Burden and Cost of Non-Communicable Diseases

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Presentation Overview

• Initial thoughts – Conferences; powerhouse of innovative ideas
• Public Health Revolution
• Non-communicable Diseases – few difficult to manage issues; Standards
• Non-communicable disease – Chronic diseases
• Burden of NCDs
• Cost of NCDs
• Third Public Health Revolution
• Conclusion
Initial thoughts – Conference Theme

Bridging Silos: Towards A Holistic Management of NCDs

Burden and Cost of Non-Communicable Diseases
History of Public Health

CONVENTIONAL MEDICINE

Doctors in the United States and most western countries practice what is called conventional medicine. Taught in medical schools and believed to be the most effective treatment, it follows the scientific method to investigate medical problems. The most common treatments of conventional medicine include the prescription of essentially tested pharmaceuticals and surgical procedures. While much literature documents alternative philosophies, including acupuncture, homeopathy, meditation, aromatherapy, and chiropractic, for example, these are not considered a part of conventional medicine. Although alternative medical philosophies may be safe, economical, and effective, they are not taught in traditional medical programs.

1200-600 BC
Sushruta was an ancient Indian physician and is known as the "founder of surgery". He authored the Sushruta Samhita, a commentary on medical science in surgery.

130-210
Asclepius Galenus, also called Galen of Pergaum, was a prominent Greek physician, surgeon, and philosopher in the Roman Empire. Arguably the most accomplished of all medical researchers of antiquity, Galen influenced the development of various scientific disciplines, including anatomy, physiology, pathology, pharmacology, and neurology, as well as philosophy and logic. His theories dominated and influenced Western medical science for more than 1,500 years.

622-750
During the Arab conquests, the Arab conquerors learned that the Christians and Jews had superior medical knowledge. Consequently, early medical practitioners translated the writing of Greek physicians into Arabic. This knowledge was combined with medical knowledge acquired from the Hindus in India.

1601
As the crusaders won back Spain from the Moors, the medical knowledge compiled by the Arabs was transmitted from Arabic to Latin and further translated into European languages and disseminated throughout Europe. By the 16th century, Western physicians had widely embraced the experimental method.

1901-Now

The 20th century brought significant discoveries that allowed huge leaps forward in all fields of medical practice. Advances in medical specialization formed, including cardiology, allergy, and immunology, anesthesiology, emergency medicine, family medicine, internal medicine, radiology, genetics, pediatrics, nuclear medicine, obstetrics, and neurology, among others. In the 20th century, the field of genetics also developed with the mapping of human, plant, and animal genomes.

1801-1900

In the United States, many states still had no requirements for practicing medicine. As medical schools developed, the United States finally caught up with scientific methodology and other medical advancements. In the middle of the century, new developments in germ theory led to the development of effective drugs that could kill bacteria without harming humans. Additional discoveries permitted pharmaceuticals to develop beyond herbal remedies and high levels of alcohol.

Modern Medicine

The works of Hippocrates and Galen were translated into Syriac Aramaic, which became a major language spoken in the Middle East in the 4th to 6th centuries. Later, during the Arab conquests, the Arab conquerors learned that the Christians and Jews had superior medical knowledge. Consequently, early medical practitioners translated the writing of Greek physicians into Arabic. This knowledge was combined with medical knowledge acquired from the Hindus in India.

1135-1204

1031-1071

When Moses Maimonides, the foremost intellectual of medieval Judaism, began practicing medicine, he practiced according to the one who he was taught medicine. His medical writings represent a significant contribution to the advancement of medicine and are considered relevant in modern teachings.

460 BC

Hippocrates, recognized as the father of modern medicine, was the first physician to systematically classify diseases based on their signs of similarity and contrast between them. He made medicine into a science and the discipline of etiology and pathology. By systematically classifying diseases, Hippocrates pioneered the diagnosis and treatment of a disease.
First Public Health Revolution

• Against infectious disease in the late 1800s and early 1900s

How was it realized...

• fighting in the environment with environmental actions, such as:
  • sanitation and water purity,
  • reducing the vulnerability of individuals through immunization

social reformers, microbiologists, and sanitary engineers
Transition from ‘First’ to ‘Second’ Revolution

<table>
<thead>
<tr>
<th>Rank order</th>
<th>1900 cause of death</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All causes</td>
<td>1719</td>
</tr>
<tr>
<td>1</td>
<td>Pneumonia, influenza</td>
<td>202</td>
</tr>
<tr>
<td>2</td>
<td>Tuberculosis</td>
<td>194</td>
</tr>
<tr>
<td>3</td>
<td>Diarrhea, enteritis</td>
<td>143</td>
</tr>
<tr>
<td>4</td>
<td>Diseases of the heart</td>
<td>137</td>
</tr>
<tr>
<td>9</td>
<td>Cancer</td>
<td>64</td>
</tr>
</tbody>
</table>

TABLE 1  Death rates for leading causes of death. Death registration states, United States, 1900 and 1948. Source: Abstracted from (1)

Transition from ‘First’ to ‘Second’ Revolution

<table>
<thead>
<tr>
<th>Rank order</th>
<th>1900 cause of death</th>
<th>Rate per 100,000</th>
<th>Rank order</th>
<th>1948 cause of death</th>
<th>Rate per 100,000</th>
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<td></td>
<td>All causes</td>
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<td></td>
<td>All causes</td>
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<tr>
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<td>Pneumonia, influenza</td>
<td>202</td>
<td>1</td>
<td>Diseases of the heart</td>
<td>323</td>
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<tr>
<td>2</td>
<td>Tuberculosis</td>
<td>194</td>
<td>2</td>
<td>Cancer</td>
<td>135</td>
</tr>
<tr>
<td>3</td>
<td>Diarrhea, enteritis</td>
<td>143</td>
<td>3</td>
<td>Intracranial vascular lesions</td>
<td>90</td>
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<tr>
<td>4</td>
<td>Diseases of the heart</td>
<td>137</td>
<td>6</td>
<td>Pneumonia, influenza</td>
<td>39</td>
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<tr>
<td>9</td>
<td>Cancer</td>
<td>64</td>
<td>7</td>
<td>Tuberculosis</td>
<td>30</td>
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</tbody>
</table>

‘Second’ Revolution

<table>
<thead>
<tr>
<th>Year</th>
<th>All causes</th>
<th>Heart disease</th>
<th>Cerebrovascular disease</th>
<th>Cancer</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>1446.0</td>
<td>586.8</td>
<td>180.7</td>
<td>193.9</td>
<td>23.1</td>
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<tr>
<td>1960</td>
<td>1339.2</td>
<td>559.0</td>
<td>177.9</td>
<td>193.9</td>
<td>22.5</td>
</tr>
<tr>
<td>1980</td>
<td>1039.1</td>
<td>412.1</td>
<td>96.2</td>
<td>207.9</td>
<td>18.1</td>
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<tr>
<td>1990</td>
<td>938.7</td>
<td>321.8</td>
<td>65.3</td>
<td>216.0</td>
<td>20.7</td>
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<tr>
<td>1999</td>
<td>886.9</td>
<td>272.4</td>
<td>59.5</td>
<td>202.4</td>
<td>24.2</td>
</tr>
</tbody>
</table>

Second Public Health Revolution

• Chronic disease

• Shifting burden of infectious diseases to non-infectious chronic diseases

• Associated individual behavioral antecedents.
Rationale for Addressing NCDs

• NCDs are the largest cause of mortality both globally and in the majority of low- and middle-income countries (LMICs).

• NCD mortality exceeds that of communicable, maternal, perinatal and nutritional conditions combined.

• Worldwide, NCDs account for 65% of global deaths, accounting for a majority of deaths in all regions except Africa and almost half of current deaths in Africa.

• Eighty percent (28 million people) of NCD deaths occur in LMICs, making NCDs a major cause of poverty and an urgent development issue.

• Bloom et al (2013) estimated that $47 trillion in economic output would be lost due to NCDs by 2030, concluding that “inaction would likely be far more costly [than interventions for NCDs].
Rationale for Addressing NCDs

• Bloom et al (2013) estimated that $47 trillion in economic output would be lost due to NCDs by 2030, concluding that “inaction would likely be far more costly [than interventions for NCDs.]"

• NCDs are wrongly perceived as diseases only of the rich. There has been a dramatic transition from infectious disease to NCD burden

• Globally, the NCD burden will increase by 17% in the next ten years, and in the African region by 27%.

• The highest absolute number of deaths will be in the Western Pacific and South-East Asia regions
Non-communicable diseases – Definitions

• Non-communicable diseases – not passed from person to person

• Non-communicable diseases – a misnomer.

• Difficult group to define

• Generally diseases characterised as non-infectious and of chronic nature are grouped together as NCDs.
So where are we for defining NCD’s

• In the current global health context, ‘NCDs’ mainly refer to four diseases –
  • Diabetes,
  • Cardiovascular diseases,
  • Cancers and
  • Chronic respiratory diseases

and associated

• Four common risk factors –
  • Tobacco use,
  • Unhealthy diet,
  • Physical inactivity and
  • Unhealthy use of alcohol
Relationships between NCD risk factors

• An NCD risk factor refers to any characteristic or attribute of an individual which increases that person’s risk of developing an NCD.

• The likelihood of developing NCDs depends upon the severity and number of risk factors that individuals possess or to which they are exposed.

• These risk factors can be genetic, behavioural or environmental.
  • Biological risk conditions (e.g., obesity, high blood pressure, blood lipids, high blood glucose levels)
  • **Behavioural risk factors (e.g., physical inactivity, poor nutrition, smoking, alcohol consumption)** and
  • Measures of demographic and SES (e.g., sex, age, urban/rural residence, ethnicity, education, income)
### Common Risk Factors

#### Noncommunicable Diseases
4 Diseases, 4 Modifiable Shared Risk Factors

<table>
<thead>
<tr>
<th></th>
<th>Tobacco Use</th>
<th>Unhealthy diets</th>
<th>Physical Inactivity</th>
<th>Harmful Use of Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
</tr>
<tr>
<td>Diabetes</td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
</tr>
<tr>
<td>Cancer</td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
</tr>
<tr>
<td>Chronic Respiratory</td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
<td><img src="tick.png" alt="Checkmark" /></td>
</tr>
</tbody>
</table>

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Source: World Health Organization
Determinants of Health

- Factors that contribute to a person's current state of health. These factors may be biological, socioeconomic, psychosocial, behavioral, or social in nature. Scientists generally recognize five determinants of health of a population:

1. Biology and genetics. Examples: sex and age
2. Individual behavior. Examples: alcohol use, injection drug use (needles), unprotected sex, and smoking
4. Physical environment. Examples: where a person lives and crowding conditions
5. Health services. Examples: Access to quality health care and having or not having health insurance
Social Determinants of Health

Social & Economic Factors
- Education
- Employment
- Income
- Family & Social Support
- Community Safety

Quality of care: 10%
Access to care: 10%
Physical environment: 10%
Healthy behaviors: 30%

Data from "County Health Rankings & Roadmaps," University of Wisconsin Population Health Institute.
Epidemiological transition

Least developed countries  
*e.g.* Subsaharan Africa

Developed countries  
*e.g.* USA, UK, Japan

Developing countries  
*e.g.* INDIA

Life style related chronic diseases  
[NCD’s]: Diabetes, Obesity, Hypertension, Cardiovascular disease

Communicable diseases

Mortality rate

Epidemiological transition
<table>
<thead>
<tr>
<th>1990 Mean rank (95% UI)</th>
<th>2010 Mean rank (95% UI)</th>
<th>Median % change (95% UI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2 (1-2)</td>
<td>1 Ischemic heart disease</td>
<td>1.0 (1-1)</td>
</tr>
<tr>
<td>1.8 (1-2)</td>
<td>2 Major depressive disorder</td>
<td>2.6 (2-5)</td>
</tr>
<tr>
<td>3.9 (3-7)</td>
<td>3 Stroke</td>
<td>3.5 (2-5)</td>
</tr>
<tr>
<td>4.8 (3-7)</td>
<td>4 Low back pain</td>
<td>3.7 (2-7)</td>
</tr>
<tr>
<td>5.0 (3-8)</td>
<td>5 Preterm birth complications</td>
<td>5.1 (3-8)</td>
</tr>
<tr>
<td>5.2 (3-9)</td>
<td>6 Major depressive disorder</td>
<td>6.1 (4-9)</td>
</tr>
<tr>
<td>8.0 (4-11)</td>
<td>7 Neonatal encephalopathy</td>
<td>8.2 (5-14)</td>
</tr>
<tr>
<td>8.0 (5-11)</td>
<td>8 Iron-deficiency anemia</td>
<td>9.1 (6-13)</td>
</tr>
<tr>
<td>8.7 (3-15)</td>
<td>9 Low back pain</td>
<td>11.0 (7-17)</td>
</tr>
<tr>
<td>10.6 (8-14)</td>
<td>10 Diarrheal diseases</td>
<td>11.5 (6-19)</td>
</tr>
<tr>
<td>11.8 (9-15)</td>
<td>11 COPD</td>
<td>11.7 (6-19)</td>
</tr>
<tr>
<td>12.1 (9-15)</td>
<td>12 Road Injury</td>
<td>15.0 (9-19)</td>
</tr>
<tr>
<td>19.2 (13-26)</td>
<td>18 Diabetes</td>
<td>24.4 (19-31)</td>
</tr>
</tbody>
</table>
Disease Burden of NCDs
Disease Burden

• **Disease burden** is the impact of a health problem as measured by financial cost, mortality, morbidity, or other indicators.

• It is often quantified in terms of quality-adjusted life years (QALYs) or disability-adjusted life years (DALYs), both of which quantify the number of years lost due to disease (YLDs).
NCDs constitute more than 60% of deaths worldwide

Data are for 2005. Source: (WHO, 2005a)

* “Other conditions” comprises communicable diseases, maternal and perinatal conditions and nutritional deficiencies.
WORLD, DEATHS, BY BROAD CAUSE GROUP, 2001

Total deaths: 56,554,000

- Noncommunicable conditions (33.1 million)
- Communicable diseases, maternal and perinatal conditions and nutritional deficiencies (18.4 million)
- Injuries (5.1 million)

Source: WHR 2002
WORLD, DALY’s, BY BROAD CAUSE GROUP, 2001

Communicable diseases, maternal and perinatal conditions and nutritional deficiencies: 42.0%

Noncommunicable conditions: 45.9%

Injuries: 12.2%

Source: WHR 2002
DEATHS, BY BROAD CAUSE GROUP AND WHO REGION, 2001

Communicable diseases, maternal and perinatal conditions and nutritional deficiencies

Noncommunicable conditions

Injuries

75%

50%

25%

AFR AMR EMR EUR SEAR WPR

Source: WHR 2002
DALY’s, BY BROAD CAUSE GROUP AND WHO REGION, 2001

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

Source: WHR 2002
The Increasing Burden of Chronic Non-communicable Diseases: 2008 and 2030

The Increasing Burden of Chronic Non-communicable Diseases: 2008 and 2030

Global Trends Causes of Deaths
Projected Deaths in 2015 and 2030

<table>
<thead>
<tr>
<th>Country group</th>
<th>% of total deaths caused by NCDs</th>
<th>% of total DALYs caused by NCDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>58</td>
<td>62</td>
</tr>
<tr>
<td>High SDI&lt;sup&gt;a&lt;/sup&gt; countries</td>
<td>88</td>
<td>89</td>
</tr>
<tr>
<td>United States</td>
<td>87</td>
<td>88</td>
</tr>
<tr>
<td>High-middle SDI countries</td>
<td>80</td>
<td>83</td>
</tr>
<tr>
<td>Middle SDI countries</td>
<td>64</td>
<td>72</td>
</tr>
<tr>
<td>Low-middle SDI countries</td>
<td>37</td>
<td>42</td>
</tr>
<tr>
<td>Low SDI countries</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>
The Global Economic Burden of NCDs
The Global Economic Burden of NCDs – Approached

Three approached

- *The cost-of-illness (COI) approach.*

- *The value of lost output: the economic growth approach*

- *The value of statistical life (VSL) approach*
Cardiovascular disease costs could rise by 22% by 2030. Global costs attributable to CVD, and CVD incidence (in 1000s), selected years: 2010-2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Total cost (billions of US$)</th>
<th>CHF incidence</th>
<th>IHD incidence</th>
<th>Stroke incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>863</td>
<td>10,072</td>
<td>24,167</td>
<td>28,299</td>
</tr>
<tr>
<td>2015</td>
<td>906</td>
<td>10,821</td>
<td>25,933</td>
<td>30,370</td>
</tr>
<tr>
<td>2020</td>
<td>957</td>
<td>11,830</td>
<td>28,284</td>
<td>33,122</td>
</tr>
<tr>
<td>2025</td>
<td>1,002</td>
<td>12,754</td>
<td>30,369</td>
<td>35,571</td>
</tr>
<tr>
<td>2030</td>
<td>1,044</td>
<td>13,637</td>
<td>32,339</td>
<td>37,886</td>
</tr>
</tbody>
</table>

Total, all years, 2010-2030 = 20,032 (billions of US$)
Developing countries will share the growing COPD bill. Global Cost of Illness for COPD in 2010 and 2030. Costs shown in billions of 2010 US$.

<table>
<thead>
<tr>
<th>Year</th>
<th>Low - and Middle-Income Countries</th>
<th>High-Income Countries</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct Costs</td>
<td>Indirect Costs</td>
<td>Overall Cost of Illness</td>
</tr>
<tr>
<td>2010</td>
<td>1,004</td>
<td>74</td>
<td>1,077</td>
</tr>
<tr>
<td>2030</td>
<td>2,328</td>
<td>255</td>
<td>2,583</td>
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</table>
Diabetes...... 2010 – 2030

<table>
<thead>
<tr>
<th>Income Group</th>
<th>Direct Costs (Billions)</th>
<th>Disability Costs (Billions)</th>
<th>Mortality Costs (Billions)</th>
<th># of People with Diabetes (Millions)</th>
<th>Direct Costs as % of World Total</th>
<th>Indirect Costs as % of World Total</th>
<th>People with Diabetes as % of World total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>$341.5</td>
<td>$41.7</td>
<td>$5.8</td>
<td>74.7</td>
<td>90.8</td>
<td>49.8</td>
<td>26.2</td>
</tr>
<tr>
<td>Upper Middle</td>
<td>$28.1</td>
<td>$33.1</td>
<td>$2.1</td>
<td>96.1</td>
<td>7.5</td>
<td>36.8</td>
<td>33.8</td>
</tr>
<tr>
<td>Lower Middle</td>
<td>$6.0</td>
<td>$11.3</td>
<td>$0.8</td>
<td>97.5</td>
<td>1.6</td>
<td>12.6</td>
<td>34.3</td>
</tr>
<tr>
<td>Low</td>
<td>$0.4</td>
<td>$0.7</td>
<td>$0.1</td>
<td>16.2</td>
<td>0.1</td>
<td>0.8</td>
<td>5.7</td>
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<tr>
<td>Total</td>
<td>$376</td>
<td>$86.8</td>
<td>$8.8</td>
<td>284.5</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Income Group | Direct Costs (Billions) | Disability Costs (Billions) | Mortality Costs (Billions) | # of People with Diabetes (Millions) | Direct Costs as % of World Total | Indirect Costs as % of World Total | People with Diabetes as % of World total |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>$123.6</td>
<td>$54.3</td>
<td>$7.2</td>
<td>92.6</td>
<td>25.4</td>
<td>24.1</td>
<td>21.2</td>
</tr>
<tr>
<td>Upper Middle</td>
<td>$55.8</td>
<td>$131.9</td>
<td>$9.5</td>
<td>143.7</td>
<td>11.5</td>
<td>55.4</td>
<td>32.8</td>
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<tr>
<td>Lower Middle</td>
<td>$294.5</td>
<td>$44.8</td>
<td>$4.4</td>
<td>170.0</td>
<td>60.6</td>
<td>19.3</td>
<td>38.9</td>
</tr>
<tr>
<td>Low</td>
<td>$12.2</td>
<td>$2.6</td>
<td>$0.6</td>
<td>30.9</td>
<td>2.5</td>
<td>1.3</td>
<td>7.1</td>
</tr>
<tr>
<td>Total</td>
<td>$486.1</td>
<td>$233.6</td>
<td>$21.6</td>
<td>437.2</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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</tbody>
</table>
The anticipated economic toll of NCDs is staggering. Economic burden of NCDs, 2011-2030 (trillions of US$ 2010), based on EPIC model

<table>
<thead>
<tr>
<th>Country income group</th>
<th>Diabetes</th>
<th>Cardiovascular diseases</th>
<th>Chronic Respiratory diseases</th>
<th>Cancer</th>
<th>Mental Illness*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>0.9</td>
<td>8.5</td>
<td>1.6</td>
<td>5.4</td>
<td>9.0</td>
<td>25.5</td>
</tr>
<tr>
<td>Upper-middle</td>
<td>0.6</td>
<td>4.8</td>
<td>2.2</td>
<td>2.3</td>
<td>5.1</td>
<td>14.9</td>
</tr>
<tr>
<td>Lower-middle</td>
<td>0.2</td>
<td>2.0</td>
<td>0.9</td>
<td>0.5</td>
<td>1.9</td>
<td>5.5</td>
</tr>
<tr>
<td>Low</td>
<td>0.0</td>
<td>0.3</td>
<td>0.1</td>
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<td>0.9</td>
</tr>
<tr>
<td>LMIC</td>
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<td>7.1</td>
<td>3.2</td>
<td>2.9</td>
<td>7.3</td>
<td>21.3</td>
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<tr>
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<td>1.7</td>
<td>15.6</td>
<td>4.8</td>
<td>8.3</td>
<td>16.3</td>
<td>46.7</td>
</tr>
</tbody>
</table>

The EPIC tool was developed by the World Health Organization to simulate the economic impact of diseases on aggregate economic output (Abegunde & Stanciole, 2006).
Output losses will speed up over time (Breakdown of NCD cost by disease, based on EPIC model)

<table>
<thead>
<tr>
<th></th>
<th>Cancer</th>
<th>Chronic respiratory disease</th>
<th>Cardiovascular diseases</th>
<th>Diabetes</th>
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<tr>
<td>High Income</td>
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<td>5.1</td>
</tr>
<tr>
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<td>0.9</td>
<td>0.1</td>
<td>0.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Low Income</td>
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<td>0.1</td>
<td>0.2</td>
<td>0.0</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>World</td>
<td>2.5</td>
<td>2.4</td>
<td>8.3</td>
<td>1.2</td>
<td>8.5</td>
<td>22.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th>Chronic respiratory disease</th>
<th>Cardiovascular diseases</th>
<th>Diabetes</th>
<th>Mental Illness</th>
<th>Total</th>
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</thead>
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<tr>
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<td>7.2</td>
<td>1.0</td>
<td>7.3</td>
<td>19.7</td>
</tr>
<tr>
<td>Upper Middle Income</td>
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<td>6.3</td>
<td>0.9</td>
<td>6.5</td>
<td>17.4</td>
</tr>
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<td>0.6</td>
<td>0.5</td>
<td>1.9</td>
<td>0.3</td>
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<tr>
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<td>0.1</td>
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<td>0.4</td>
<td>0.0</td>
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<td>1.0</td>
</tr>
<tr>
<td>World</td>
<td>4.9</td>
<td>4.5</td>
<td>15.8</td>
<td>2.2</td>
<td>16.1</td>
<td>43.4</td>
</tr>
</tbody>
</table>
## Noncommunicable Diseases

### Macro-economic Impact: Lost National Income

<table>
<thead>
<tr>
<th>Countries</th>
<th>Lost national income (billions)</th>
<th>2005</th>
<th>2006-2015 (cumulative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>3</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>China</td>
<td>18</td>
<td></td>
<td>558</td>
</tr>
<tr>
<td>India</td>
<td>9</td>
<td></td>
<td>237</td>
</tr>
<tr>
<td>Nigeria</td>
<td>0.4</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>11</td>
<td></td>
<td>303</td>
</tr>
<tr>
<td>Tanzania</td>
<td>0.1</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

WHO: "Heart disease, stroke and diabetes alone are estimated to reduce GDP between 1 to 5% per year in developing countries experiencing rapid economic growth"
The NCD cost tally

Three different approaches were applied to estimate this burden, and although none of the results are comparable for reasons described above, all approaches yield dauntingly large numbers.

- **Cost-of-illness approach**: estimates of direct and indirect costs of ill health for five distinct disease categories are:
  - Cardiovascular disease: an estimated US$ 863 billion in 2010 rising to US$ 1.04 trillion in 2030.
  - Diabetes: an estimated nearly US$ 500 billion in 2010 rising to at least US$ 745 billion in 2030.
  - Mental illness: an estimated US$ 2.5 trillion in 2010 rising to US$ 6.0 trillion by 2030.

- **EPIC approach**: lost output from five conditions (cancer, cardiovascular disease, chronic respiratory diseases, diabetes and mental health) over the period 2011-2030 is estimated at nearly US$ 47 trillion.

- **VSL approach**: the economic burden of life lost due to all NCDs ranges from US$ 22.8 trillion in 2010 to US$ 43.3 trillion in 2030.
What prevents effective NCD action?

- MYTHS ABOUT NCDs: *diseases of affluence, of ageing, of men*
- Underestimation of prevention impact
- Myth of cognitive delay in prevention effect
- LOW PUBLIC VISIBILITY (*perceived threat*)
- LACK OF DIRECT ECONOMIC INTERESTS (*vs drugs or clinical measures*)
- CONFLICTING MESSAGES, *often related to commercial interests*
- INERTIA IN CHANCE: *administration, financing, services etc*
Third Public Health Revolution

• Third revolution is about moving from an illness model to focusing on all of the things that promote wellbeing both at individual as well as at population level
• Building Health not just absence of disease
Strategic Problem for the population health

• What is the optimal balance of investments (e.g., dollars, time, policies) in the multiple determinants of health (e.g., behavior, environment, socioeconomic status, medical care, genetics) over the life course that will maximize overall health outcomes and minimize health inequities at the population level?

Kindig D. Understanding Population Health Terminology. Milbank Q. 2007.;85:139-161
Figure 2. Results of a Reanalysis of the Monthly Prevalence of Illness in the Community and the Roles of Various Sources of Health Care.

Each box represents a subgroup of the largest box, which comprises 1000 persons. Data are for persons of all ages.

Bridging Silos: Multi-sectoral action for NCD Management

EXPANDING DELIVERY PLATFORMS

- Information and awareness—package labelling, health promotion, nutrition education, etc.
- Diagnostics and treatment—blood pressure monitoring, etc.
- Settings—schools, workplaces, religious sites, community centres, etc.
**Bridging Silos: Multi-sectoral action for NCD Management**

### NCD-SPECIFIC ACTIONS ON SOCIAL DETERMINANTS

1. **Expanding Delivery Platforms**
   - Information and awareness—package labelling, health promotion, nutrition education, etc.
   - Diagnostics and treatment—blood pressure monitoring, etc.
   - Settings—schools, workplaces, religious sites, community centres, etc.

2. **Alcohol, tobacco taxes**
3. **Social norms on eating, drinking, body image**
4. **Regulation of production or sale of alcohol, tobacco, trans fats, excess sugars**
5. **Smoke-free places**
6. **Incentives for improved diet, physical activity**
**Bridging Silos:** Multi-sectoral action for NCD Management

<table>
<thead>
<tr>
<th>EXPANDING DELIVERY PLATFORMS</th>
<th>NCD-SENSITIVE ACTIONS ON SOCIAL DETERMINANTS</th>
<th>NCD-SPECIFIC ACTIONS ON SOCIAL DETERMINANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Information and awareness— package labelling, health promotion, nutrition education, etc.</td>
<td>• Employment and working conditions</td>
<td>• Alcohol, tobacco taxes</td>
</tr>
<tr>
<td>• Diagnostics and treatment— blood pressure monitoring, etc.</td>
<td>• Social protection</td>
<td>• Social norms on eating, drinking, body image</td>
</tr>
<tr>
<td>• Settings—schools, workplaces, religious sites, community centres, etc.</td>
<td>• Education availability and accessibility (especially early childhood development)</td>
<td>• Regulation of production or sale of alcohol, tobacco, trans fats, excess sugars</td>
</tr>
</tbody>
</table>

- Smoke-free places
- Incentives for improved diet, physical activity
- Healthy places
**Bridging Silos:** Multi-sectoral action for NCD Management

### NCD-Sensitive Actions on Social Determinants

#### 1. NCD-Specific Actions on Social Determinants
- Alcohol, tobacco taxes
- Social norms on eating, drinking, body image
- Regulation of production or sale of alcohol, tobacco, trans fats, excess sugars
- Smoke-free places
- Incentives for improved diet, physical activity

#### 2. NCD-Specific Actions on Social Determinants
- Employment and working conditions
- Social protection
- Education availability and accessibility (especially early childhood development)
- Healthy places

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### Expanding Delivery Platforms

- Information and awareness—package labelling, health promotion, nutrition education, etc.
- Diagnostics and treatment—blood pressure monitoring, etc.
- Settings—schools, workplaces, religious sites, community centres, etc.

---

More specific to NCDs, more targeted to individuals and groups

Broader development synergies that can be made NCD-sensitive, more targeted at social determinants and environment
Bridging Silos: Multi-sectoral action for NCD Management

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Burden and Cost of NCD
First Revolution

Second Revolution

Third Revolution

Strategic Planning

Burden and Cost
Maximise value by allocating optimally

Maximise value by using resources optimally

Value-based and shared decision-making

Added value from doing the right things

Add value from doing things right
Conclusion

• The future of public health practice will be defined by both the "first revolution" of infectious disease and the "second revolution" of chronic disease.

• Collective community action, grounded in environmental approaches, will determine our progress via “third revolution”
QUESTIONS?

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+6019 254 2482