Supporting Nutrition and Health throughout the Human Life Cycle

The International Atomic Energy Agency is a partner in addressing nutrition and health problems in more than 50 countries in collaboration with Member State counterparts, other United Nations organizations, and donors.

International Atomic Energy Agency

Spanning a Lifetime

In the general public, few people are aware that the work of the International Atomic Energy Agency extends beyond the realms of the nuclear power and safeguarding against the misuse of radioactive materials. Indeed, for many years now Agency activities in research and technical co-operation include a strong emphasis on isotope techniques as tools to evaluate human nutritional status and the nutritional quality of foods within the context of national development programmes. These techniques are considered the best methods for measuring the uptake and bioavailability of many important vitamins and minerals. Thus, they are well-suited for determining the success of food supplementation programmes and other interventions aimed at fighting many forms of malnutrition found throughout the world.

Safeguarding a Child's Nutrition

UNICEF/Pirozzi

FAO photo/TJanssen

An estimated 200 million children (more than 150 million in Asia and approximately 27 million in Africa) under the age of five are moderately to severly underweight, suffering from protein energy malnutrition, while 70 million are severly malnourished. Malnutrition results in poor physical and cognitive development as well as lower resistance to illness. Everyday, 40,000 children (14,600,000/year) under the age of five die, and malnutrition is a major contributing factor. In addition to the human suffering, the loss in human potential translates into social and economic costs that no country can afford (WHO information).

Malnutrition due to micronutrient deficiency during the different life stages of the child (foetus, neonate, infant, and adolescent) leads to serious health consequences mainly in growth and developmental retardation, but also an increased risk of infection, anaemia, and blindness.

Isotope techniques provide essential information for designing and evaluating nutritionally adequate complementary foods. As an example, in Sri Lanka, an Agency project evaluated the effectiveness of a national iron fortification programme by transferring radio-immunoassay (RIA) and related techniques, as well as equipment to an RIA laboratory at the University of Ruhuna. The results of the project show that the sprinkle iron supplement in the national programme has a high bioavailability and can be used effectively in iron fortification for infants and young children. These techniques can also be used to indicate how much breast milk a baby is taking, the nutrients that are being transferred, and the body composition of both the mother and baby, thus indicating the best time during pregnancy at which to provide food supplements.

Contributing to Adult Nutrition

In most developing countries, chronic nutrient deficiencies place adults at risk of anemia, infection, and maternal mortality. A total of 1.5 billion people worldwide suffer from iron deficiency anemia, making it the world's most widespread nutritional disorder. The functional consequences are reduced work capacity, while the physiological consequences are coronary heart disease and stroke. Anemia is worsened by parasites and bacteria linked to poor sanitation and hygiene in many poor countries. Isotopic techniques can be used to identify population groups most at risk and enable direct and simple intervention through iron supplementation.

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How Isotopes Work

Isotopes used in nutrition evaluation are natural, harmless, and are simply used to label a food supplement to allow it to be traced within the body, or from mother to baby. With her consent, the mother may be given a drink that has a slightly higher than normal percentage of deuterium, a natural isotope of hydrogen. This can be measured in breast milk using Fourier transformed infared spectroscopy.

Addressing Health Challenges in the Elderly

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By 2025, there will be 1.2 billion elderly people in the world, 60% of whom will reside in developing countries. Ageing is associated with changes in body composition, which increase the risks of cancer and degenerative diseases. Planning and evaluating interventions to prevent or reverse body compositional change during ageing relies on good assessment tools. Isotopic methods used to measure bone density and body composition are often preferred because they are inexpensive tests to perform, accurate, practical, and can be applied under field conditions and pose no risk or discomfort to the person being measured.

Responding to Major Nutritional Problems

Iron Deficiency Anaemia

More than 90% of the world's population affected by iron deficiency anaemia live in developing countries, of which almost 40% are pre-school children. The International Atomic Energy Agency has contributed to improve knowledge about iron bioavailability in local meals and foodstuffs consumed in Chile, Ecuador, India, Myanmar, Pakistan, Peru, the Philippines, Poland, Sri Lanka, and Venezuela.

Protein-energy Malnutrition

The Agency uses isotopic techniques to investigate infant growth in Bangladesh, Brazil, Chile, and Pakistan, as well as stunting in Argentina, Brazil, Chile, Mexico, Pakistan, Peru, and Venezuela.

Vitamin A Deficiency

Vitamin A deficiency can cause irreversible blindness and impaired immune function. The Agency is developing isotopic tracer methods for assessing human vitamin A status and the bioavailability of provitamin A carotenoids. Projects have been launched in China, Ghana, India, Peru, the Philippines, South Africa, and Thailand.

Osteoporosis

Measuring bone mass is essential to diagnosing and managing osteoporosis and potential bone fractures. Isotopic techniques are gaining prominence in studies of osteoporosis and related issues of bone metabolism. The Agency has already undertaken studies of the incidence and severity of osteoporosis in predominately urban population groups in Brazil, Canada, Chile, China, Croatia, Hungary, Philippines, Russia, Singapore, South Africa, and Turkey.

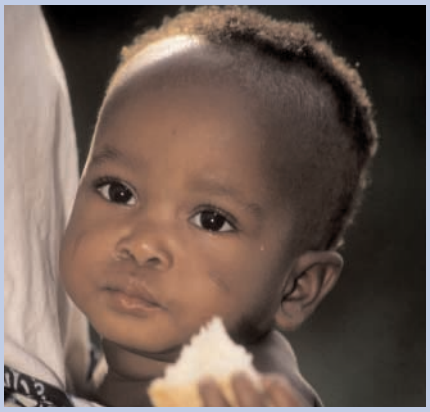
Obesity

Obesity is not limited to technologically advanced countries but in fact is now prevalent in formerly malnourished populations in developing countries. Obesity is a risk-factor in the development of diabetes, vision and kidney disorders; circulatory problems; and early death. Isotopic techniques aimed at measuring body composition and energy expenditure can provide data which have been used in the following countries: Brazil, Chile, China, Cuba, India, Jamaica, Mexico, and Nigeria.

Using the Technology

Large-scale nutrition programmes are very expensive to implement and it is obviously important to know which food supplements, and which strategies or interventions, are most effective. It may be that some elements of a programme should be modified or replaced, or that the timing of a food supplement should be adjusted to achieve maximum benefit. However, because there are so many variables, it is difficult to tell which factors are having the most impact. Isotope techniques can help nutritionists to adjust their nutrition programs so that they are more effective and sustainable.

Isotope techniques have begun to be applied in developing countries where they produce benefits for millions through improved nutrition, and serve as specific indicators of broader social and economic advances.



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