A Global View of Heart Health

Sir Magdi Yacoub, FRS
Professor of Cardiothoracic Surgery
Imperial College London
A global view of heart health

I. **Chronology**

- Prologue
- Size of the problem
- Gross inequalities
- The concept of neglected diseases
- Challenges and opportunities
- The future
II. Prologue

“The heart of creatures is the foundation of life, the prince of all, the sun of their microcosmos from where all vigor and strength does flow”

William Harvey
De Motu Cordis
1628
A global view of heart health

Size of the problem

1. CVD as the main cause of mortality
2. Affects all sectors of community (age, sex, social strata)
3. Developed and developing.
4. Major causes ↓ QOL.
5. Loss of earnings to individuals and nations.
6. Other economic impacts.
Causes of global mortality

<table>
<thead>
<tr>
<th>Cause</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular diseases</td>
<td>16,733,000 (29%)</td>
</tr>
<tr>
<td>Infectious and parasitic diseases</td>
<td>14,867,000 (26%)</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>7,121,000 (12%)</td>
</tr>
<tr>
<td>Violence/injuries/accidents/suicides</td>
<td>5,168,000 (9%)</td>
</tr>
<tr>
<td>Chronic lung diseases</td>
<td>3,702,000 (6%)</td>
</tr>
<tr>
<td>Pregnancy-related deaths</td>
<td>2,972,000 (5%)</td>
</tr>
<tr>
<td>Other</td>
<td>2,398,000 (4%)</td>
</tr>
<tr>
<td>Digestive diseases</td>
<td>1,968,000 (3%)</td>
</tr>
<tr>
<td>Neuropsychiatric disorders</td>
<td>1,112,000 (2%)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>988,000 (2%)</td>
</tr>
</tbody>
</table>

Total deaths 57,029,000

WHO, 2004
Grand challenges in chronic non-communicable diseases

The top 20 policy and research priorities for conditions such as diabetes, stroke and heart disease.

Abdallah S. Daar¹, Peter A. Singer¹, Deepa Leah Persad¹, Stig K. Pramming², David R. Matthews³, Robert Beaglehole⁴, Alan Bernstein⁵, Leszek K. Borysiewicz⁶, Stephen Colagiuri⁷, Nirmal Ganguly⁸, Roger I. Glass⁹, Diane T. Finegood¹⁰, Jeffrey Koplan¹¹, Elizabeth G. Nabel¹², George Sama¹³, Nizal Sarrafzadeh¹³, Richard Smith¹⁴, Derek Yach¹⁵ and John Bell¹⁶

Chronic non-communicable diseases (CNCDs) are reaching epidemic proportions worldwide¹⁷-²⁰. These diseases — which include cardiovascular conditions (mainly heart disease and stroke), some cancers, chronic respiratory conditions and type 2 diabetes — affect people of all ages, nationalities and classes. The conditions cause the greatest global share of death and disability, accounting for around 60% of all deaths worldwide. Some 80% of chronic-disease deaths occur in low- and middle-income countries. They account for 44% of premature deaths worldwide.

Poor diet and smoking are two factors that contribute to the millions of preventable deaths that occur each year.

• All patients are the same.
  Paul Dudley White (1886-1973)

• We are all the same.
  Never mind I am going to make my life matter
  Nkosi Johnson (1989-2001)
The sobering facts: global inequalities in

- Life expectancy

- Resource allocation to health delivery

- Research in cardiovascular disease
Science with Africa

The massive divide in Life Expectancy

Figure 1: Estimated life expectancy at birth, countries with available data and selected population groups, males.

Abbreviations: I = Indigenous Australian, Af = African American, M = NZ Maori, N = Native American, C = Canadian Native, Au = all Australian.
Data sources: UN Department of Economic and Social Affairs 1998 (6); ABS 1999 (8); US Bureau of Census 2000 (9); Peters et al. 1998 (11); Indian Health Service 1999 (12); Statistics New Zealand 2000 (13); ABS, unpublished data, Indian and Northern Affairs Canada, unpublished data.
MASSIVE DIVIDE IN LIFE EXPECTANCY

Life expectancy at birth, 2008

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not be full agreement.

Data Source: World Health Organization
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization
© WHO 2010. All rights reserved.
A global view of heart health

Infant mortality

Per 1000 live births

- Worldwide 49 per 1000
- Developed countries 6 per 1000
- Developing countries 85 per 1000

Population Reference Bureau
World Population data sheet 2008
A global view of heart health

Congenital Heart Surgery

Resources

Congenital heart surgeries per population

Africa 1 : 38,000,000

North America and Europe 1 : 3,000,000

Bernier PL, 2010
Disease appearance and evolution

Potential causes of the divide in Life Expectancy

- Poverty
- Culture
- Climate
- Health care delivery
- Reduced resources

- Emerging diseases and evolution of existing diseases
Re-Emergence
2

- War/ Biological weapons
- Migration
- Globalisation
A global view of heart health

Grand challenges in chronic non-communicable diseases

Goal A: Raise public awareness

Goal B: Enhance economic, legal and environmental policies

Goal C: Modify risk factors

Goal D: Engage businesses and community

Goal E: Mitigate health impacts of poverty and urbanization

Goal F: Reorientate health systems
Carlos Chagas described the disease and vector in 1909
CHAGAS DISEASE
SPREAD OF CHAGAS TO NON-ENDEMIC AREAS

Nature 2010
Disease appearance and evolution

Mode of Global Spread of CHAGAS

Migration
Vector spread
Blood transfusion
Organ Transplantation
Child Birth
Lab accident
Disease appearance and evolution

Mocumbi AO et al
JACC Vol 55 (7);
16 February
2010, 680-687
INSTITUTO DO CORAÇÃO
CENTRO DE INVESTIGAÇÃO DE DOENÇAS CARDIOVASCULARES
INHARRIME
PATROCÍNIO: MAGDI YACOUB INSTITUTE - REINO UNIDO
Chain of Hope UK
Project in Kenya

In collaboration with the Mater Hospital run by the dedicated Sisters of Mercy (clinical training and research)
Ethiopia Project

State of the art clinical facility (in collaboration with Children Heart Fund of Ethiopia)

Evolving basic science research facility (planning stage)
Science in Egypt 5000 years ago
Egypt’s decade of science

1. My own personal experience

2. Partners for ‘Atlas’ Egyptian case study

- Lead researcher: Michael Bond

- National Research Partner: Bibliotheca Alexandrina

- National Focal Point: Academy of Scientific Research and Technology
Egypt’s geography

80 million inhabitants
Aswan Heart Centre for Science and Practice
Aswan Heart Centre for Science and Practice: mission statement

1. Offers state-of-the-art treatment to children and adults regardless of colour, religion or creed

2. Free of charge at entry

3. Research as an integral part of the mission (one third of budget)

4. Develop CV science and biotechnology in Egypt
Egypt’s decade of science

• To run from 2007-2017

• Expansion of Egypt’s scientific and technological capabilities

• Enhanced co-operation with international partners

• President’s Supreme Council for Science and Technology established
People

- Large, youthful population
- Science graduates are in a small minority
- Students have to be trained to ‘think like scientists’
- Business critical of graduates’ ability to apply knowledge intelligently
- Ministry of Education £2.6 billion five-year plan for pre-university education reform

Maat (goddess of truth “science”)
Places

• Capacity of universities and research centres to win R&D funds varies hugely

• Centres of Upper Egypt attract less funding, publish fewer papers and win fewer patents relative to their size

• Cairo metropolitan area contains the greatest concentration of research institutes

• Competitive sources of funding introduced in 2007 and 2008
Centres of Excellence

- Cancer Biology Research Laboratory, University of Cairo
- Nanoelectronics Integrated Systems Center, Nile University
- Analytical Chemistry Unit, Assiut University
- Mubarak City for Scientific Research and Technology Applications
Business

- Of Egypt’s total investment in R&D, only 5% comes from nongovernmental sources
- Businesses tend to import goods or manufacturing products licensed from foreign companies, rather than focusing on the engineering and development of their own products
- Difference in ‘mindset’ between academia and industry
A decade of science: Conclusions

• Lessons from ancient culture of science
• Heightened awareness, needs fostering
• Early developments are encouraging
• New dawn of “freedom” could be extremely helpful
Disease appearance and evolution

Possible Solutions

1) North-South and South-South collaborations

2) Empowering local researchers

3) Data collection, validation of predictors

4) Targeted strategies
A Global View of Heart Health

Melbourne 2011

1886-1973
Paul Dudley White

We who are “Medicin Du Coeur” would also like to perform the miracle of Healing the troubled World of Today by a Universal Bond of Spiritual Brotherhood.

World Congress of Cardiology, Paris 1950