underestimates the implications of chronic diseases for poverty and the potential that chronic disease prevention and health promotion have for alleviating poverty in low and middle income countries (33).

### DIRECT ECONOMIC IMPACT

#### CATASTROPHIC EXPENDITURE

Direct costs related to chronic disease include out-of-pocket payments for health services and medications. Ongoing health care-related expenses for chronic diseases are a major problem for many poor people. Acute chronic disease-related events – such as a heart attack or stroke – can be disastrously expensive, and are so for millions of people.

People who fall ill often face a dire choice: either to suffer and perhaps die without treatment, or to seek treatment and push their family into poverty. Those who suffer from long-standing chronic diseases are in the worst situation, because the costs of medical care are incurred over a long period of time (34).

#### SPOTLIGHT BARRIERS TO TREATMENT IN JAMAICA

In Jamaica 59% of people with chronic diseases experienced financial difficulties because of their illness, and a high proportion of people admitting such difficulties avoided some medical treatment as a result (30).

#### SPOTLIGHT MEDICAL EXPENSES IN INDIA

People in India with diabetes spend a significant portion of their annual income on medical care. The poorest people – those who can least afford the cost – spend the greatest proportion of their income on medical care. On average, they spend 25% of their annual income on private care, compared with 4% in high income groups (31).

## TOBACCO USE

For various reasons, tobacco use tends to be higher among the poor than wealthier members of society, and they therefore spend relatively more on tobacco products. Spending money on tobacco deprives people of education opportunities that could help lift them out of poverty and also leads to greater health-care costs.

## INDIRECT ECONOMIC IMPACT

Chronic diseases have an indirect impact on people's economic status and employment opportunities in the long term. Indirect costs include:

- » reduction in income owing to lost productivity from illness or death;
- » the cost of adult household members caring for those who are ill;
- » reduction in future earnings by the selling of assets to cope with direct costs and unpredictable expenditures;
- » lost opportunities for young members of the household who leave school in order to care for adults who are ill or to help the household economy (35).

## REDUCTION IN INCOME

In most high income countries, people with chronic diseases and disabilities are protected by social security systems, yet they still experience adverse economic consequences. However, in low and middle income countries disability insurance systems are either underdeveloped or nonexistent.

The illness of a main income earner in low and middle income countries significantly reduces overall household income. People who have chronic diseases are not fully able to compensate for income lost during periods of illness when they are in relatively good health (36).

## SALE OF HOUSEHOLD POSSESSIONS

Chronic diseases affect household investment and consumption patterns. Households often sell their possessions to cover lost income and health-care costs. In the short term, this might help poor households to cope with urgent medical costs, but in the long term it has a negative effect: the selling of productive assets – property that produces income – increases the vulnerability of households and drives them into poverty. Such changes in the investment pattern of households are more likely to occur when chronic diseases require long-term, costly treatment (36).

## SPOTLIGHT ECONOMIC IMPACT OF TOBACCO USE

It is estimated that over 10.5 million people in Bangladesh who are malnourished could have an adequate diet if money spent on tobacco were spent on food instead, saving the lives of 350 children under the age of five years each day. The poorest households in Bangladesh spend almost 10 times as much on tobacco as on education (37).

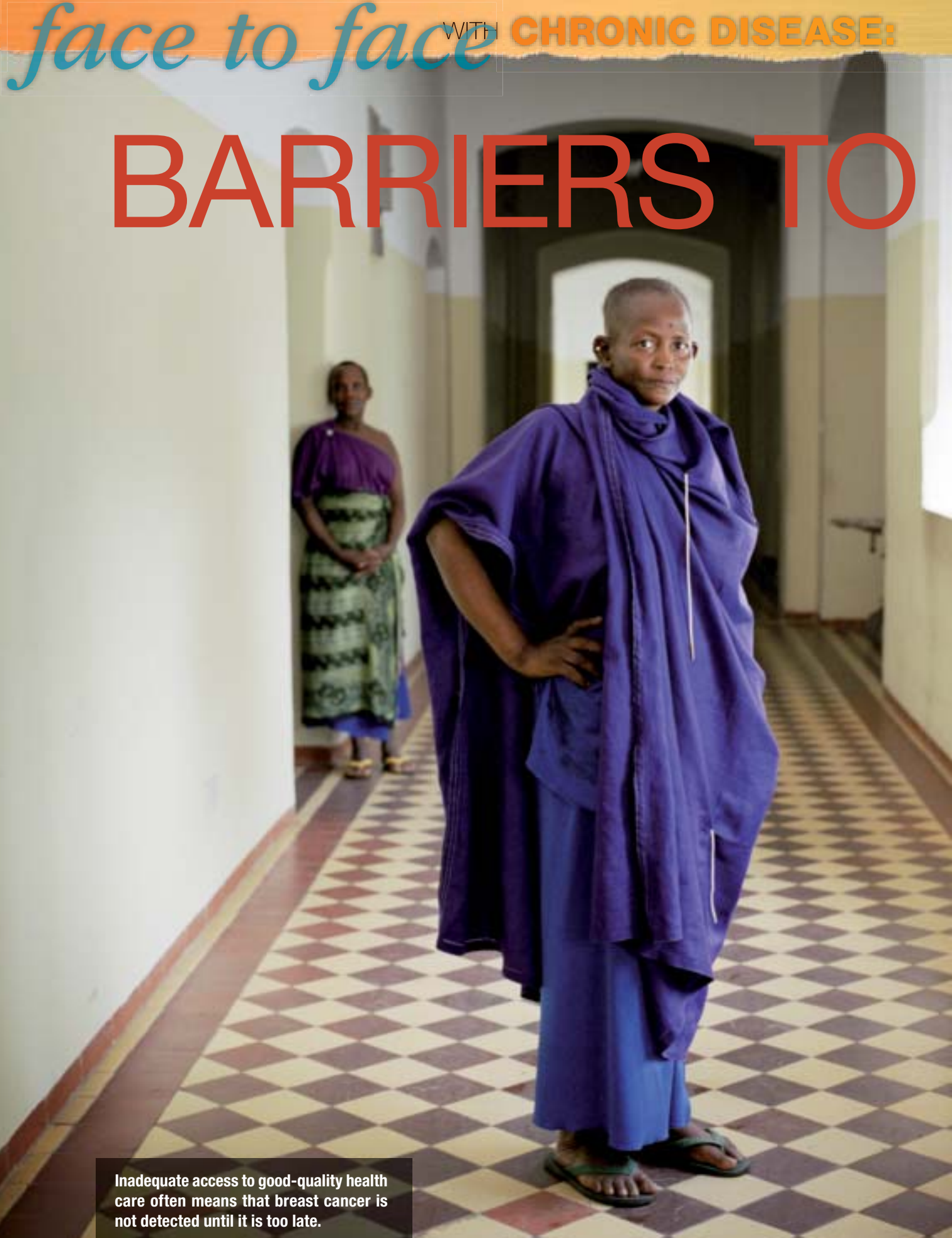
In countries such as Bulgaria, Egypt, Indonesia, Myanmar and Nepal, household expenditure surveys show that low income households spend 5–15% of their disposable income on tobacco (37).

In India, people are more likely to borrow money and sell their assets during hospitalization if they are tobacco users. The same is true if they are non-users but belong to households that use tobacco (38).

In the United Kingdom, the average cost of monthly health insurance premiums for a 35-year-old female smoker is 65% higher than the cost for a non-smoker. Male smokers pay 70% higher health insurance premiums than non-smokers (37).

*face to face* WITH CHRONIC DISEASE:

# BARRIERS TO



Inadequate access to good-quality health care often means that breast cancer is not detected until it is too late.

MARIA SALONIKI

# HEALTH CARE



**MARIA SALONIKI CAN HARDLY REMEMBER how many times she went to the local traditional healer, how many doctors in clinics and dispensaries she consulted between two hospitalizations, how many words she used to describe her pain. But one thing she clearly remembers is that each time she returned home without receiving adequate treatment and care.**

Today, this livestock keeper and mother of 10 children is fighting for her life at the Ocean Road Cancer Institute in Dar es Salaam. It took Maria more than three years to discover the words to describe her pain – breast cancer – and to receive the treatment she desperately needs. “It all started with a swollen armpit and a bad fever,” she recalls.

In fact, between these first symptoms and chemotherapy treatment, Maria was prescribed herb ointments on several occasions, has been on antibiotics twice and heard from more than one health professional that they couldn’t do anything for her. The 60-year-old even travelled to Nairobi, Kenya to seek treatment, but it wasn’t until later, in Dar es Salaam, that a biopsy revealed her disease.

Maria’s story is sadly common in the understaffed and poorly equipped hospital ward she shares with 30 other cancer patients. Her husband, who now works day and night to pay for her medicine and feed their children, can’t afford both the treatment costs and the bus fare to come and visit her. The family has one year to pay back a substantial loan to its tribe.

<b>Name</b>	Maria Saloniki
<b>Age</b>	60
<b>Country</b>	United Republic of Tanzania
<b>Diagnosis</b>	Breast cancer

## SPOTLIGHT ECONOMIC IMPACT IN THE RUSSIAN FEDERATION

Chronic diseases pose a significant threat to earnings and wage rates. People with chronic diseases in the Russian Federation, for example, retire earlier than those without, this effect being strongest for people in the lowest income groups. Chronic disease also affects the economic well-being of families, contributing to annual losses as high as 6% per capita average income. Investing in adult health could bring tangible economic returns, both for individuals and for the economic development of the country as a whole (39).

## INTERGENERATIONAL IMPACT

The death or illness of adults from chronic disease can lead to the impoverishment of their children. To compensate for the lost productivity of a sick or disabled adult, children are often removed from school; this deprives them of the opportunity to study and gain qualifications.

The fact that an adult family member has a chronic disease can also have direct health implications for children. According to a study in Bangladesh, for example, the relative risk of a severely malnourished child coming from a household with an incapacitated income earner is 2.5 times greater than that of households which are not in such a situation (40).

## CHRONIC DISEASES AND THE MILLENNIUM DEVELOPMENT GOALS

In September 2000, the largest-ever gathering of Heads of State ushered in the new millennium by adopting the UN Millennium Declaration. The Declaration, endorsed by 189 countries, was then translated into a roadmap setting out goals to be reached by 2015. Health is central to the achievement of the Millennium Development Goals (MDGs), and three goals relate specifically to health issues: those concerned with reducing child mortality, improving maternal health, and combating HIV/AIDS, malaria and other diseases.

The MDGs have successfully focused attention on the plight of the world's poorest children and mothers, and on some infectious disease epidemics. However, chronic diseases – the major cause of death in almost all countries – have not been included within the global targets; although as a recent WHO publication on health and the MDGs has recognized, there is scope for doing so within Goal 6 (Combat HIV/AIDS, malaria and other diseases) (41). Health more broadly, including chronic disease prevention, contributes to poverty reduction and hence Goal 1 (Eradicate extreme poverty and hunger).

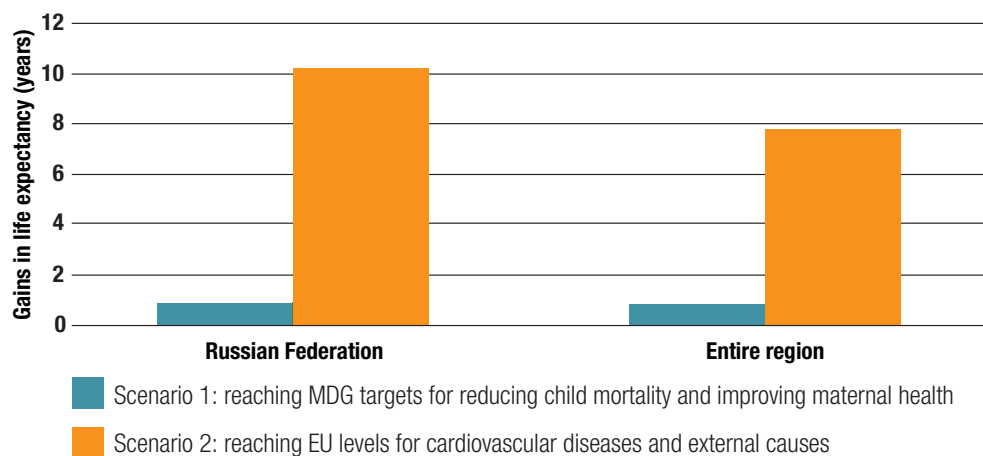
A recent World Bank study has found that the generic MDG targets are only of limited relevance for countries in eastern Europe and the former Soviet Union. The implications are relevant to many other countries that face a notable chronic disease burden.

In the countries studied, reduction of adult mortality to the level found in the European Union would have the greatest impact on life expectancy

at birth, with an average gain of eight years. The Russian Federation would gain more than 10 years. In contrast, health gains from reducing child and maternal mortality would be much more modest: reaching the levels prescribed by the MDGs would raise life expectancy at birth in the region by only 0.7–1.2 years, while reaching European Union levels would result in 0.9–2.0 years of gain.

According to the World Bank report, the greatest potential contributor to health gains in this region would be the reduction of deaths from cardiovascular diseases. The figure below shows the estimated impact of two scenarios: (1) reduction of infant, child and maternal mortality rates to the MDG levels; (2) reduction of mortality from cardiovascular diseases and external causes of death (injuries, violence and poisoning) to European Union levels, while keeping infant, child, and maternal mortality rates constant (42).

## The impact of two scenarios on life expectancy in eastern Europe and the former Soviet Union



Chronic disease prevention and control can no longer be ignored as an important means of poverty reduction, and more generally, economic development. Investment in chronic disease prevention programmes is essential for many low and middle income countries struggling to reduce poverty. Several countries have adapted the MDG targets and indicators to include chronic diseases. These adaptations are needed to achieve Goal 6, on combating HIV/AIDS, malaria and other diseases, and a selection are featured in the table on the next page.

### **Adaptations to Millennium Development Goal 6: Combat HIV/AIDS, malaria and other diseases**

#### **Czech Republic**

New target added: reduce morbidity and mortality caused by main chronic diseases

#### **Mauritius**

New target added: have halted by 2015, and begun to reverse, the incidence of noncommunicable diseases such as diabetes, hypertension, high cholesterol, cancer, etc.

#### **Poland**

New target added: reduce premature adult mortality by 25% by 2010 (primarily due to tobacco and alcohol use, and unhealthy diet)

#### **Slovakia**

New target added: decrease the spread of cancers to the level of EU countries and decrease the prevalence of respiratory diseases

#### **Thailand**

New indicators added: heart disease prevalence and death rates

### **Importance of chronic disease noted in country MDG reports**

#### **Hungary**

Tobacco use, cardiovascular disease and cancer are noted as primary contributors to premature mortality

#### **Indonesia**

Tobacco use is reported as a major contributor to ill health, accounting for a large proportion of the total disease burden

#### **Jordan**

Cardiovascular disease and cancer are noted as additional health problems

#### **Lithuania**

Cardiovascular disease and cancer are noted as the leading causes of death

# CONCLUSION

This chapter has illustrated some of the relationships between chronic diseases and poverty. As a country develops economically, chronic disease risks may first increase among the wealthy but soon concentrate among the poor. In almost all countries poverty increases the risk of developing a chronic disease, and everywhere increases the chances of developing complications and dying prematurely. Chronic diseases can cause individuals and families to fall into poverty and create a downward spiral of worsening poverty and disease. But the impact is not only on individuals and their families. As the next chapter shows, chronic diseases also hinder the macroeconomic development of many countries.

## 3

## The economic impact of chronic diseases

This chapter presents estimates of the economic impact of selected chronic diseases – heart disease, stroke and diabetes – using three approaches. First, cost of illness studies are summarized. Second, the impact of premature mortality from these diseases on the national income of selected countries is estimated. Third, the “full costs” or welfare losses of chronic disease are assessed. Finally, the potential gains to the economies of these countries – were the global goal to be achieved – are estimated.

- » **Chronic diseases are a major cost and a profound economic burden to individuals, their families, health systems and societies**
- » **These costs will increase without the implementation of effective interventions**
- » **Investment in interventions to control the burden of chronic diseases will bring appreciable economic benefits**

## MEASURING THE COSTS OF CHRONIC DISEASES

Chronic diseases have an impact on national economies in a number of direct and indirect ways. They reduce the quantity and productivity of labour. In agricultural communities, the pattern of planting crops may change and the timing of critical activities, such as planting or harvesting, can be delayed. Medical expenses deplete savings and investment, including investment in the education of children. All these factors reduce the earning potential of individuals and households, and affect the national economy. An important component of the socio-economic impact of chronic diseases is, therefore, the effect on income or earnings at the household level, and national income or gross domestic product at the national level.

The cost of chronic disease can be estimated in three ways: the accounting cost of illness method; economic growth models, which estimate the impact of chronic diseases on national income through variables such as labour supply and savings; and the full-income method, which attempts to measure the welfare losses associated with ill-health in money terms. The majority of published studies on the costs of chronic diseases have employed the accounting cost method. Very few have used economic growth and full-income models. Estimates from all methods vary in degree of completeness and are subject to a wide range of interpretations. Estimates from the economic growth approach give the lowest estimates, the full-income approach gives the highest estimates, while cost of illness estimates fall between the two. A summary of the methods used in this chapter is given in Annex 4 (a more detailed description is available at [http://www.who.int/chp/chronic\\_disease\\_report/en/](http://www.who.int/chp/chronic_disease_report/en/), including a full list of references).

## COST OF ILLNESS STUDIES

The direct costs of health-care resources and non-medical goods and services consumed in the treatment of chronic diseases are enormous. Estimates vary by country, by year and for the same year in any country, reflecting differences in the level of health-care access and delivery, the financing systems of the countries, and methodological variations (43–49).

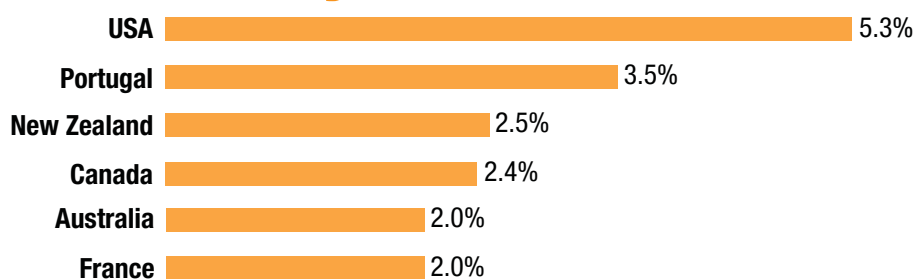
In the United States, the estimated total health-care costs resulting from heart disease increased from US\$ 298.2 billion in 2000, to US\$ 329.2 billion in 2001 and US\$ 351.8 billion in 2002 (46). The estimated 2 million stroke cases in the United States in 1996 cost the health-care

system US\$ 8.3 billion, and caused 5.2 million work days to be lost. In the United Kingdom, heart disease cost the health-care system £1.7 billion (approximately US\$ 3 billion) in 1999: £2.4 billion (approximately US\$ 4.3 billion) in informal care and £2.9 billion (approximately US\$ 5.2 billion) in loss of productivity (49). Stroke cost the National Health Service £15 303 (approximately US\$ 27 306) over five years for every person who experienced a stroke, rising to £29 405 (approximately US\$ 52 470) (2001/2002 prices) if informal care is included. Heart disease alone cost 6% of National Health Service revenue at 1994–95 prices (48). In Australia, stroke is estimated to be responsible for about 2% of the country's total attributable direct health-care costs (50–52).

### RISK FACTORS IMPOSE AN ECONOMIC BURDEN ON SOCIETY

Overlapping somewhat with these estimates, obesity has been reported to account for approximately 5% of national health expenditure in the United States, and from 2% to 3.5% in other countries (see figure below). Some studies have highlighted effects of the burden of obesity from other perspectives, for example on health insurance plans, as well as the impact of obesity on future disease risks and associated medical care costs.

## Proportion of national health expenditure attributable to obesity in selected countries



Source: Adapted from Thomson D, Wolf AM, 2001 (53).

The direct health expenditures attributable to physical inactivity have been estimated at approximately 2.5% of health expenditure in Canada and the United States (54). In 1999, the World Bank estimated that tobacco-related health care accounts for between 6% and 15% of all annual health-care costs (55, 56) and between 0.1% and 1.1% of GDP (57) in high income countries.

A large proportion of these costs is avoidable and shows the extent of the savings that could be made. Evidence suggests that a modest reduction in the prevalence of certain chronic disease risk factors could result in substantial health gains and cost savings. For instance, a Norwegian study estimated that savings of US\$ 188 million from averted heart disease and stroke over 25 years would result from lowering the population blood pressure level by 2 mmHg, by means of a reduction in salt intake (58). A Canadian study estimated that a 10% reduction in the prevalence of physical inactivity could reduce direct health-care expenditures by C\$ 150 million (approximately US\$ 124 million) in a year. It is clear that chronic diseases and their risk factors impose significant costs on the health systems of countries where people have good access to care.

## MACROECONOMIC CONSEQUENCES OF CHRONIC DISEASES

In addition to measuring direct costs, cost of illness studies traditionally also measure indirect costs or the lost production associated with the disease. This is usually rather simplistically assumed to be the total time lost through premature death and illness (mostly self-reported lost days, which overestimate true lost days) multiplied by a wage rate, and sometimes accounting for unemployment. The sums of direct and indirect costs are then assumed to be the loss of GDP. This is incorrect for a variety of reasons. A more appropriate way of considering the GDP cost of chronic diseases is used in this report.

The Solow economic growth model was applied under conservative assumptions of projected chronic disease mortality and a combination of other economic parameters (details are provided in Annex 4). The model was calibrated for each country for 2002, and then GDP was projected to 2015. Estimates of variations in output with respect to labour were taken from previous growth models, some of which did not have access to the exact size of the labour force, so the total population aged 15–64 years was used. To be consistent, the size of the working-age population has also been used in the estimates.

In addition, the impact of direct medical expenditures on growth was captured through the assumption that a certain proportion would be met from savings, which in turn reduces growth. Projections were made of national income with or without mortality and medical expenditures associated with disease, with the difference representing the value of foregone national income. The assumptions used in this chapter are deliberately conservative.

The base estimates presented here show that countries will potentially lose substantial amounts of national income as a result of the impact of deaths from chronic diseases on labour supplies and savings. In 2005, the estimated losses in national income from heart disease, stroke and diabetes (reported in international dollars to account for differences in purchasing power between countries)<sup>1</sup> are 18 billion dollars in China, 11 billion dollars in the Russian Federation, 9 billion dollars in India and 3 billion dollars in Brazil. Similarly, the losses for the United Kingdom, Pakistan, Canada, Nigeria and the United Republic of Tanzania are 1.6 billion, 1.2 billion, 0.5 billion, 0.4 billion, and 0.1 billion international dollars, respectively.

These losses accumulate over time because each year more people die. Estimates for 2015 for the same countries are between approximately three and six times those of 2005. The cumulative and average losses are higher in the larger countries like China, India and the Russian Federation, and are as high as 558 billion international dollars in China.

### Projected foregone national income due to heart disease, stroke and diabetes, selected countries, 2005–2015 (billions of constant 1998 international dollars)

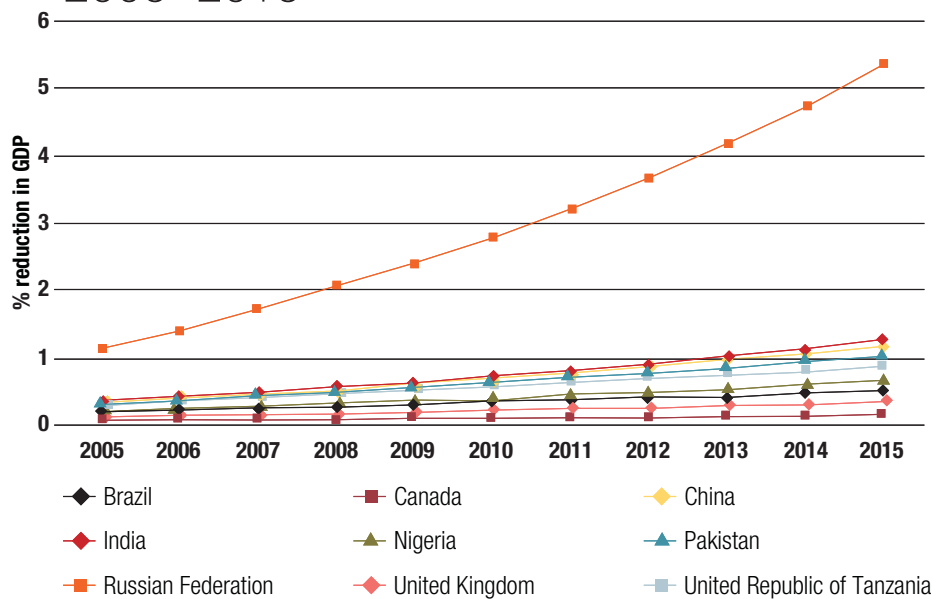
	Brazil	Canada	China	India	Nigeria	Pakistan	Russian Federation	United Kingdom	United Republic of Tanzania
Estimated income loss in 2005	2.7	0.5	18.3	8.7	0.4	1.2	11.1	1.6	0.1
Estimated income loss in 2015	9.3	1.5	131.8	54.0	1.5	6.7	66.4	6.4	0.5
Accumulated loss in 2005 value	49.2	8.5	557.7	236.6	7.6	30.7	303.2	32.8	2.5

These losses can be translated into percentage reductions in GDP by comparing what would have happened to GDP in the absence of chronic diseases with what happens in their presence (see figure opposite). In 2005, chronic diseases are estimated to reduce GDP by less than 0.5% in most of the countries, and by 1% in the Russian Federation. By 2015, the percentage reduction in GDP would be over 5% in the Russian

<sup>1</sup> An international dollar is a hypothetical currency that is used as a means of translating and comparing costs from one country to the other using a common reference point, the US dollar. An international dollar has the same purchasing power as the US dollar has in the United States.

Federation and around 1% in the other countries. The absolute loss in dollar terms would be highest in the most populous countries, not unexpectedly, such as India and China. However, the greatest percentage loss would be in the Russian Federation where the cardiovascular disease rates are much greater than in the other countries.

## Projected annual reduction in GDP from deaths due to heart disease, stroke and diabetes as proportion of GDP, 2005–2015



### ROBUSTNESS OF THE ESTIMATES

Many of the assumptions in this model were tested using sensitivity analysis. The results were robust to even large changes in the majority of the assumptions, including the costs of treatment.

This analysis is exploratory, but seeks to measure the impact of chronic diseases on GDP in a way that is consistent with economic theory. A number of the possible pathways between illness and macroeconomic output were not included, such as the impact on children's education, which could in future be included with exploration of the impact of different functional forms. However, this analysis already provides a more realistic idea of the impact on GDP than traditional methods.

# *face to face* WITH CHRONIC DISEASE:



Ongoing medication expenses for poor people suffering from long-standing chronic diseases often create difficult choices.

## SHAKEELA BEGUM



# FACING A DIRE CHOICE

### SHAKEELA BEGUM, NOW 65 YEARS

**OLD, has been living in fear since she had a heart attack 10 years ago. The fact that she hasn't fully recovered from this ordeal both physically and emotionally makes her life very difficult. "I'm okay when I'm busy, otherwise I keep thinking that I'll have another heart attack," she says with a worried look on her face. "I can't do as much, because I get tired very quickly," she adds.**

Name	Shakeela Begum
Age	65
Country	Pakistan
Diagnosis	Heart disease

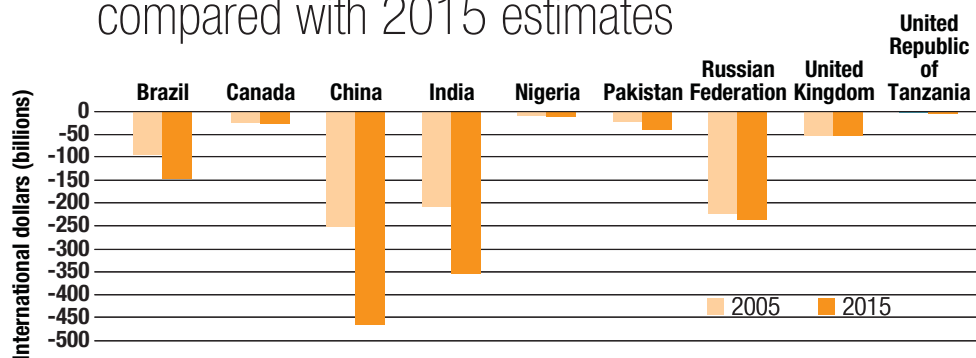
Like many women her age, Shakeela leads a rather sedentary life in the Karachi home she shares with family. She spends most of her time cleaning and looking after her grandchildren and rarely leaves the house other than for food and medication. "I prefer going to the nearby pharmacy, even if it costs more, than going to the hospital and waiting in line for hours to get my medication," she explains. The downside to this alternative is that, for financial reasons, Shakeela is not buying a sufficient amount of medication and therefore not taking the prescribed dose. "I know I should be taking my medication every day but this way I can also save some money for my grandchildren – they are young and have a future," she argues.

## THE FULL COSTS OF CHRONIC DISEASES FOR COUNTRIES

In the previous section, the impact of deaths due to chronic diseases on national income was estimated for the selected countries by examining the known relationship between savings, capital stocks and labour availability. The estimated loss of GDP from chronic diseases is just that – the loss of GDP – and does not include the value that people place on losses (or gains) in health. People also value health for its own sake, and suffer welfare losses from poor health and from the death of loved ones.

Recent work has developed an approach called the full-income method that seeks to value the health gains (and by extension, health losses) in monetary terms. These estimates are regarded as changes in economic welfare. Disease and deaths will result in losses to welfare which is greater than the loss of income, and may be regarded as full costs. This section estimates the value of the welfare losses associated with chronic disease deaths using this approach.

### Full-income losses due to heart disease, stroke and diabetes in 2005 compared with 2015 estimates



Here, only the mortality associated with heart disease, stroke and diabetes is valued. Following recent suggestions in the literature, the welfare value of a lost life was assumed to be 100 times GDP per capita. Estimates of welfare losses run into billions of dollars for all countries (see figure above), and increase annually as the cumulative toll of mortality increases. Variations across countries are driven by differences in the total number of deaths from these causes and levels of GDP per capita. In Brazil, China, India and the Russian Federation losses are more than a

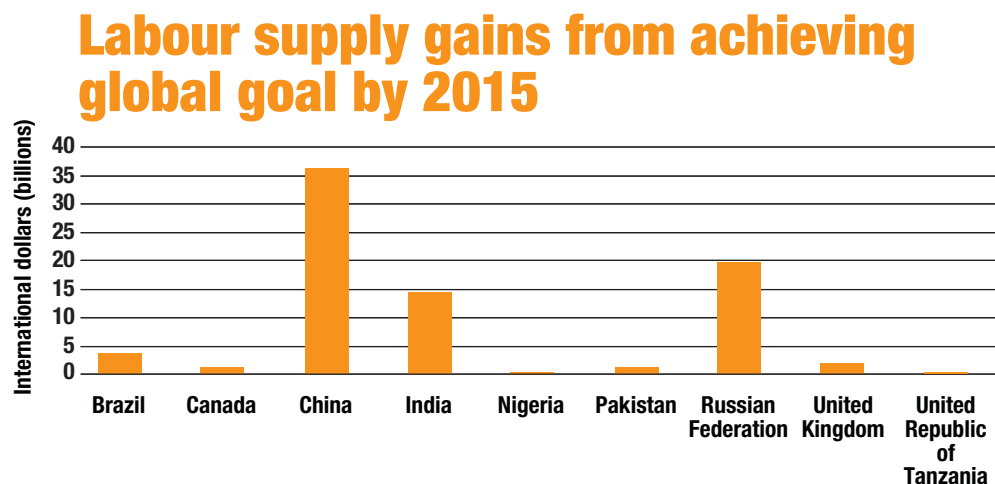
trillion dollars because of the large number of deaths, whereas Canada and the United Kingdom experience lower welfare losses because of fewer deaths from cardiovascular disease in total.

The converse is that these figures could be considered to be potential welfare gains if chronic diseases in these countries were successfully reduced. These gains are clearly much higher than the gains in GDP estimated in the previous section because of the fact that welfare encompasses much more than narrow economic benefits. The numbers should be interpreted with caution, because the approach is not yet well accepted; however, it provides an upper limit for the cost estimates.

## ECONOMIC IMPACT OF ACHIEVING THE GLOBAL GOAL IN COUNTRIES

The global goal described in Part One of this report proposes a target of an additional 2% annual reduction in projected chronic disease death rates between 2005 and 2015. This corresponds to the prevention of 36 million premature deaths over the next 10 years. Some 17 million of these prevented deaths would occur in people under 70 years of age.

To estimate the potential economic gain were this scenario to be achieved, the growth model was used, and the loss in national income given the global goal scenario was compared with the loss that would occur given the business-as-usual situation discussed previously.



The averted deaths would translate into substantial labour supply gains. This in turn would translate to an accumulated gain in income of over 36 billion dollars in China, 15 billion dollars in India and 20 billion dollars in the Russian Federation over the next 10 years (see figure above).

# CONCLUSION

The estimates arrived at by the different methods used here vary – but all indicate that chronic diseases place a grave economic burden on countries, and that this burden will increase if no action is taken. The evidence is clear that action is urgently needed to avoid an adverse impact on national economic development. The cost of achieving the global goal has not been estimated here, although Part Three will show that simple, well-applied policies and interventions targeted at the prevention and control of chronic diseases are cost-effective and affordable.

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