

Endorsing Academies

Prof. Dr. Roberto J. J. Williams
President Academia Nacional de Ciencias Exactas, Físicas y Naturales Argentina

Prof. Dr. Andrew Holmes
President Australian Academy of Science

Prof. Dr. Luiz Davidovich
President Brazilian Academy of Sciences

Prof. Dr. Maryse Lassonde
President Royal Society of Canada

Prof. Dr. Chunli Bai
President Chinese Academy of Sciences

Prof. Dr. Sébastien Candel
President Académie des Sciences France

Prof. Dr. Jörg Hacker
President Nationale Akademie der Wissenschaften Leopoldina Germany

Prof. Dr. Ajay K. Sood
President Indian National Science Academy

Prof. Dr. Sangkot Marzuki
President Indonesian Academy of Sciences

Prof. Dr. Alberto Quadrio-Curzio
President Accademia Nazionale dei Lincei, Italy

Prof. Dr. Takashi Onishi
President Science Council of Japan

Prof. Dr. Jaime Urrutia Fucugauchi
President Academia Mexicana de Ciencias

Prof. Dr. Vladimir E. Fortov
President Russian Academy of Sciences

HRH Prince Dr. Turki bin Saud bin Mohammed Al-Saud
President King Abdulaziz City for Science and Technology, Saudi Arabia

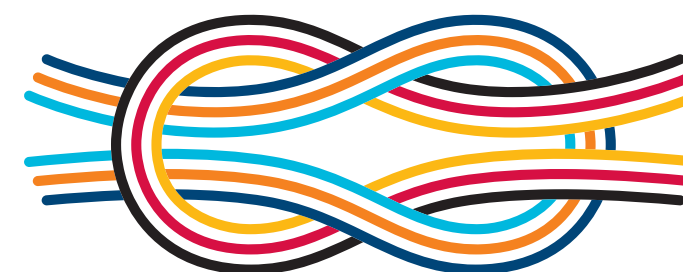
Prof. Dr. Jonathan Jansen
President Academy of Science of South Africa

Prof. Dr. Myung Chul Lee
President Korean Academy of Science and Technology South Korea

Prof. Dr. Ahmet Cevat Acar
President Turkish Academy of Sciences

Prof. Dr. Venkatraman Ramakrishnan
President Royal Society United Kingdom

Prof. Dr. Marcia McNutt
President National Academy of Sciences, USA



G20 GERMANY 2017
SCIENCE 20 DIALOGUE

IMPROVING GLOBAL HEALTH

STRATEGIES AND TOOLS TO
COMBAT COMMUNICABLE AND
NON-COMMUNICABLE DISEASES

Executive Summary

Communicable (infectious) and non-communicable (non-infectious) diseases seriously endanger individual wellbeing and global health, and threaten the global economy. Strong short- and long-term evidence-based strategies are needed. The G20 Academies of Sciences call for (1) the strengthening of healthcare and public health systems, (2) applying existing and emerging knowledge, (3) addressing the broader social and environmental determinants of health, (4) reducing serious risk factors for disease through education and promotion of healthy life styles, (5) ensuring access to health resources globally, and (6) enhancing and extending robust strategies for surveillance and information-sharing. Furthering research is a prerequisite for providing knowledge and new tools to meet these challenges.

Communicable diseases (CDs) and non-communicable diseases (NCDs) continue to burden all nations and require urgent action. Around the globe, their impact is devastating, leading not only to individual and family suffering, but also to tremendous healthcare costs, loss of workforce, and declines in productivity and prosperity. Together these present a serious and continuously growing threat to healthcare and public health systems, economic growth, social cohesion and equity, and even to international security.

The recent Ebola and Zika epidemics have shown that a disease in one country can have serious effects on other countries around the globe. Preparedness for future outbreaks of emerging and re-emerging diseases urgently needs improvement. In addition, the interrelationship between CDs and NCDs can no longer be ignored: at least 15 percent of all new cancer cases worldwide (17.5 million in 2015) are caused by infectious agents.^{1,2} In turn, NCDs may also increase an individual's risk of certain infectious diseases: for example, 15 percent of the tuberculosis burden may be linked to type II diabetes.³

Scientific research continues to improve the understanding of the causes and contexts of different diseases and how they are interrelated. This knowledge leads to more effective measures for prevention, medical interventions and disease control. Application of existing knowledge has been inadequate, however.

In order to reduce the burden of disease, the following areas require particular attention: public health and living conditions, risk factors and healthy lifestyles, interactions between CDs and NCDs.

Public health measures such as vaccination, sanitation, water treatment and supply, and waste management have improved the lives of billions of people, but their implementation is still not adequate. In addition, there are many challenges that interfere with good **living conditions** and good health, and these must be addressed: e.g. poverty and inequality, population growth, climate change, armed conflicts, population displacement, natural and man-made

disasters, megacities, violence, traffic and other injuries, environmental degradation and pollution, as well as loss of biodiversity.

Scientific research has shown the overarching and growing importance of **risk factors** associated with major NCDs (e.g. cancer, cardiovascular diseases, mental illnesses). Treatable or preventable risk factors include overweight, malnutrition, frailty, abuse of substances such as tobacco, alcohol and drugs, lack of physical activity, dysfunctional microbiota, and infectious agents. One single risk factor can be linked to various diseases: for example, smoking is a major risk factor associated with cancer, cardiovascular diseases, asthma and chronic obstructive pulmonary disease (COPD).

Measures to reduce CDs will also reduce NCD-based mortality: highly effective strategies already exist for the diagnosis, therapy and prevention of most infections that are known to increase the risk of cancer. These strategies include vaccination programmes as well as treatments using antimicrobials against infectious agents such as *Helicobacter pylori*, human papillomavirus, hepatitis B virus or hepatitis C virus.*

References

1. Remais, J. V., Zeng, G., Li, G., Tian, L. & Engelgau, M. M. Convergence of non-communicable and infectious diseases in low- and middle-income countries. *International Journal of Epidemiology*. 42, 221–227 (2013).
2. Fitzmaurice, C. et al. Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life-years for 32 Cancer Groups, 1990 to 2015: A Systematic Analysis for the Global Burden of Disease Study. *JAMA Oncology*. (2016). doi:10.1001/jamaoncol.2016.5688
3. WHO: Diabetes & TB – fact sheet. (2016). http://www.who.int/tb/publications/diabetes_tb.pdf [accessed 30 January 2017].

* For some cancer-associated viruses (e.g. Epstein-Barr virus) treatment or preventive vaccine is not yet available.

In view of these challenges, **the Science20 network recommends actions in the following areas:**

1. Provide reliable and resilient health systems

- Ensure strong systems for health that include
 - robust public health services encompassing disease surveillance, epidemiology, laboratory capacity, prevention, education and risk reduction programmes.
 - accessible, appropriate and comprehensive primary and other medical care, including quality vaccination.
- Apply existing knowledge to prevent
 - infection-associated cancer (e.g. cervical carcinoma, hepatoma and stomach cancer) by preventive vaccination (human papillomavirus and hepatitis B virus) or other treatment (hepatitis C virus and *Helicobacter pylori*).
 - diseases related to alcohol or tobacco by regulation and education.
 - diseases such as type II diabetes or cardiovascular diseases by treating hypertension and reducing obesity.

2. Address social, environmental and economic determinants of health

- Ensure clean air and water (including wastewater treatment and waste management), sanitation, adequate and safe housing, and liveable healthy cities.
- Beginning in early childhood, promote health literacy and knowledge about risk factors and adequate hygiene.
- Facilitate programmes to empower and educate multipliers such as family heads, peers, health workers, employers and teachers.
- Eliminate malnutrition and improve dietary education, e.g. in schools, by raising awareness about nutrition and food quality, as well as support access to appropriate diets.

3. Strategic instruments

- Implementing global access to quality vaccines, diagnostics, medical devices and therapeutic drugs at affordable prices. This would also help to reduce the misuse of antibiotics and, consequently, antimicrobial resistance.
- Educating on the evidence-based safety and the benefits of vaccinations to increase confidence in vaccines.
- Developing of combined strategies for global surveillance to detect, track and control CDs and NCDs. This includes strengthening and extending disease reporting, laboratory capacity, syndromic surveillance, and innovative data mining strategies, as well as information sharing. Better coordination of human, animal and environmental health systems (“One Health concept”) is important, especially with respect to early detection of and response to threats.
- Support of robust, active surveillance networks and facilitating of prompt reporting about outbreaks:
 - Provide incentives for immediate response and access to financial support.
 - Ensure that evidence-based scientific data and sound public health policies define actions taken by countries directly and indirectly affected by outbreaks.
- Support basic and applied research, within and among countries, because research is vital for providing knowledge and new tools for current and future challenges.