

Responding to the Challenge of Non-communicable Diseases

International Atomic Energy Agency

1. Nuclear techniques assist in the prevention, early detection, diagnosis and treatment of NCDs¹

Nuclear techniques play an integral role in the management of non-communicable diseases (NCDs) such as cancer, cardiovascular diseases, and neurological conditions, and can be used to design and evaluate interventions to address malnutrition in all its forms.

Cancer. Cancer causes 9 million deaths each year.² Medical imaging, including X-rays, and nuclear medicine techniques are critical in cancer care, in terms of: early and accurate diagnosis, including assessment of the location and spread of the disease (staging); follow-up of the patient to detect relapses; prognostic evaluation; and appropriate therapeutic decisions and follow-up of the response to treatment.³ Radiotherapy is a key element of cancer treatment for every second cancer patient worldwide. Modern radiotherapy allows automated delivery of a precise dose to the tumour and avoids the surrounding critical structures, giving the patient a chance to recover with minimal side-effects.

United Nations high-level meetings have highlighted the need for UN agencies, including IAEA, to scale up their work on NCDs as part of the 2030 Agenda for Sustainable Development.

NCDs contribute to ill health, poverty and inequities and slow the development of countries. Every year 15 million people die before age 70 from NCDs, with 86% of these premature deaths occurring in low- and middle-income countries.

Major progress on NCDs is possible. Premature deaths from NCDs are largely caused by modifiable behavioural risk factors, such as unhealthy diet, tobacco use, physical inactivity and harmful use of alcohol. Environmental risks (e.g. air pollution) and constrained access to basic services also contribute significantly to NCDs.

Addressing NCDs requires coordinated action from all UN agencies within a broader whole-of-society response.



1 This UNIATF brief draws from the IAEA Brief for policymakers, "Prevention, Early Diagnosis and Treatment of Non-Communicable Diseases: The Role of Nuclear Techniques." Available at: <https://www.iaea.org/sites/default/files/18/10/prevention-early-diagnosis-and-treatment-of-non-communicable-diseases.pdf>
2 WHO. Key facts. NCDs. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
3 For more information, see: <https://www.iaea.org/topics/cancer-diagnosis>

Cardiovascular disease. Cardiovascular diseases account for most NCD deaths, claiming the lives of 17.9 million people annually.⁴ Cardiac imaging using nuclear techniques is an important diagnostic tool, enabling earlier diagnosis and the planning of more effective treatment, as well as follow-up of patient response.

Neurological conditions. Worldwide, around 50 million people have dementia, and there are nearly 10 million new cases every year. Alzheimer's disease is the most common form of dementia and may contribute to 60–70% of cases.⁵ Molecular imaging, including brain perfusion techniques, is helpful in the diagnosis of Alzheimer's and other forms of dementia.⁶

Malnutrition. The effects of poor nutrition add to the burdens on health-care systems. In 2018, globally 149 million children under 5 years of age were stunted, 49 million wasted and 40 million overweight.⁷ Nuclear and stable isotope techniques provide important accurate data on body composition, breastfeeding practices, total daily energy expenditure, micronutrient bioavailability and vitamin A status, all of which directly relate to the prevention of diet-related NCDs.

2. IAEA has a role to play in preventing and controlling NCDs

Working with governments, research and health institutions and development partners, IAEA provides technical assistance to Member States to strengthen their capacity in cancer diagnostics and treatment, and to evaluate preventive interventions for diet-related NCDs using stable isotope techniques.⁸

This support consists of developing, adopting and strengthening practices, providing technical advice and training, engaging in coordinated research projects, provision of equipment, preparation of technical publications and public information, and resource mobilization activities. IAEA also strengthens the evaluation of a range of nutrition interventions to prevent and support treatment of NCDs such as those that increase physical activity, promote breastfeeding and assess body composition and energy expenditure.

IAEA has supported more than 110 low- and middle-income countries (LMICs) to address issues related to NCDs. IAEA has established a dedicated service (*imPACT Review*)⁹ to assess national capacities in cancer control and subsequently support Member States in evidence-based planning of cancer control resources. This service is delivered in cooperation with the World Health Organization (WHO) and International Agency for Research on Cancer (IARC).

4 WHO. Key facts. NCDs. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>

5 WHO. Dementia: Key facts. <https://www.who.int/news-room/fact-sheets/detail/dementia>

6 Torosyan N, Silverman S. (2012). Neuronuclear Imaging in the Evaluation of Dementia and Mild Decline in Cognition. *Semin Nucl Med*; 42(6): 415–422.

7 Global Health Observatory: Child malnutrition <https://www.who.int/gho/child-malnutrition/en/>

8 IAEA Brief on Human Health for Policy Makers. <https://www.iaea.org/sites/default/files/18/10/prevention-early-diagnosis-and-treatment-of-non-communicable-diseases.pdf>

9 <https://www.sciencedirect.com/science/article/abs/pii/S1470204517303728> Abdel-Wahab M, Lahoupe B, Polo A, et al. (2017). Assessment of Cancer Control Capacity and Readiness: The Role of the International Atomic Energy Agency. *Lancet Oncol*; 18(10): 587-594.

IAEA's Quality Management Audit for Nuclear Medicine Practice aims to support facilities to improve the quality of their clinical practice. Since 2009, IAEA has conducted 72 audits in 38 countries.^{10, 11, 12}

IAEA has compiled the first comprehensive database on global energy expenditure data. Between 1981 and 2017, over 6600 measurements from 23 countries were collected using the Doubly Labelled Water method. These data help countries develop better health policies to combat the growing obesity epidemic.

IAEA has reviewed the recommended cost-effective interventions endorsed by the WHA for NCDs to identify those that can be advanced through IAEA's work at global, regional and country levels. Examples are provided in the table below.

BEST BUYS

In 2017, the World Health Assembly endorsed a set of "best buys" and other recommended interventions to address NCDs.¹³ Best buy interventions address four NCD risk factors (tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity) and four disease areas (cardiovascular disease, diabetes, cancer and chronic respiratory disease). There are 88 recommended interventions, including overarching/enabling policy actions.



10 Dondi M, Paez D, Torres L, et al. (2018). Implementation of Quality Systems in Nuclear Medicine: Why It Matters. An Outcome Analysis (Quality Management Audits in Nuclear Medicine Part III). *Semin Nucl Med*; 48(3):299-306.
 11 Dondi M, Torres L, Marengo M, et al. (2017). Comprehensive Auditing in Nuclear Medicine Through the International Atomic Energy Agency Quality Management Audits in Nuclear Medicine Program. Part 2: Analysis of Results. *Semin Nucl Med*;47(6):687-693.
 12 Dondi M, Torres L, Marengo M, et al. (2017). Comprehensive Auditing in Nuclear Medicine Through the International Atomic Energy Agency Quality Management Audits in Nuclear Medicine (QUANUM) Program. Part 1: the QUANUM Program and Methodology. *Semin Nucl Med*;47(6):680-686.

13 'Best buys' and other recommended interventions for the prevention and control of noncommunicable diseases. WHO. 2017. <http://apps.who.int/iris/bitstream/handle/10665/259232/WHO-NMH-NVI-17.9-eng.pdf>

Evidence-based interventions	IAEA actions
Treatment of heart attacks.	Building capacity in appropriate and safe use of medical imaging, including nuclear medicine (SPECT and PET) and radiology.
Treatment of heart failure.	Establishing sustainable medical imaging facilities for evaluation of patients with CVD.
Breast screening using mammography with timely diagnosis and treatment of breast cancer.	<p>Ensuring quality control, image quality and dose optimization of mammography units.</p> <p>Assisting in the development of national diagnostic reference levels.</p> <p>Building capacity for the appropriate and safe use of mammography.</p> <p>Establishing sustainable mammography facilities.</p>
Treatment of colorectal cancer stages I and II and basic palliative care for cancer.	<p>Planning, establishing and sustaining radiotherapy services.</p> <p>Supporting radiotherapy quality assurance programmes.</p> <p>Provision of training in radiotherapy.</p>
Raising public and political awareness, understanding and practice relating to the prevention and control of NCDs.	Highlighting NCD issues through media including social media.
Strengthening international cooperation for resource mobilization, capacity-building, health workforce training, and exchange of information on lessons learned and best practices.	<p>Supporting education and training activities for health practitioners.</p> <p>Supporting the development of national resource mobilization strategies, technical documents and targeted funding proposals.</p>
Assessing national capacity for the prevention and control of NCDs.	<p>Supporting the development of national cancer control plans and strategies.</p> <p>Providing recommendations on national treatment and palliative care programmes.</p> <p>Conducting national assessments to strengthen national cancer control programmes.</p>
Strengthening human resources and institutional capacity for research.	<p>Supporting countries to train healthcare staff.</p> <p>Supporting countries to build clinical research capacity.</p>
Strengthening research capacity through cooperation with domestic and foreign research institutes.	<p>Partnering with joint research programmes.</p> <p>Supporting clinical research protocols in LMICs.</p>
Promoting and supporting exclusive breastfeeding for the first six months of life.	Evaluating breastfeeding practices using stable isotope techniques.

3. Partnerships are critical for IAEA in mobilizing an effective response to NCDs

The IAEA collaborates with a number of partners in response to NCD burdens. Examples include:

- IAEA/WHO (Network of Secondary Standards Dosimetry Laboratories) which provides calibrations for dosimetry equipment that are used to determine radiation dose levels for patients, staff or the public;
- UN Joint Global Programme on Cervical Cancer Prevention and Control, which supports countries to reduce the burden of cervical cancer – IAEA has a key role in supporting Member States in the diagnosis and treatment of cervical cancer, including radiotherapy and palliative treatment;
- International Union of Nutritional Sciences' Task Force on Nutrition and Cancer which, at national, regional and global levels, catalyses capacity and collaboration across nutrition and cancer;
- International Organization for Medical Physics in the development of guidelines and American Association of Physicists in Medicine in the development of dosimetry codes of practice; and
- International Centre for Theoretical Physics, European Society for Radiotherapy and Oncology and a range of other professional organizations in building capacity through training courses, conferences and workshops.

A formal mechanism for due diligence, which also addresses conflicts of interest in safeguarding the reputational risk to the organization, should be in place to ensure that all partnerships advance health and development outcomes.



4. Mobilizing resources to deliver

As Member States struggle with inadequate resources to tackle their increasing cancer burden, IAEA has adopted a new resource mobilization approach, joining forces with the private sector and international financial institutions to support low- and middle-income countries in order to secure financial and non-financial resources: in 2012, for instance, IAEA launched a focused partnership effort with the Organization of Islamic Cooperation and the Islamic Development Bank to expand access to effective, safe and sustainable cancer care in common Member States.



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The United Nations Inter-Agency Task Force on the Prevention and Control of Non-communicable Diseases was established in 2013 by the Secretary General and placed under the leadership of WHO to coordinate the activities of the UN System to support the realization of the commitments made by Heads of State and Government in the 2011 Political Declaration on NCDs. Joint activities included in the work plan of the Task Force are additive to various, more comprehensive efforts conducted by the UN agencies to prevent and control NCDs. These joint activities offer important opportunities to address cross-cutting issues and to advance capacity and learning in countries.



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