The Burden of Non-Communicable Diseases in India

D. Wayne Taylor, Ph.D., F.CIM
Executive Director
Executive Summary

In 2004, deaths due to non-communicable diseases in India were twice those from communicable diseases.

Top 4 NCDs

The four leading chronic diseases in India are: cardiovascular diseases (CVDs), diabetes mellitus (diabetes), chronic obstructive pulmonary disease (COPD) and cancer.

Economic Burden

In 2004, the people of India spent USD 9.1 billion out-of-pocket on tests, treatments and medical devices to manage their non-communicable diseases (equal to 3.3% of India’s GDP for that year and 4 times the total spent by all governments on healthcare.)
The Burden of Non-Communicable Diseases in India

India will bear 60% of the world’s heart disease burden in the next two years [2008-2010]. In addition, researchers have determined that compared to people in other developed countries, the average age of patients with heart disease is lower among Indian people and Indians are more likely to have types of heart disease that lead to worse outcomes.

The WHO list of the most common non-communicable diseases

- Asthma
- Cancers
- Cardiovascular diseases (CVD)
- Chronic Obstructive Pulmonary Disease (COPD)
- Congenital conditions
- Diabetes
- Diseases of the digestive system (e.g., peptic ulcers)
- Eye conditions
- Genitourinary conditions (prostate disorders, nephritis)
- Neuro-psychiatric conditions (mental disorders, epilepsy, Alzheimer’s)
- Skin and musculoskeletal conditions (e.g., arthritis)
- Skin diseases.

India and NCDs

As of 2005, India experienced the “highest loss in potentially productive years of life” worldwide, according to an article published in The Lancet. The leading cause of death was cardiovascular disease, mostly affecting people aged 35-64. It has been calculated that, in 2000, 9.2 million years of productive life were lost in India. This translates into USD9 billion of lost national income.

The projected cumulative loss of national income for India due to non-communicable disease mortality for 2006-2015 will be USD237 billion. By 2030, this productivity loss was expected to double to 17.9 million years lost – almost 1,000% greater than the corresponding loss in the United States, which has a population a third the size of India’s.

As a low-middle income country it is not surprising that India’s expenditure on healthcare is also quite low. In 2007, India spent 4.1% of its Gross Domestic Product (GDP) on health services or USD40 per capita, only 26% of which was government funding.

Like in developed countries, India must either shift government health expenditures towards, or increase absolute spending on, prevention, screening, early intervention, and new medical treatments reducing the burden of chronic disease. These measures are essential for the health of India as well as its economic progress. The major risk factors for non-communicable diseases are smoking, alcohol abuse, a sedentary lifestyle, and an unhealthy diet; 40-50% of non-communicable disease-related, premature deaths are preventable.

Universal access to preventive and curative intervention is crucial. Early detection of hypertension and other risk factors reduces cardiovascular disease mortality 35-60%. Further, multi-drug regimens for patients can reduce the risk of CVD and stroke. Early detection and treatment of cancers account for a 30-80% reduction in mortality.
The Burden of Non-Communicable Diseases in India

Wellness Programmes

Over 80% of American firms, with 50 employees or more, have some sort of preventive healthcare programme for their employees. Less than a third of Indian firms do. This is a good start but needs to be ramped up considerably if such programming is to have any significant impact upon the health of workers and the Indian economy. Of the employees interviewed just over half had undergone a work-sponsored check-up. There was no statistic reported for the proportion that were followed up by treatment and re-checked – the most important part of the whole process.

Well designed employee preventive health programmes can reduce by 25% a firm’s health plan costs, sick leave, disability pay, and worker’s compensation. Almost 100% of employees who undergo preventive health screening feel that such measures improve their on-the-job productivity and quality of life. Even basic preventive activities such as annual check-ups, screening, exercise, lifestyle advice, preventive healthcare vouchers, and stress counseling can go a long way in reducing employee presenteeism and absenteeism due to non-communicable disease.

The Cameron Institute

263 John Street South, Suite 203
Hamilton, Ontario
Canada
L8N 2C9
www.cameroninstitute.org
BACKGROUND and OBJECTIVE

To paraphrase a hackneyed expression of the late twentieth century, paradigms are shifting everywhere in respect to the delivery of healthcare, slowly but surely. Industrialized nations are re-focusing their healthcare systems on chronic diseases and easing away from the traditional acute care model of care. Institutionalized care is giving way to medical care in the community. Invasive procedures are giving way to less invasive pharmaco-medical treatments. Neglected diseases in the least developed countries are finally being attacked in force.¹

But one shift has yet to occur. Middle-income countries, such as Brazil, China and India need to concentrate more, as their prosperity grows, on non-communicable diseases rather than the traditional scourges of communicable diseases. According to the World Health Organization’s (WHO) definitions, non-communicable diseases include:

- Asthma,
- Cancers,
- Cardiovascular diseases (CVD),
- Chronic Obstructive Pulmonary Disease (COPD),
- Congenital conditions,
- Diabetes,
- Diseases of the digestive system (e.g., peptic ulcers),
- Eye conditions,
- Genitourinary conditions (prostate disorders, nephritis),
- Neuro-psychiatric conditions (mental disorders, epilepsy, Alzheimer’s),
- Skin and musculoskeletal conditions (e.g., arthritis), and
- Skin diseases.

WHO also identifies the six leading risk factors that are associated with non-communicable diseases as being the leading global risk factors for death today²:

- Tobacco use
- Physical inactivity
- Overweight/obesity
- High blood pressure
- High cholesterol levels
- High blood glucose levels

As the world entered the new millennium, chronic diseases accounted for 60% of all deaths worldwide, with 80% of those taking place in developing countries where they take a disproportionate toll during the ages of prime productivity. Part of the reason for this dilemma is that a person with a non-communicable disease is also vulnerable to common infectious diseases, such as tuberculosis and community-acquired pneumonias — and therefore to the poorer outcomes associated with these complications.

In May 2008, at the 61st World Health Assembly, health ministers endorsed the Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases (NCD Action Plan). This NCD Action Plan defines six objectives for implementation during a six-year period from 2008 to 2013 with a particular focus on low- and middle-income countries and vulnerable populations:

1. To raise the priority accorded to non-communicable disease in development work at global and national levels, and to integrate prevention and control of such diseases into policies across all government departments.
2. To establish and strengthen national policies and plans for the prevention and control of non-communicable diseases.
3. To promote interventions to reduce the main shared modifiable risk factors for non-communicable diseases: tobacco use, unhealthy diets, physical inactivity and harmful use of alcohol.
4. To promote research for the prevention and control of non-communicable diseases.
5. To promote partnerships for the prevention and control of non-communicable diseases.
6. To monitor non-communicable diseases and their determinants and evaluate progress at the national, regional and global levels.

Under each objective, there are specific sets of actions for WHO Member States, the Secretariat, and for their international and other partners.

This report by The Cameron Institute, The Burden of Non-Communicable Diseases in India, provides a brief overview of the burden of four non-communicable diseases facing India as a contribution to Objective 1 of the NCD Action Plan with the hope that it will energize Indian governments, firms, and healthcare stakeholders to create the public-private partnerships identified in Objective 5 to achieve the overall goal of preventing and controlling non-communicable diseases in India by reducing risk, morbidity and mortality related to four shared risk factors (tobacco use, physical inactivity, unhealthy diets, and the harmful use of alcohol) and four groups of diseases (cardiovascular diseases, diabetes, cancers and chronic respiratory diseases).

---

2 http://www.who.int/ncdnet/about/creation/en/index.html
NON-COMMUNICABLE DISEASE IN INDIA

India is the second most populous nation in the world with nearly 1.2 billion inhabitants. Thus, the impact of chronic, infectious, and neglected diseases on patients, families, and society can be severe as this country struggles to join the richer nations of the world. In addition to the obvious effects that morbidity and mortality have, the burden of these diseases to the country’s economy is often substantial in terms of loss of productivity, aggravated presenteeism, loss of employment, and health care expenditures.

Similar to most highly developed countries today, chronic diseases represent the lion’s share of India’s disease burden (see Figure 1). In 2004, deaths due to non-communicable diseases in India were twice those from communicable diseases. Non-communicable diseases accounted for 40% of all hospital stays (with longer stays than for any other type of health condition) and 35% of all outpatient visits in 2004. Figure 2 shows how the mortality share flips between communicable disease and non-communicable diseases as a country grows richer. Figure 3 shows the increase in mortality attributable to non-communicable diseases in developing nations.

This study has relied upon the World Health Organization’s lexicon to frame the burden of non-communicable diseases in India. The “burden of disease, for the purposes of this report, shall refer to the loss of healthy life through disabling disease in a specified population, as measured by disability-adjusted life years (DALYs). The World Health Organization (WHO) defines DALYs

---

as “a time-based measure that combines years of life lost due to premature mortality and years of life lost due to time lived in states of less than full health.”

Figure 2  Share of mortality by disease category and country-income group, 2004

![Diagram showing share of mortality by disease category and country-income group, 2004](image)

As of 2005, India experienced the “highest loss in potentially productive years of life” worldwide, according to an article published in The Lancet. The leading cause of death was cardiovascular disease, mostly affecting people aged 35-64. It has been calculated that, in 2000, 9.2 million years of productive life were lost in India. This translates into USD9 billion of lost national income. The projected cumulative loss of national income for India due to non-communicable disease mortality for 2006-2015 will be USD237 billion. By 2030, this productivity loss was expected to double to 17.9 million years lost – almost 1,000% greater than the corresponding loss in the United States (U.S.), which has a population a third the size of India’s.

---

10 Ibid:60.
13 Ibid.
As a low-middle income country it is not surprising that India’s expenditure on healthcare is also quite low. In 2007, India spent 4.1% of its Gross Domestic Product (GDP) on health services or USD40 per capita, only 26% of which was government funding.\textsuperscript{15} Table 1 puts these figures in perspective.

**Table 1 Comparative healthcare spending, 2007\textsuperscript{16}**

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>United States</th>
<th>Global average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>% GDP</td>
<td>4.1</td>
<td>15.7</td>
</tr>
<tr>
<td>2</td>
<td>Govt % of (1)</td>
<td>26.2</td>
<td>45.4</td>
</tr>
<tr>
<td>3</td>
<td>Private as % of (1)</td>
<td>73.8</td>
<td>54.5</td>
</tr>
<tr>
<td>4</td>
<td>(2) as % of total govt spending</td>
<td>3.7</td>
<td>19.5</td>
</tr>
<tr>
<td>5</td>
<td>Out-of-pocket % of (3)</td>
<td>89.9</td>
<td>22.6</td>
</tr>
<tr>
<td>6</td>
<td>Private insurance % of (3)</td>
<td>2.1</td>
<td>63.5</td>
</tr>
<tr>
<td>7</td>
<td>Per capita USD</td>
<td>40</td>
<td>7,285</td>
</tr>
</tbody>
</table>

\textsuperscript{14} Harvard School of public Health, *Global Burden of Disease and Injury Series, Volume 1*, 1996.


\textsuperscript{16} Ibid.
Like in developed countries, India must either shift government health expenditures towards, or increase absolute spending on, prevention, screening, early intervention, and new medical treatments reducing the burden of chronic disease. These measures are essential for the health of India as well as its economic progress. The major risk factors for non-communicable diseases are smoking, alcohol abuse, a sedentary lifestyle, and an unhealthy diet. As a result, 40-50% of non-communicable disease-related, premature deaths are preventable\(^\text{17}\) (see Figure 4).

Universal access to preventive and curative intervention is crucial. Early detection of hypertension and other risk factors reduces cardiovascular disease mortality 35-60\%.\(^\text{18}\) Further, multi-drug regimens for patients can reduce the risk of CVD and stroke. Early detection and treatment of cancers account for a 30-80% reduction in mortality.

![Figure 4](image)

**Figure 4** Preventable deaths from non-communicable diseases in developing countries\(^\text{19}\)

A positive step in addressing the burden of disease in India is that, as of April, 2009, there were 186 medicines in development (in clinical trials or awaiting regulatory review) in India.\(^\text{20}\) But unfortunately as is the case in most countries, inadequate healthcare infrastructure in India continues to be a barrier to access to basic health services in India. For example, there are only 60 physicians per 100,000 population in India as compared to 140/100,000 globally and

\(^{17}\) World Health Organization, ECOSOC High Level Segment, “Non-communicable diseases, 2009”

\(^{18}\) Ibid.

\(^{19}\) Ibid.

\(^{20}\) Adis R&D Database (accessed April 9, 2010).
256/100,000 in the United States. Likewise, India has only 130 nurses per 100,000 people whereas the global average is 280/100,000 and the U.S. has 980/100,000. See Figure 5 for international comparisons.

Without such infrastructure for 1.2 billion people, and with a per capita gross national income of only USD460 and 86% of the population with an income below USD2 per day – over 70% of whom are rural - the healthcare delivery challenges in India are phenomenal. See Table 2 for comparative data.

**Figure 5 Healthcare workforce/10,000 (2000-2009)**

---


Table 2 Comparative socio-economic data

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>United States</th>
<th>Global average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Age (2008)</td>
<td>24</td>
<td>36</td>
<td>29</td>
</tr>
<tr>
<td>Annual % Population increase (1998-2008)</td>
<td>1.6</td>
<td>1.0</td>
<td>1.3</td>
</tr>
<tr>
<td>% Population Urban (2008)</td>
<td>29</td>
<td>82</td>
<td>50</td>
</tr>
<tr>
<td>Adult Literacy Rate (2000-2007)</td>
<td>45</td>
<td>n/a</td>
<td>81</td>
</tr>
<tr>
<td>Gross National Income/Capita (PPP$ 2008)</td>
<td>2,960</td>
<td>46,970</td>
<td>10,290</td>
</tr>
</tbody>
</table>

Table 3 The prevalence of CVD, diabetes, COPD and cancer in India

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>No. of Cases 2005*</th>
<th>Deaths 2005*</th>
<th>Projected no. of cases 2015**</th>
<th>Projected deaths 2015**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Disease25</td>
<td>38,041,090 (90% CHD)</td>
<td>2,089508</td>
<td>64,071,981 (95% CHD)</td>
<td>3,420,752</td>
</tr>
<tr>
<td>Diabetes26</td>
<td>31,039,932</td>
<td>n/a</td>
<td>45,809,149</td>
<td>n/a</td>
</tr>
<tr>
<td>COPD27</td>
<td>17,020,000</td>
<td>n/a</td>
<td>22,210,000</td>
<td>n/a</td>
</tr>
<tr>
<td>Cancer28</td>
<td>2,016,700</td>
<td>538,858</td>
<td>2,496,133</td>
<td>666,563</td>
</tr>
</tbody>
</table>

* CVD/diabetes data from 2005; COPD from 2006; cancer from 2004.
** Projected data for CVD/diabetes is for 2015; COPD is 2016; cancer is 2014.

The four leading chronic diseases in India, as measured by their prevalence, are in descending order: cardiovascular diseases (CVDs), diabetes mellitus (diabetes), chronic obstructive pulmonary disease (COPD) and cancer. All four of these diseases are projected to continue to increase in prevalence in the near future given the demographic trends and lifestyle

24 Ibid. Table 9.
25 http://www.whoindia.org/LinkFiles/Commision_on_Macroeconomic_and_Health_Bg_P2_Forecasting_vascular_disease_cases_and_associated_mortality_in_India.pdf
26 http://www.whoindia.org/LinkFiles/Commision_on_Macroeconomic_and_Health_Bg_P2_Forecasting_vascular_disease_cases_and_associated_mortality_in_India.pdf
27 http://www.whoindia.org/LinkFiles/Commision_on_Macroeconomic_and_Health_Bg_P2_Economic_burden_of_chronic_obstructive_pulmonary_disease.pdf
28 http://www.whoindia.org/LinkFiles/Cancer_resource_Commission_on_Macroeconomic_and_Health_Bg_P2_Cancers_current_scenario.pdf
changes underway in India.\textsuperscript{29} Table 3 provides an overview of the prevalence of CVD, diabetes, COPD and cancer in India.

All four of these major types of non-communicable diseases share similar risk factors (see Table 4) thus making a focused, integrated, well-resourced campaign of prevention, early detection and treatment a very plausible success.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
 & Tobacco Use & Unhealthy diets & Physical Inactivity & Harmful Use of Alcohol \\
\hline
Cardiovascular & ✓ & ✓ & ✓ & ✓ \\
Diabetes & ✓ & ✓ & ✓ & ✓ \\
Cancer & ✓ & ✓ & ✓ & ✓ \\
Chronic Respiratory & ✓ & ✓ & ✓ & ✓ \\
\hline
\end{tabular}
\caption{Four most common non-communicable disease types in India share four modifiable risk factors\textsuperscript{30}}
\end{table}

\textbf{Cardiovascular Diseases (CVDs)}

Cardiovascular diseases are, and will continue to be for some time, the number one cause of death world-wide. According to the WHO, an estimated 17 million people died from CVDs in 2005 accounting for 30\% of all global deaths.\textsuperscript{31} About 80\% of these deaths took place in low- and middle income countries, such as India, occurring almost equally in men and women.

Cardiovascular diseases include:
- coronary heart disease (CHD, heart attacks),
- cerebrovascular disease,
- raised blood pressure (hypertension),
- peripheral artery disease,
- rheumatic heart disease,
- congenital heart disease, and
- heart failure.

\textsuperscript{30} World Health Organization Non-Communicable Disease Network, www.who.int/ncdnet/about/en, 2009
\textsuperscript{31} http://www.who.int/nmh/publications/fact_sheet_cardiovesselular_en.pdf
The major causes of cardiovascular disease are tobacco use, physical inactivity, and an unhealthy diet.

India suffers disproportionately from cardio-vascular disease. A 2008 article in The Lancet claimed that:

"India will bear 60% of the world’s heart disease burden in the next two years [2008-2010]. In addition, researchers have determined that compared to people in other developed countries, the average age of patients with heart disease is lower among Indian people and Indians are more likely to have types of heart disease that lead to worse outcomes.”

According to the World Heart Federation, 35% of all CVD deaths in India occur in those aged 35-64 years." Coronary heart disease (CHD) is the predominant CVD accounting for 90-95% of all cases and deaths. Figure 6 shows the prevalence of CHD by age group. CHD includes conditions such as cardiomyopathies, acute myocardial infarction (MI), angina pectoris, congestive heart failure and inflammatory heart disease (with none of these necessarily being mutually exclusive). The known risk factors for coronary heart disease (CHD) include, but are not limited to:

- overweight/obesity,
- a sedentary lifestyle,
- smoking,
- hypertension,
- high low-density lipoprotein (LDL),
- low high-density lipoprotein (HDL),
- diabetes,
- insulin resistance,
- triglycerides,
- lipoprotein (a) (Lp[a]),
- homocysteine,
- fibrinogen,
- glycated haemoglobin (HbA1c),
- albumin,
- stroke,
- rheumatic heart disease (RHD),
- congenital heart disease, and
- lower economic status

---

34 http://www.whoindia.org/LinkFiles/Commision_on_Macroeconomic_and_Health_Bg_P2_Forecasting_vascular_disease_cases_and_ass ociated_mortality_in_India.pdf
The Burden of Non-Communicable Diseases in India

Figure 6 The prevalence of CHD by age group

*note: the measure, “lakh”, represents 100,000

Figure 7 illustrates the growth in obesity amongst the population of India over the past ten years.

Figure 7 Prevalence of being overweight or obese in India, 2002-2010

35 Ibid.
Cardiovascular diseases usually affect people in “middle age”. CVDs very often devastate the income and savings of affected individuals and their families. Lost earnings and out-of-pocket healthcare payments, in turn, undermine the socioeconomic development of families, communities, regions and nations.

At least 80% of premature deaths from heart disease and stroke could be prevented through healthy diet, regular physical activity and avoiding tobacco smoke. In addition, diabetics need to control their blood pressure and blood sugar. India must embark upon a comprehensive tobacco control strategy, such as Canada has done. In addition, effective and inexpensive medicines are available to help prevent and treat nearly all cardiovascular diseases, such as statins to lower cholesterol, drugs to lower blood pressure, and simple aspirin.

**Diabetes**

Over 220 million people worldwide have diabetes. In 2005, an estimated 1.1 million people died from diabetes (the actual number is much higher because people may live for years with diabetes and their cause of death is often recorded as heart disease or kidney failure – brought on by their diabetes.) Nearly 80% of diabetes deaths occur in low- and middle-income countries. About half of diabetes deaths occur in people under the age of 70 years; 55% of diabetes deaths are in women. The WHO projects that diabetes deaths will double between 2005 and 2030.37

Diabetes is a chronic disease that occurs either when (i) the pancreas does not produce enough insulin, or (ii) when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or high blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to the nerves and blood vessels.

"Type 1 diabetes" (previously known as insulin-dependent, juvenile or childhood-onset) is characterized by deficient insulin production and requires daily administration of insulin. "Type 2 diabetes" (formerly called non-insulin-dependent or adult-onset) results from the body’s ineffective use of insulin. Type 2 diabetes comprises 90% of people with diabetes around the world, and is largely the result of excess body weight and physical inactivity. Until recently, this type of diabetes was seen only in adults but it is now also occurring in children. Finally, “gestational diabetes” (hyperglycaemia) has onset or is first recognized during pregnancy.

Over time, diabetes can damage the heart, blood vessels, eyes, kidneys, and nerves. Damage to the nerves as a result of diabetes is called diabetic neuropathy and afflicts up to 50% of people with diabetes. Diabetes increases the risk of heart disease and stroke; 50% of people with diabetes die of cardiovascular disease. Combined with reduced blood flow, neuropathy in the feet increases the chance of foot ulcers and eventual limb amputation. Diabetic retinopathy occurs as a result of long-term accumulated damage to the small blood vessels in the retina and is an important cause of blindness. Diabetes is among the leading causes of kidney failure; 10-20% of people with diabetes die of kidney failure.

Diabetes is second only to CVD as a health burden in India and, of course, the two are highly correlated and interdependent. The International Diabetes Federation (IDF) reports a projected prevalence of 70 million patients in India by the year 2025, and the WHO estimates that India will have 80 million cases of diabetes by 2030.

Given the predominance of private financing of healthcare in India, it is no surprise that 60% of diabetics - irrespective of their socio-economic status - pay for the treatment and management of their disease from their personal savings. The next most common method of payment was by selling assets, mortgaging immovable assets, or taking loans with interest rates as high as 39%. The situation is especially grim for low-income patients. While among the rest, 27% have simply no option but to finance their treatment by using their savings. Of the higher income groups, up to 81% pay their medical bills from their personal savings. Even within the highest income group only 2% were covered by private health insurance.

Healthcare costs for a diabetic include diagnosis and treatment of the ailment, and its attendant complications, routine laboratory investigations, physician fees, ambulances, inpatient or outpatient care, medication and transport. The average diabetic Indian will directly spend USD575 annually out-of-pocket. Indirectly, it will also cost the diabetic another USD100 or more annually in lost work-time while seeking and undergoing treatment. One estimate places diabetic care in India for 2010 costing $31.9 billion.

Given the economic burden on individuals, families, regions and health systems that diabetes imposes in a country like India, simple behavioural measures are called for, such as: healthy diet, regular physical activity, maintaining a normal body weight, and avoiding tobacco use to prevent or delay the onset of type 2 diabetes. Early diagnosis can be achieved by inexpensive blood testing. Treatment of diabetes involves lowering blood glucose and the levels of other known risk factors that damage blood vessels. Tobacco cessation is also important to avoid complications.

Cost-effective interventions that are feasible in developing countries such as India include:

- blood glucose control (type 1 diabetics require insulin; type 2 diabetics can be treated with oral medication, but may also require insulin),
- blood pressure control,
- foot care,
- screening for retinopathy,
- blood lipid control to regulate cholesterol levels, and
- screening for early signs of diabetes-related kidney disease.

---

41 Ibid.
42 Ibid.
Chronic Obstructive Pulmonary Disease (COPD)

According to the latest estimates by the WHO, 210 million people around the world suffered from COPD in 2007. Chronic obstructive pulmonary disease (COPD) is the name given to a group of disorders characterized by chronic, persistent and largely irreversible airflow obstruction/limitation. COPD is marked by two different pathophysiological processes—chronic bronchitis and emphysema. COPD displays an abnormal inflammatory response of the lungs and airways to noxious particles or gases, such as tobacco smoke and air pollution—both indoor and outdoor.

It is most common for COPD to be witnessed as and called "smoker’s cough" with little or no breathlessness, mostly among older adults. As one would expect, when not detected and attended with proper medication, deterioration slowly occurs as it progresses into its moderate form with increasing breathlessness and/or wheezing on moderate exertion. As a result, the COPD patient’s inability to exert him/herself results in presenteeism at work; perhaps even absenteeism and loss of wages. Then there is the financial and psychological burden of financing medical treatment (as we have seen above with diabetes). The disease is progressive eventually causing death.

Chronic bronchitis manifests as chronic cough and sputum production for more than 3 months in a year for at least 2 consecutive years. Exacerbations are frequent, more so during winter, resulting in progressive loss of the functional capacity of the lungs. Chronic bronchitis is largely preventable; all it takes is early diagnosis and proper treatment.

COPD is the fourth leading cause of death in the world, and the third leading cause of death in India where cigarette smoking is common.

Risk factors for COPD include but are not limited to:

- Tobacco,
- Environmental pollution (indoor and outdoor),
- Allergens,
- Age (mainly due to cumulative exposure to tobacco smoke, pollution and other irritants),
- Gender (more prevalent among males, probably due to association with other risk factors),
- Specific occupational groups with higher, persistent risks, exposure, and vulnerability, and
- Lower economic status (in association with other risk factors).

Crucial tools in the battle against COPD are the (i) surveillance and analysis of the risk factors in a population; (ii) primary prevention to reduce the level of exposure to tobacco, poor

---

44 http://www.whoindia.org/LinkFiles/Commision_on_Macroeconomic_and_Health_Bg_P2_Economic_burden_of_chronic_obstructive_pulmonary_disease.pdf
nutrition, and environmental air pollution (indoor, outdoor, and occupational); and (iii) secondary and tertiary prevention by identifying cost-effective early screening and disease management interventions.

Cancer

Cancer is a leading cause of death worldwide accounting for 7.4 million deaths (around 13% of all deaths) in 2004, according to the WHO. Deaths from cancer worldwide are projected to continue rising, with an estimated 12 million deaths in 2030. More than 70% of all cancer deaths occur in low- and middle-income countries.45

The main types of cancer leading to overall cancer mortality each year are:

- lung (1.3 million deaths/year)
- stomach (803,000 deaths/year)
- colorectal (639,000 deaths/year)
- liver (610,000 deaths/year)
- breast (519,000 deaths/year).

The most prevalent forms of cancer will vary by gender. Globally, the most frequent types of cancer (in descending order by mortality) are:

- Among men - lung, stomach, liver, colorectal, oesophagus and prostate;
- Among women - breast, lung, stomach, colorectal and cervical.

The prevalence and incidence of cancer by type will also vary by country, and even by region within large countries such as India. Figure 8 illustrates the geographical distribution and concentration of the most common kinds of cancer in India.

Cancer is a general term used for a large group of diseases that can affect any part of the body. Other terms used are malignant tumours and neoplasms. Cancer arises from a change in one single cell that may be started by external agents and inherited genetic factors. The transformation from a normal cell into a tumourous cell is result of the interaction between a person’s genetic factors and three categories of external agents, including:

- physical carcinogens, such as ultraviolet and ionizing radiation
- chemical carcinogens, such as asbestos, components of tobacco smoke, aflatoxin (a food contaminant) and arsenic (a drinking water contaminant)
- biological carcinogens, such as infections from certain viruses, bacteria or parasites.

The defining feature of cancer is the rapid creation of more abnormal cells that grow beyond their usual boundaries, and which can then invade adjoining parts of the body and spread to other organs. This process is referred to as metastasis. Metastases are the major cause of death from cancer.

45 http://www.who.int/topics/cancer/en/index.html
Risk factors for cancer include:

- tobacco use (by far the number one),
- being overweight or obese,
- physical inactivity,
- urban air pollution,
- infections such as hepatitis B (liver cancer), sexually-transmitted human papilloma virus (HPV) (cervical cancer), and human immunodeficiency virus (HIV) (Kaposi sarcoma),
- bacteria such as Helicobacter pylori (stomach cancer),
- parasites such as schistosomiasis (bladder cancer),
- ageing (the incidence of cancer rises dramatically with age, most likely due to a buildup of risks for specific cancers that increase with age combined with cellular repair mechanisms being less effective as a person grows older),
- excessive alcohol use,
- indoor smoke from household use of solid fuels, and
- low fruit and vegetable intake.
In middle-income developing countries, such as India, the leading risk factors for cancer are, in descending order of importance:

- tobacco use,
- alcohol abuse,
- low fruit and vegetable intake, and
- chronic infections from hepatitis B virus (HBV), hepatitis C virus (HCV) and human papilloma virus (HPV)

According to the WHO, 6.5% of the total population of India was 60 years of age or older. The overall life expectancy in 2008 was 64 (global average is 68) and the Healthy Life Expectancy (HALE) in 2007 was 56 (global average 59). These are marked improvements as compared to past population statistics but for a middle income country, with an exploding economy, these are below average results. Regrettably, these positive trends in increased life expectancy also lead to an increase in the number of cancer cases. The probability of dying between the ages of 15 and 60 is 21.3% in India as compared to 18% globally and 10.7% in the United States – exactly half of India’s rate.

In India, the most prevalent forms of cancer among men are tobacco-related cancers including lung, oral, larynx, esophagus, and pharynx. In India almost 50% more men smoke than in the U.S. Amongst Indian women, in addition to tobacco-related cancers, cervix, breast, and ovarian cancers are also prevalent. India currently has the highest prevalence of oral cancer cases in the world as a result of the popularity of chewing tobacco in its rural regions. Figure 9 shows the prevalence of smoking in India.

Figure 9  Prevalence of smoking in India for ages 15+ (2006)

---


47 World Health organization, World Health Statistics, 2010:Table 5


Knowledge about the causes of cancer and interventions to prevent and manage the disease is extensive. Cancer can be reduced and controlled by implementing evidence-based strategies for cancer prevention, early detection of cancer, and the management of patients with cancer. Proven prevention strategies include:

- increase avoidance of the risk factors listed above, especially tobacco use,
- vaccinate against human papilloma virus (HPV) and hepatitis B virus (HBV),
- control occupational hazards, and
- reduce exposure to sunlight.

About one-third of the cancer burden could be decreased if cases were detected and treated early based on the observation that treatment is more effective when cancer is detected earlier. The key is detecting the cancer when it is still localized (before metastasis). Critical to early detection are (i) education to help people recognize early signs of cancer and seek prompt medical attention for symptoms, and (ii) screening programmes to identify early cancer or pre-cancer before signs are recognizable.

**THE ECONOMIC BURDEN**

The economic burden of non-communicable disease can be catastrophic for a nation’s economy yet go relatively unnoticed or not even addressed. In 2009, the World Economic Forum boldly stated that non-communicable diseases were among the most severe threats to global economic development right along with fiscal crises, natural disasters, and pandemic influenza. Given the burdensome health care costs, disability, absenteeism, and forgone income, non-communicable diseases can result in individual and/or familial poverty, thus contributing to the vicious cycle of poverty in many parts of developing countries such as India.

---

Cardiovascular diseases and diabetes collectively cost the United States USD750 billion annually. Over the next ten years it has been estimated that mostly preventable heart diseases, strokes and diabetes (all intertwined in many instances) will cost China, India, and Britain USD558 billion, USD237 billion, and USD33 billion, respectively, in national income.\(^{51}\)

In 2004, the people of India spent USD9.1 billion out-of-pocket on tests, treatments and medical devices to manage their non-communicable diseases (equal to 3.3% of India’s GDP for that year and 4 times the total spent by all governments on healthcare.) The odds of incurring catastrophic hospitalization expenses are 30%-160% greater for non-communicable diseases than for communicable diseases. The World Bank has calculated that the annual income loss in India from non-communicable diseases totaled USD22.7 billion in 2004. The total cost to the Indian economy was 4-10% of GDP depending upon the calculations and assumptions made.\(^{52}\) In terms of welfare gain (the value to an Indian worker of not dying prematurely) the cost is higher at 13-14% of GDP.\(^{53}\) Any way one looks at the prevalence and economics of non-communicable diseases in India, the individual, and/or his/her family, are extremely vulnerable to financial ruin, or chronic ill health, or both.

There have been few economic impact studies done on the financial burden of non-communicable diseases in India beyond what has already been cited. Studies have been small in scope and limited by disease type, sample size, time period studied, and variables included. To conduct a full national economic impact study covering all non-communicable disease was well beyond the scope of this report.

One such study reported that “the estimated loss in national income as a result of heart disease, stroke and diabetes in 2005 was USD9 billion” and was projected to exceed USD200 billion over the 10 ensuing years.\(^{54}\) Firms that participated in this study reported losing 14% of their annual person-working days due to illness. Almost 80% of employees had some sort of illness during the year of the study, over half of which were one or more non-communicable disease.

### EFFORTS TO REDUCE INDIA’S DISEASE BURDEN

Since many of the costs associated with chronic disease conditions can be avoided, measures must be taken to promote healthy lifestyles, behaviours and environments so that Indians may experience better health and continued growth in their economic prosperity (after all, a strong, growing economy is the number one correlate of a healthy population.)

By way of reference, in the United States the most common chronic diseases cost the American economy more than USD1 trillion annually—a figure that threatens to reach USD6

\(^{51}\) Ibid.


\(^{53}\) Ibid., xviii

The Burden of Non-Communicable Diseases in India

trillion by 2050.\textsuperscript{55} The calculated potential direct cost savings from a combination of healthier lifestyles and modest advances in treatment could amount to USD217 billion. The cumulative avoidable treatment costs from 2007 to 2023 were estimated to be USD1.6 trillion.

Similarly, in India, efforts including expanding health care infrastructure and fostering the development of new medicines could substantially reduce the projected burden of non-communicable disease and its cost to Indian society. To date, India has taken a number of positive steps to advance the health of its citizens, such as:

• public-private partnerships that are expanding India’s health care infrastructure and improving health care quality and access to therapies,\textsuperscript{56}

• a ten-year, USD280 million partnership between the Department of Biotechnology and the Wellcome Trust to fund biomedical research in India,\textsuperscript{57}

• the development of a national biotechnology development strategy in 2007 that is fostering R&D investment expected to generate USD7 billion by 2012,\textsuperscript{58} and

• the revamping of biotechnology education programs to create global centers of educational and research excellence.\textsuperscript{59}

Over 80% of American firms, with 50 employees or more, have some sort of preventive healthcare programme for their employees. Less than a third of Indian firms do.\textsuperscript{60} This is a good start but needs to be ramped up considerably if such programming is to have any significant impact upon the health of workers and the Indian economy. Just over half of Indian workers had undergone a work-sponsored check-up. There was no statistic reported for the proportion that were followed up by treatment and re-checked – the most important part of the whole process.

Well designed employee preventive health programmes can reduce by 25% a firm’s health plan costs, sick leave, disability pay, and worker’s compensation. Almost 100% of employees who undergo preventive health screening feel that such measures improve their on-the-job productivity and quality of life. Even basic preventive activities such as annual check-ups, screening, exercise, lifestyle advice, preventive healthcare vouchers, and stress counseling can go a long way in reducing employee presenteeism and absenteeism due to non-communicable disease.


\textsuperscript{57} “Wellcome Trust and Indian government announce £80 million partnership to boost biomedical research”, September, 2008.


\textsuperscript{59} Ibid.

The Cameron Institute is an alternative, not-for-profit, public policy think tank specializing in the independent study of current health, social, and economic issues in Canada and internationally. The Institute researches policy concerns in the health world related to the need for balance between patient safety and access to new, innovative, affordable therapies. It is an objective of The Cameron Institute to provide decision makers with analyses that will help inform choices. The Institute is also dedicated to educating and better preparing patients, providers, and payers to make appropriate clinical choices.

Dr. D. Wayne Taylor has worked as an executive in the private sector, as a senior civil servant, as a political assistant, and was the Founding Director of both the MBA Programme in Health Services Management and the Health Leadership Institute at McMaster University. He remains a tenured faculty member in the DeGroote School of Business at the Ron V. Joyce Centre for Advanced Management Studies while serving as the Executive Director of The Cameron Institute and as president of his own private international consultancy as well as Finergy Analytics.