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The full article is available for preview on request to R.Francis@nature.com. Advance phone interviews are available; please call contacts to schedule a time.

Curbing World's Most Fatal Diseases: Consensus Created by Health Experts Offers a New Global Prescription

*20 'Grand Challenges' in Chronic Non-Communicable Diseases,
1st Agreed Roadmap to Reduce Rising Toll of Slow Killer Illnesses*

Several of the world's most eminent health scientists and organizations today published a landmark global consensus on the 20 foremost measures needed to curb humanity's most fatal diseases, their study featured in Nature magazine.

Known as chronic, non-communicable diseases, they are reaching world epidemic proportions and include cardiovascular diseases (mainly heart disease and stroke), several cancers, chronic respiratory conditions, and type 2 diabetes.

In their paper for Nature, the authors (list appended) say chronic non-communicable diseases:

- Cause the greatest share of death and disability worldwide;
- Account for over 60% of deaths worldwide, four-fifths of those fatalities being citizens of low and middle income countries;
- Cause twice as many deaths as the combined total of HIV/AIDS, tuberculosis, malaria, maternal and peri-natal conditions, and nutritional deficiencies.

Researchers used the structured consensus-building "Delphi" technique to create the "Grand Challenges in Chronic Non-Communicable Diseases (CNCs)" – a distillation of

informed opinions drawn from 155 panel members across 50 nations, carefully selected from recommendations.

Study authors say the result is an authoritative list of the 20 most important challenges today to restraining and reversing the toll of these slow killer illnesses. The list of Grand Challenges is accompanied by research priorities for meeting them, drawn from the study data and finalized by leading world health figures guiding the project (list appended).

CNCDs, defined by the WHO as cardio-vascular disease, type 2 diabetes, chronic respiratory diseases and certain cancers, are largely preventable. It's estimated that eliminating key risk factors (poor diet, physical inactivity, smoking) would prevent 80% of heart disease, strokes and type 2 diabetes, and over 40% of cancer cases.

The initiative's leaders say their goals are "to galvanize the health, science and public policy communities into action on this epidemic," and to foster global debate, support and funding.

Leading partners behind the project are the McLaughlin-Rotman Center for Global Health (University Health Network and University of Toronto), Toronto; the Oxford Health Alliance, London; the UK Medical Research Council, London; the Canadian Institutes of Health Research, Ottawa; and the US National Institutes of Health, Bethesda.

The 20 Grand Challenges (appended) are of equal precedence – there is no priority assigned within the list, says lead author Dr. Abdallah S. Daar of the McLaughlin-Rotman Center.

The Grand Challenges are grouped under six broad goals:

- Reorient **health systems** (*e.g.* *Grand Challenge*: "Allocate resources within health systems based on burden of disease");
- Mitigate health impacts of **poverty and urbanization** (*e.g.*: "Study and assess how poverty increases risk factors");
- Engage **businesses and community** (*e.g.*: "Make business a key partner in promoting health and preventing disease; Develop and monitor codes of responsible conduct with the food, beverage and restaurant industries");
- Modify **risk factors** (*e.g.*: "Deploy universally measures proven to reduce tobacco use and boost resources to implement the WHO framework Convention on Tobacco Control");
- Enhance economic, legal and environmental **policies** (*e.g.* "Study and address the impacts of poor health on economic output and productivity"); and
- Raise public and political **awareness** (*e.g.*: "Promote healthy lifestyle and consumption choices through effective education and public engagement").

The Grand Challenges in CNCDs complement the "Grand Challenges in Human Health," published in 2003 by the Bill and Melinda Gates Foundation and partners, an initiative focused mainly on infectious disease, especially in developing countries.

“Without concerted action, some 388 million people will die of one or more CNCDs in the next 10 years,” according to co-author Nizal Sarrafzadegan, Professor, Isfahan University of Medical Sciences, Iran. “With concerted action, the number of premature deaths prevented by 2015 would total at least 36 million – a number of people roughly equal to the population of Canada, Algeria or Kenya.”

Noting the economic impact of CNCDs, co-author Robert Beaglehole, former WHO Director (Department of Chronic Diseases and Health Promotion), says that unless serious action is taken now, over the next decade China, India and the U.K. will lose an estimated \$558 billion, \$237 billion and \$33 billion respectively in foregone national income due to heart disease, stroke and diabetes.

“While these challenges are applicable to all countries, different nations should identify local priorities from among those identified here for immediate attention, depending on resources and disease patterns,” says John Bell, Regius Professor of Medicine, University of Oxford and Chair, Oxford Health Alliance.

Process

Identifying the Grand Challenges involved the Delphi method — the structured, sequential, written questioning of a panel. The first round elicited 1,854 ideas, distilled into 109 from which the panel members selected and commented on their top 30. In the final round, panelists either accepted the list or reordered choices, and offered further comment.

The seven-member Executive Committee and 19-member Scientific Board milled the wording of the panel’s final 20 Grand Challenges, grouped them according to six goals, and suggested the key research requirements for reaching each goal.

Next steps

The Grand Challenges Global Partnership is being established with a secretariat at the Oxford Health Alliance (www.oxha.org), funded for the first five years by its members.

The founding partners:

- Oxford Health Alliance;
- Medical Research Council;
- Canadian Institutes of Health Research;
- Indian Council of Medical Research;
- National Institutes of Health;
- Ovarious Chronic Disease Initiative.

The Partnership is intended as a platform for collaboration of global research funding organizations. An advocacy program to be developed will encourage adoption of the Challenges and Goals.

“Without a roadmap, we are all driving in different directions. These problems require long-term commitment and a coordinated effort between multiple funding agencies around a set of clear priorities,” says co-author Peter A. Singer, co-director of the MRC Program on Life Sciences, Ethics and Policy, Toronto.

Says Nirmal Ganguly, Director General, Indian Council of Medical Research: “Providing priorities will be the major contribution from this Grand Challenges exercise. The growing interest in this area of research now being registered by governments and funding agencies alike suggests that substantial resources may be available in the future to pursue these priorities.”

“Chronic non-communicable diseases constitute the major burdens of illness and disability in all countries of the world apart from sub-Saharan Africa,” says Stig Pramming, Executive Director, Oxford Health Alliance. “They must urgently receive more resources, research and attention, in proportion to the burden of disease as mapped out in these Grand Challenges. Inaction is costing millions of premature deaths throughout the world and will offset the gains from a decreasing burden of infectious diseases.”

"This study has the potential to galvanise more effective action against chronic diseases," concludes Dr. Daar. "In developing countries, many beset by infectious diseases, authorities have not resourced or thought through the policy implications of addressing these silent killers. But that's like putting out one fire in a house burning from both ends."

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Appendix

20 Grand Challenges in Chronic Non-Communicable Diseases

Goal: Raise public and political awareness

Grand Challenges

- Raise the political priority of non-communicable disease;
- Promote healthy lifestyle and consumption choices through effective education and public engagement;
- Package compelling and valid information to foster widespread, sustained and accurate media coverage and thereby improve awareness of economic, social and public health impacts.

Research Needed to Address Goals

- *Study how to engage governments in partnerships for disease prevention;*
- *Develop research activities for health that bridge government departments (e.g. transport, civic planning, health, education and environment);*
- *Identify the reasons for low awareness and advocacy of chronic disease in societies;*
- *Study how to create public forums that sustainably raise awareness of CNCD issues.*

Goal: Enhance economic, legal and environmental policies

Grand Challenges

- Study and address the impact of government spending and taxation on health;
- Develop and implement local, national and international policies and trade agreements, including regulatory restraints, to discourage the consumption of alcohol, tobacco and unhealthy foods;
- Study and address the impacts of poor health on economic output and productivity.

Research Needed to Address Goals

- *Evaluate the health impacts of agricultural policy interventions;*
- *Study the health and economic impacts of comprehensive community-based interventions;*
- *Create general population metrics and outcome indicators for policy and program surveillance;*
- *Quantify impact of CNCDS on domestic economies;*
- *Study the international ramifications of change of food and tobacco consumption;*
- *Probe motivations behind domestic expenditures, and how these affect lifestyle choices;*
- *Investigate the impact and effectiveness of food labeling legislation.*

Goal: Modify risk factors

Grand Challenges

- Deploy universally measures proven to reduce tobacco use and boost resources to implement the WHO Framework Convention on Tobacco Control;
- Increase the availability and consumption of healthy food;
- Promote lifelong physical activity;
- Better understand environmental and cultural factors that change behaviour.

Research Needed to Address Goals

- *Do prospective cohort studies to identify risk factors, the magnitude of their effects, and factors that reduce risk of CNCDS;*
- *Evaluate foetal and early life influences on chronic disease risk;*
- *Find and evaluate new or combined medical preparations to prevent cardiovascular disease and diabetes, or reduce their morbidities;*
- *Evaluate behavioural modifications to reduce risks;*
- *Establish metrics, and relationships between metrics, which are culturally and ethnically specific;*
- *Investigate cultural and ethnic variation in risk factors to refine behavioural interventions;*
- *Quantify personal risk related to phenotypes, genotypes and multiplicative risks;*
- *Study the interaction of environment and genes in risk factors and in outcomes;*
- *Develop new biomarkers and diagnostics for risk and for early disease detection.*

Goal: Engage businesses and community

Grand Challenges

- Make business a key partner in promoting health and preventing disease;
- Develop and monitor codes of responsible conduct with the food, beverage and restaurant industries;
- Empower community resources such as voluntary and faith-based organizations.

Research Needed to Address Goals

- *Study marketing techniques and marketing data derived from commercial companies regarding behaviour modification;*
- *Investigate mechanisms for consumers and the public to influence food industry positively;*
- *Research the impact of taste, flavour, packaging, labeling and advertising on choice and health;*
- *Create and evaluate community-based strategies to promote healthy living;*
- *Identify modes of effective public/private partnerships that support health;*
- *Develop better understanding of nutrient benefit in foods.*

Goal: Mitigate health impacts of poverty and urbanization

Grand Challenges

- Study and address how poverty increases risk factors;
- Study and address the links between the built environment, urbanization and chronic non-communicable disease.

Research Needed to Address Goals

- *Investigate the biological basis of health risks related to poverty;*
- *Examine the influence of poverty on the adoption of high risk behaviour;*
- *Identify negative effects of economic growth on health;*
- *Study how to work with planners, architects and city representatives to enhance the environment for healthier living.*

Goal: Reorient health systems

Grand Challenges

- Allocate resources within health systems based on burden of disease;
- Move health professional training and practice towards prevention;
- Increase number and skills of professionals who prevent, treat and manage chronic non-communicable diseases, especially in developing countries;
- Build health systems that integrate screening and prevention within health delivery

Research Needed to Address Goals

- *Develop strategies to integrate health system management of communicable and non-communicable disease;*
- *Form collaborations to find best practices in delivering affordable and equitable health care;*
- *Study how to provide more structured knowledge for health-promotion;*

- Develop strategies to ensure that medical training and curricula focus on chronic non-communicable diseases;
- Develop and provide culturally specific and nationally appropriate resources for training of health-care workers;
- Study how best to ensure that disadvantaged communities have adequate resource allocations in health care and in preventative practice;
- Optimise use of electronic health records for predicting disease and measuring the effect of health interventions;
- Study how best to develop and establish real time surveillance tools;
- Discover and develop tools for screening and stratifying populations according to risk;
- Increase access to medications to prevent complications of chronic non-communicable disease.

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Grand Challenges in Non-Communicable Diseases

Executive Committee

(* Denotes *Nature* article co-author)

- **Robert Beaglehole** (*), former Director, WHO Department for Health Promotion, Disease Prevention, Management and Surveillance. New Zealand.
- **John Bell** (*), Regius Professor of Medicine, University of Oxford; Chair, Oxford Health Alliance, UK
- **Alan Bernstein** (*), President, Canadian Institutes of Health Research, Canada.
- **Sir Leszek K Borysiewicz** (*), Chief Executive, Medical Research Council, UK
- **Abdallah Daar** (*), Senior Scientist and Co-director, Program on Life Sciences, Ethics and Policy, McLaughlin-Rotman Centre for Global Health; Professor of Public Health Sciences and of Surgery, University of Toronto, Canada
- **Roger I. Glass** (*), Director, Fogarty International Center, National Institutes of Health, USA
- **Jeffrey Koplan** (*), Vice President for Academic Health Affairs, Emory University, USA

Scientific Board

- **Lucas Adetokunbo**, Former Director, WB/WHO/UNDP/UNICEF Special Programme on Tropical Diseases Research and Training, Nigeria
- **Sir George Alleyne**, Professor Emeritus, University of the West Indies, Jamaica
- **Stephen Colagiuri** (*), Professor of Metabolic Health, University of Sydney, Australia
- **Diane T. Finegood** (*), Scientific Director, Canadian Institutes of Health Research, Institute of Nutrition, Metabolism and Diabetes, Canada
- **Ray Fitzpatrick**, Faculty Fellow and Dean, Professor of Public Health and Primary Care, University of Oxford, UK
- **Julio Frenk**, Former Secretary of Health, Mexico; Bill and Melinda Gates Foundation, Mexico
- **Catherine Le Galès-Camus**, Former Assistant Director-General, Noncommunicable Diseases and Mental Health, World Health Organization
- **Nirmal Ganguly** (*), Director General, Indian Council of Medical Research, India
- **Harold Jaffe**, Professor of Public Health, University of Oxford, UK
- **Stephen Leeder**, Director, Australian Health Policy Institute & University of Sydney, Australia
- **Alan Lopez**, Director, Population Health, University of Queensland, Australia
- **Adel Mahmoud**, Senior Molecular Biologist, Woodrow Wilson School of Public and International Affairs at Princeton University
- **David R. Matthews** (*), Chairman, Oxford Centre for Diabetes, Endocrinology and Metabolism, Professor of Diabetic Medicine, University of Oxford, UK
- **Elizabeth G. Nabel** (*), Director, National Heart, Lung, and Blood Institute, National Institutes of Health, USA
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- **Lars Rebien Sorensen**, Chief Executive, Novo Nordisk A/S, Denmark
- **Derek Yach** (*), Director of Global Health Policy, PepsiCo, USA
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- **Richard Smith** (*), Director, Ovations Chronic Disease Initiative, Former Editor, British Medical Journal, UK.

Also co-authoring the *Nature* article:

- **Deepa Leah Persad (*)**, Program Research Coordinator, McLaughlin-Rotman Centre for Global Health, Toronto, Canada

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The **McLaughlin-Rotman Centre for Global Health, Program on Life Sciences, Ethics and Policy**, Toronto, harnesses and fosters innovative technology for global health equity, optimizing its benefits and minimizing social risks. Based at the University Health Network / McLaughlin Centre for Molecular Medicine at the University of Toronto, the program was created in 2001 and led by Professors Abdallah Daar and Peter A. Singer.

For more information: www.mrcglobal.org

The Oxford Health Alliance (OxHA), London, is a public-private partnership committed to finding innovative solutions to the world's largest preventable health problem - the global epidemic of chronic diseases - by addressing the risk factors of unhealthy diet, physical inactivity and tobacco use. Particularly, OxHA brings together a cross-section of society to determine the role employers, governments, NGOs, businesses, urban planners, economists and young people can play in helping to make the healthy choices the easy choices. For more information:

www.oxha.org

The Medical Research Council, London, is a publicly-funded organisation dedicated to improving human health. We support research across the entire spectrum of medical sciences, in universities and hospitals, in our own units and institutes in the UK, and in our units in Africa. The heart of our mission is to improve human health through world-class medical research.

For more information: www.mrc.ac.uk

The Canadian Institutes of Health Research, Ottawa, is the Government of Canada's health research funding agency supporting the work of more than 11,000 researchers and trainees in universities, teaching hospitals, and research institutes nationwide. CIHR funds research that improves health, the health care system and quality of life and fosters commercialization, moving discoveries from academic setting to the marketplace.

For more information: www.cihr-irsc.gc.ca

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Case studies of community-based CNCD prevention interventions and corporate responses to CNCDs are available on request.