America’s Vital Interest in Global Health

Perspectives from the Fogarty International Center

Institute of Medicine
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The Fogarty International Center

Mission
To address global health challenges through innovative and collaborative programs for research and training

To support and advance the NIH mission through global partnerships

“Science for Global Health”
The United States is currently the global leader in biomedical research...

The failure to engage in the fight to anticipate, prevent, and ameliorate global health problems would diminish America's stature in the realm of health and jeopardize our own health, economy, and national security”
NIH Supporters

Eunice Kennedy Shriver National Institute of Child Health and Human Development

National Cancer Institute

National Heart, Lung, and Blood Institute

National Center for Complementary and Alternative Medicine

National Center for Research Resources

National Eye Institute

National Human Genome Research Institute

National Institute on Alcohol Abuse and Alcoholism

Fogarty International Center

National Institute of Allergy and Infectious Diseases

National Institute of Arthritis and Musculoskeletal and Skin Diseases

National Institute on Deafness and Other Communication Disorders

National Institute of Dental and Craniofacial Research

National Institute on Drug Abuse

National Institute of Environmental Health Sciences

National Institute of Mental Health

National Institute of Neurological Disorders and Stroke
Much has changed since the 1997 IOM Report

New Advocates for Global Health
Major Presidential Initiatives

Presidents Emergency Program For Aids Research PEPFAR
$15 B – 5 years & Reauthorization

Avian flu & emerging infections

Presidents Malaria Initiative
$1.2 B – 5 years

Neglected Tropical Diseases
$350 M
Global Health: A New Frontier of Science: *Accelerating Discovery*

Genomics, Proteomics, Metabolomics…
Nanoscience
Molecular biology
Clinical trials networks
Imaging & biomarker advances
Information & communications technology

“The speed of biomedical advance is accelerating –like Moore’s law”

Ray Kurzweil
(International dollars are derived from national currencies by assessment of purchasing power, not by exchange rates. Source: World Development Report 1993 p. 34.)
Life expectancy in China
1960-2000

• Life expectancy in China rose from 39 years in 1960 to 71 years in 2000
• ~ 8 years per decade for 4 decades
• The most rapid prolongation of life in history
• The consequences on health have been enormous!
### GLOBAL BURDEN OF DISEASE (DALYS)

<table>
<thead>
<tr>
<th>1990</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Respiratory Infection</td>
<td>Ischaemic heart disease</td>
</tr>
<tr>
<td>Diarrhoeal Disease</td>
<td>Depression</td>
</tr>
<tr>
<td>Perinatal</td>
<td>Road Traffic Accidents</td>
</tr>
<tr>
<td>Depression</td>
<td>Cerebrovascular</td>
</tr>
<tr>
<td>Ischaemic Heart Disease</td>
<td>COPD</td>
</tr>
<tr>
<td>Cerebrovascular</td>
<td>Lower Respiratory Infection</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Measles</td>
<td>War</td>
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<tr>
<td>Road Traffic Accidents</td>
<td>Diarrhoeal Disease</td>
</tr>
<tr>
<td>Congenital Diseases</td>
<td>HIV</td>
</tr>
</tbody>
</table>

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</table>
Leading causes of Disability-Adjusted life years in low/middle-income and High-income countries, by World Bank Region, 2001

<table>
<thead>
<tr>
<th>Rank</th>
<th>South Asia (GNI: $450) LE:63</th>
<th>Sub-Saharan Africa (GNI: $460) LE:46</th>
<th>East Asia and the Pacific (GNI: $900) LE:69</th>
<th>Europe and Central Asia (GNI: $1,970) LE:69</th>
<th>Middle East and North Africa (GNI: $2,200) LE:68</th>
<th>Latin America and the Caribbean (GNI: $3,580) LE:71</th>
<th>High-income countries (GNI: $26,500) LE:78</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perinatal conditions</td>
<td>HIV/AIDS</td>
<td>Cerebrovascular diseases</td>
<td>Ischemic heart disease</td>
<td>Ischemic heart disease</td>
<td>Perinatal conditions</td>
<td>Ischemic heart disease</td>
</tr>
<tr>
<td>2</td>
<td>Lower respiratory infections</td>
<td>Malaria</td>
<td>Perinatal conditions</td>
<td>Cerebrovascular diseases</td>
<td>Perinatal conditions</td>
<td>Unipolar depressive disorders</td>
<td>Cerebrovascular diseases</td>
</tr>
<tr>
<td>3</td>
<td>Ischemic heart disease</td>
<td>Lower respiratory infections</td>
<td>Chronic obstructive pulmonary disease</td>
<td>Unipolar depressive disorders</td>
<td>Traffic accidents</td>
<td>Homicide and violence</td>
<td>Unipolar depressive disorders</td>
</tr>
<tr>
<td>4</td>
<td>Diarrheal diseases</td>
<td>Diarrheal diseases</td>
<td>Ischemic heart disease</td>
<td>Self-inflicted injuries</td>
<td>Lower respiratory infections</td>
<td>Ischemic heart disease</td>
<td>Alzheimer's and other dementias</td>
</tr>
<tr>
<td>5</td>
<td>Unipolar depressive disorders</td>
<td>Perinatal conditions</td>
<td>Unipolar depressive disorders</td>
<td>Chronic obstructive pulmonary disease</td>
<td>Diarrheal diseases</td>
<td>Cerebrovascular diseases</td>
<td>Tracheal and lung cancer</td>
</tr>
</tbody>
</table>

GNI = gross national income per capita (US$); LE = life expectancy at birth (average male and female).

Sources: Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL, eds 2006 15; World Development Indicators, 2003
In the 21st Century, Global Health is in transition

- From infectious diseases & child health – “the unfinished agenda”
- To chronic diseases – cardiovascular disease, cancer, stroke, diabetes, smoking, mental illness – “the second agenda’
- Towards new problems facing us all – obesity, environmental hazards, injuries & accidents, climate change, addictions, “the third agenda”
Our approaches to global health research must change

- **Multi-disciplinary teams** — engaging engineers, behavioral scientists, economists, policy experts, modelers, anthropologists.....

- **Address complex diseases** — multifactorial etiologies, behavioral changes,

- **Address implementation science** — the gap between what we know and what we do!

- **Sustainability** — consider long term training, partnerships, & centers of excellence

- **New Partners** — expanding research communities in India, China, Brazil, S. Africa ......
GLOBAL EXAMPLES OF EMERGING AND RE-EMERGING INFECTIOUS DISEASES (A.S. FAUCI)
GLOBAL EXAMPLES OF ENDURING ENVIRONMENTAL DISASTERS

- Global Warming
  - London Smog (1952)
  - Seveso-Italian dioxin crisis (1976)
  - Chernobyl disaster (1986)
  - Baia Mare cyanide spill (2000)

- Desertification
  - Water pollution
  - Love Canal
  - Spanish waste water spill (1998)

- Health Disasters
  - Mustard gas exposure
  - Cholera
  - Mercury poisoning
  - Mining
  - Asbestosis, silicosis
  - Chronic arsenic poisoning

- Industrial Disasters
  - Atmospheric pollution
  - Lead smelters
  - Pesticide poisoning
  - Alaska oil spill (1989)
  - Three Mile Island (1979)

- Other Disasters
  - Radiation effects
  - Minimata disease-methyl-mercury poisoning
  - Bhopal-Union Carbide gas leak (1984)
  - Indoor air pollution
  - Deforestation
  - Mining
GLOBAL EXAMPLES OF PEDIATRIC AND ADULT CANCERS

- Lung
- Nasopharyngeal
- Wilm's tumor
- Skin
- Stomach
- Oral cavity
- Liver
- Oral cavity
- Skin
- Lip
- Oesophagus
- Burkitt's lymphoma (area shaded in red)
- Bladder
- Kaposi sarcoma
- Adrenocortical carcinoma
- Cervix uteri
- Prostate
- Testis
- Colon and Rectum
GLOBAL EXAMPLES OF GENETIC DISEASES AND DISORDERS
Grand challenges in chronic non-communicable diseases

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

Chronic non-communicable diseases (CNCDs) are reaching epidemic proportions worldwide. 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.
Implementation Science

Temina Madon, Karen J. Hofman, * Linda Kupfer, Roger I. Glass

“We face a formidable gap between innovations in health (including vaccines, drugs, and strategies for care) and their delivery to communities in the developing world.”

- A field of research that seeks ways to optimize scientific advances & facilitate their adoption in the real world

- Compelling need: 14,000 deaths per day in developed world from HIV, malaria & diarrheal disease, despite medical breakthroughs

*Implementation science will help determine evidence-based strategies that will work*
Capacity Building - Investing in Leaders
AITRP (Aids Int’l Training & Research Program (1988-…))
We need to train the research workforce of tomorrow today at home .....
Challenges for the IOM - Training

• How do we prepare the US research “work-force” to meet future challenges in global health research and to function in the global arena?

• How do we ensure that US universities & research centers maintain their preeminence in medical research & continue to train the best & brightest from abroad?

• How do we train a generation of scientific leaders & researchers rapidly in country while providing career paths to remain at home?
Challenges for the IOM - Funding

• How do we leverage government & donor investments creatively to ensure sustainable, enduring outcomes – move from “assistance programs” to long term partnerships?

• How can we build centers of excellence in the research & training in the developing world to sustain long term research collaborations?

• Can we build IT infrastructure to enable long distance learning, consultation, research, on a grand scale linking US researchers with those in the developing world?
Challenges for the IOM - Partnerships

• How do build the most effective partnerships in the developing world with---
  
  • Local governments & institutions
  • International governments, agencies & donors (G-8)
  • Private sector
  • Civil society – research councils & science agencies

& provide for a coordinated plan of action, funding & long term support?
Americans have benefited from the results of Global Health Research in the past

- Oral rehydration therapy for diarrhea (Bangladesh)
- First chemotherapy for cancer (Uganda)
- Gene discovery (eg. Huntington’s gene (Venezuela) & deafness (Pakistan)- Human genome
- Identifying emerging infections (SARS, Nipah virus, & bird flu – Asia & new problems (XDR-TB – S. Africa)
- Clinical trials of new drugs & vaccines
- New drugs from traditional medicines (artemisinin, cancer drugs)
- Cancer Genome – multicenter activities

We will benefit even more in the future
The Landscape Is Flat

…. "virtually” ….the Internet has nullified time and distance in a digital age

We have a flat world in:

• Business
• Banking
• Communications
• Music
• Entertainment
• News

How about biomedical science?
Why invest in global health?

- For scientific discovery
- To bring evidence-based solutions to global problems
- For diplomacy, humanitarianism & good will
- For our enlightened self interest - unique people, populations & scientific opportunities
- To counter terrorism & anticipate threats
- For economics – for our competitiveness & their development - *It’s just the right thing to do?*