Burden of Disease – Implications for Future Research

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“It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.”

Why we measure the Burden of Disease ?

Because we want : -

- To determine the incidence and severity of disease by person, place and time variables
- *To identify emerging trends and anticipate future needs*
- To identify which interventions would have the greatest effect
- *To assist in determining priorities for expenditure*
- To provide information for education to the public
- To help in setting health research agendas

Leading Causes of Death in Asia Pacific Region

Leading Causes of Death

WHO South East Asia Region (largely India), 2002

SN	Cause	Deaths (000's)	Percent
1	Ischaemic heart disease	2,038	13.9
2	Lower respiratory infections	1,371	9.4
3	Cerebrovascular disease	1,058	7.2
4	Perinatal conditions	1,012	6.9
5	Tuberculosis	690	4.7
6	Chr. obstructive pulmonary disease	656	4.5
7	Diarrhoeal diseases	599	4.1
8	HIV/AIDS	373	2.6
9	Road traffic accidents	295	2.0
10	Diabetes mellitus	262	1.8
11	Self-inflicted injuries	246	1.7
12	Cirrhosis of the liver	203	1.4
13	Measles	197	1.3
14	Fires	183	1.3
15	Trachea, bronchus, lung cancers	173	1.2

Leading Causes of DALYs
Asia-Pacific Region, 2002

	Cause	DALYs (000's)	Percent
1	Lower respiratory infections	38,319	5.7
2	Unipolar depressive disorders	35,493	5.3
3	Ischaemic heart disease	27,466	4.1
4	Diarrhoeal diseases	26,657	4.0
5	Cerebrovascular disease	26,443	3.9
6	Tuberculosis	21,636	3.2
7	Road traffic accidents	18,610	2.8
8	Chr. obstructive pulmonary disease	17,980	2.7
9	Cataracts	15,622	2.3
10	Hearing loss, adult onset	14,785	2.2
11	Self-inflicted injuries	13,342	2.0
12	HIV/AIDS	12,791	1.9
13	Falls	10,022	1.5
14	Schizophrenia	9,077	1.3
15	Measles	8,228	1.2

These findings clearly indicate that : -

A visible change in scenario :

- Clear evidence of advancing epidemiological transition
- Major vascular diseases (stroke, IHD) already leading causes of death
- Specific causes of major importance in different regions (e.g. COPD in China, stomach cancer in Japan, TB and traffic accidents in Thailand/Indonesia)
- Major childhood diseases of poverty (pneumonia, diarrhoea, perinatal causes, TB) still major causes of death in India and neighbours
- No real evidence yet of HIV/AIDS as major cause of death in Region, except South Asia (300,000-400,000 deaths)
- Mental disorders/injuries major cause of non-fatal outcomes

Projected changes :

The next 20 years

Projected Change in Rank/Order of DALYs for the 15 Leading Causes in 2020 Compared with 1990

2020	Disease or Injury	1990
1	Ischemic heart disease	5
2	Unipolar major depression	4
3	Road traffic collisions	9
4	Cerebro vascular disease	6
5	Chronic obstructive pulmonary disease	12
6	Lower respiratory tract infections	1
7	Tuberculosis	7
8	War	16
9	Diarrheal diseases	2
10	Human immunodeficiency virus	28
11	Conditions arising during the perinatal period	3
12	Violence	19
13	Congenital anomalies	10
14	Self-inflicted injuries	17
15	Trachea, bronchus, and lung cancers	33

While projecting these changes, one has to keep in mind....

Burden of long term illness

- About three quarters of those over 75 years have long term illness, and the figure continues to rise
- Accounts for 80% of GP consultations and 60% of hospital bed days in the UK
- Two thirds of medical emergency admissions are caused by exacerbations of chronic disease or occur in patients with chronic disease

Poverty and Burden of Disease

- It is important to monitor the coverage and quality of intervention especially with regard to the poor and vulnerable.

- There have been suggestions that new health care interventions tend to first reach population groups that least need them ; the rich.

Limitations of BOD studies in decision making for future research:

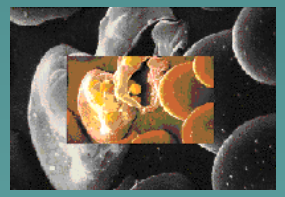
- Burden of disease study is simply a method or tool to be used to assist decision makers in resource allocation
- Not only are there problems of trying to put so many dimensions of health together, but there can be serious concerns about the reliability and validity of information upon which they are based
- Continuing vigilance in how data are obtained, compiled and used is critical, and those responsible for using these methods must have a clear technical understanding of what is behind the numbers and the underlying assumptions associated with these approaches

Challenges to Public Health

Acute to Chronic Conditions

Aging Population

Health Disparities



Emerging Diseases

Challenges for Future Research

- The proportion of people above 65 will increase and the burden of non-communicable disease will rise.
- DALYs are expected to dramatically decrease in respect of diarrhea diseases and respiratory infections and less dramatically for maternal conditions.
- HIV infections in children under 15 to rise significantly up to 2010.

However, these Predictions about future Health of individuals and population can be uncertain

Because of : -

- Changes in individual behavior health risks
- Interventions and outcome
- Changes in levels and distribution of wealth an incomes and by the direction of scientific discovery
- Changing popular perceptions in a post-modern world about the meaning of health, disease and well being

How to move about ?

Time Frame for major decision within the health sector and data that supports this process needs to be made available

While predicting for future health, one has to keep in mind the ongoing : -

1. ***Socio-demographic changes***
2. ***Newer developments***
3. ***Techniques***
4. ***Drugs***
5. ***Vaccines***

And therefore the future research needs are to be

based on …..

- **Framework for what data is needed**
- **Intervention that may reduce this loss**
- **The costs of these interventions**
- **Effectiveness / cost ratio of intervention, and**

this information should serve as the foundation for policy of resource planning decisions

Burden of Disease Studies Help in Decision Making for Future Research Needs by : -

- **Rationing of health care resources and choices about the best use of funds for health.**
- **The poor countries should be careful in choosing how to optimize health expenditures to obtain the most health in the most equitable fashion.**

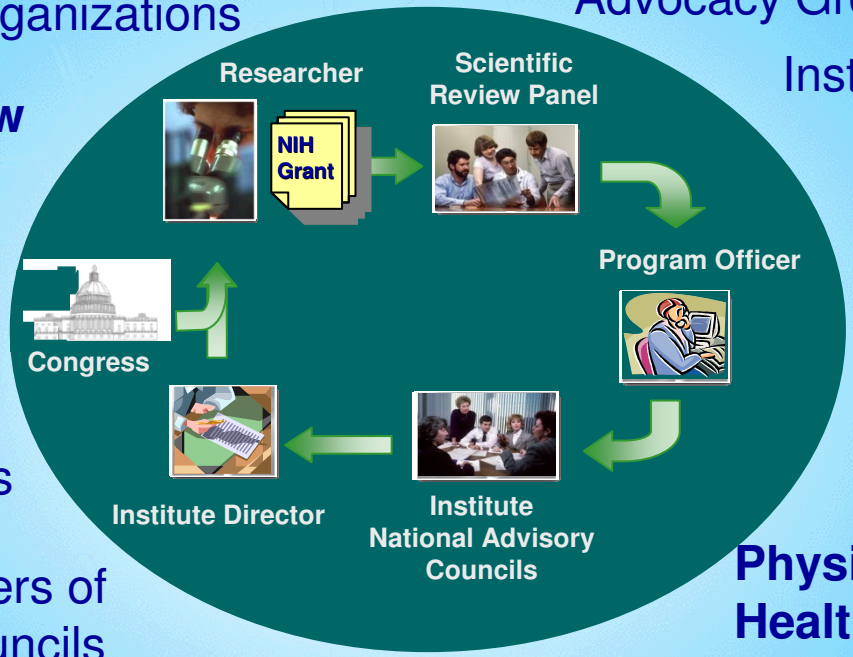
Setting Research Priorities

The Commission on Health Research for Development (1990) reviewed Global health needs and priorities for health research and identified a great inequity in the allocation of research funds-the 5/95 gap ; Less than 5% of global health research funds devoted to 95% of the world health problems which were measured using years of life lost.

Setting Research Priority : WHO's Five Step Process

1. Estimate the magnitude of the disease burden and its distribution
2. Analyze the determinants responsible for persistence of the disease burden
3. Assess existing intervention and efforts reduce the burden of disease
4. Estimate the potential cost effectiveness of future interventions to reduce the burden of disease
5. Identify the level of resource being inevsted to address the burden of disease

Setting Future Research Priorities :Every Voice Counts



General Public

Scientists

Voluntary Organizations

Patients & Their Advocacy Groups

Institute Staff

Scientific Review Committees

Congress

President & Administration

Scientist Council Members

Boards of Scientific Counselors

Ad Hoc Advisors

Public Members of Advisory Councils

Physicians & Other Health Professionals

Professional Societies

Industry Scientists

Industry Managers

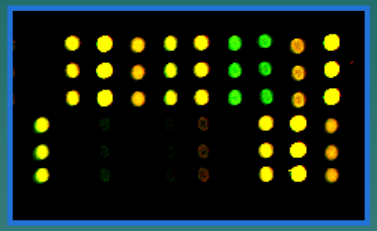
Source: NIH, USA

Future Research Needs : Shift in Focus (from 20th to 21st Century)

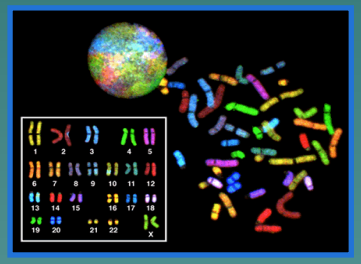
20th Century	21st Century
Treatment of disease when symptoms appear and normal function is lost	Intervene before symptoms appear and preserve normal function for as long as possible
No understand ing of molecular and cellular events leading to disease	Understanding of preclinical molecular events and ability to detect patients at risk
Expensive financial and disability costs	Orders of magnitude more effective

Source: NIH, USA

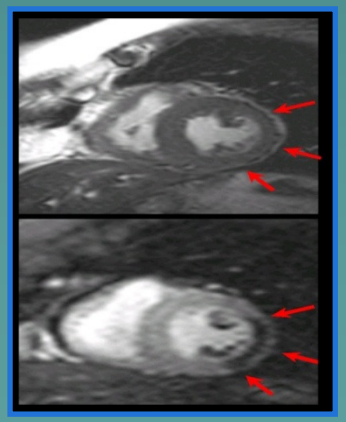
Future Research Needs : The Areas of Concern



Genomics – With a greater understanding of the molecular basis of diseases, the possibility of developing successful prevention and treatment strategies is greatly enhanced



Advanced Technologies – New approaches to studying protein structure and function will bring great insights into the study of diseases and the design of new drugs

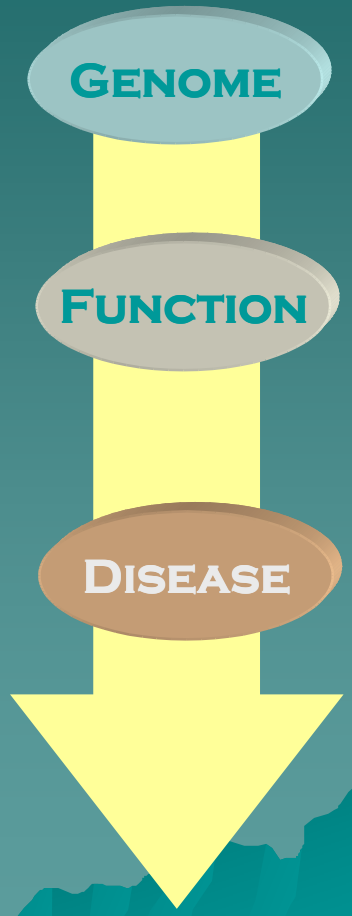


Disease Prevention, Diagnosis, and Treatment - New age of medical research with advanced molecular and imaging techniques provides unprecedented opportunities to design new ways to prevent, diagnose, and treat many diseases and conditions

NIH

Research in the 21st century : **Challenges**

- Characterise the function of every gene in the mammalian genome
- Generate mutations in every gene in the mouse genome
- Characterise the phenotype of every mutant mice
- Identify models of human disease



Research in the 21st Century : **Needs**

Training and Collaboration – The need for interdisciplinary teams to put together the "big picture"

High-risk, high-impact research – Being encouraged in the intramural program

Health Disparities – Research to eliminate health disparities affecting minority populations and the medically underserved

Health Education and Outreach – Informing people about the latest advances in medical research so they can take the best steps to improve their health, avoid diseases, or seek treatment

Source: NIH

Scope for the Future Research

- **Scientists to be involved in identification of molecules against which drugs can be targeted. This will be possible through.**
  - ***Genome***
  - ***Transcriptosome***
  - ***Proteome analysis***
- **Advances in drug delivery systems will help achieve gene therapy and targeting drug for greater efficacy and safety.**

- Genomics in environmental health research will offer new opportunities and challenges

- The linkage of genomics, proteomics and metabolomics to conventional toxicology and pathology databases holds great promise for elucidating mechanisms of gene-environment interaction in human health and disease in the years to come.

“The great end of life is not knowledge, but action.”

- Thomas Henry Huxley

Thank You