

THE IAEA SUPPORTS MEMBER STATES' NUTRITION PROGRAMMES: WHAT THEY HAVE TO SAY



Top: Breastfeeding practices during the first six months are evaluated under IAEA nutrition projects.

Right: A mother and child involved in the body composition assessment study.

(Photos: N. Mokhtar, IAEA)

IAEA Capacity Building in Burkina Faso

“Under the IAEA’s Technical Cooperation programme, Burkina Faso’s Institute of Research in Health Sciences (IRSS) has received support to help build the capacity to evaluate human nutrition programmes using stable isotope techniques, and assess public health actions to improve maternal and young child nutrition.

Various nutrition projects were supported by the IAEA and implemented by the IRSS to assess the impact of double supplementation with vitamin A and zinc on the reduction of malaria incidence; the body composition of young children and their mothers; and the human milk intake of breastfed babies. They also provided key information on exclusive breastfeeding during the first six months of life to the national programme coordinators.

These projects have established sustainable research capacity for the assessment of micronutrient nutrition, specifically for analysing the level of zinc in plasma using atomic absorption spectrometry, and for measuring vitamin A using high performance liquid chromatography (HPLC). Stable isotope techniques have been used to determine the

body composition of lactating mothers and the human milk intake of breastfed babies. In addition, the IRSS is now providing training in these techniques and is engaged in regional and international collaboration with scientists and research institutes specializing in these fields of study.”

— By Jean-Bosco Ouedraogo, IRSS, Burkina Faso

Building the Capacity to Evaluate Vitamin A Supplementation Programmes in Cameroon

“Vitamin A deficiency affects 190 million children under five years old worldwide, occurring most frequently in Africa and South East Asia. Cameroon, which is one of the countries facing this challenge, established a WHO-recommended high-potency vitamin A supplementation programme in 2002, following a national survey of serum vitamin A that showed that 39% of children under five were suffering from vitamin A deficiency. To support the Cameroon Government in enhancing its expertise and evaluation techniques to monitor the effectiveness of the vitamin A supplementation programme, the IAEA has provided Cameroon with equipment and the





research projects (CRPs) have helped to improve understanding of how the health of people of all ages is related to body composition and daily total energy expenditure, and the relationship of anaemia and *Helicobacter pylori* (*H. pylori*) infection to absorption of iron from foods.

Meeting with participants for the first Cameroon study of vitamin A reserves in children.

(Photo: G. Medoua, Cameroon)

The equipment, materials and training provided by the IAEA in this field have helped to improve Cuban nutrition programmes for children and the elderly, to establish new nutritional recommendations, and to improve investigations of obesity and risk factors for non-communicable diseases and national intervention programmes for the prevention of childhood micronutrient deficiencies.

necessary training. A stable isotope technique can sensitively detect whether human vitamin A reserves are deficient, adequate, or excessive (for more details please see article on Stable Isotopes: The Method of Choice to Assess Vitamin A Intervention). Cameroon is the first country in Africa to establish national capacity for the implementation of this method, and has provided leadership in planning a new regional project in Africa on the use of stable isotope techniques to monitor and assess the vitamin A status of children susceptible to infection.”

— By Gabriel Medoua, Centre for Food and Nutrition Research, Yaoundé, Cameroon

With the IAEA’s support, the Cuban Institute of Nutrition and Food Hygiene has established a new Stable Isotope Laboratory, which is able to measure ¹³C and deuterium. This allows for body composition and *H. pylori* infection to be measured by non-invasive methods. A total of six researchers have been trained in stable isotope techniques and ten workshops and training courses related to the use of isotopes in human nutrition research have been held in Cuba. New projects planned for 2014–2016 will use these techniques to evaluate agriculture programmes to provide nutritious food for schoolchildren and the effect of muscle wasting on the quality of life of the elderly.”

— By Manuel Hernandez Triana, Institute of Nutrition and Food Hygiene, Havana, Cuba

Cuban children travelling to school.

(Photo: M. Hernandez Triana, Cuba)

Isotope Studies in Cuba Influence the National Nutrition Recommendations

“Over the past few years, Cuba has acquired in-depth knowledge about the connection between nutrition and health using nuclear science and techniques. With the support of IAEA projects, Cuban researchers are using sensitive methods to evaluate national nutrition programmes. These methods are based on the use of stable isotopes of oxygen and hydrogen to assess body composition and daily energy expenditure in children and adults.

Since 1999, the Cuban Institute of Nutrition and Food Hygiene of the Ministry of Public Health has been using stable isotope techniques in human nutrition research. Four Latin American regional projects and four coordinated



St John's Research
Institute, Bangalore, India.

(Photo: St John's Research
Institute, India)



The IAEA's Collaborating Centre in Nutrition in Bangalore, India

"St John's Research Institute (SJRI) in Bangalore, India, has been an IAEA collaborating centre for nuclear techniques in nutrition for four years, and has been a nodal point for training in the application of stable isotope approaches to nutrition. The Centre has excellent facilities for conducting research in human nutrition and health, including a calorimetry facility for measuring energy expenditure and the full range of facilities for applying reference techniques to assess body composition, including dual energy X ray absorptiometry to measure bone mineral content; air displacement plethysmography to assess body fat; and stable isotope dilution to measure total body water.

The collaborating centre is also building a whole body potassium counter to measure body cell mass in infants and pregnant women. It has state-of-the-art mass spectrometry facilities that are required for measuring stable isotope enrichment, including facilities for isotope ratio mass spectrometry, gas chromatography-mass spectrometry, liquid chromatography-mass spectrometry, and thermal ionization mass spectrometry.

Technology transfer has been one of the successful outcomes of technical cooperation (TC) projects and of coordinated research projects (CRPs). The IAEA identifies cutting

edge technologies that can be used in resource poor areas and international experts to facilitate technology transfer. The collaborating centre in nutrition supports the IAEA's TC programme by providing experts and hosting fellowships and scientific visits to provide training in the assessment of body composition, energy metabolism, breastfeeding practices and iron absorption.

Trainees have come from a number of countries, including Afghanistan, Bangladesh, Botswana, Cambodia, Ghana, Madagascar, Malaysia, Mauritius, Myanmar, Nepal, South Africa, Senegal, Sri Lanka, the Syrian Arab Republic, Tanzania, Thailand and Uganda. The collaborating centre also participates in and supports the IAEA's CRPs, which provide a launch pad for young investigators from developing countries to study nutrition and enhance their skills in, and understanding of, the use of nuclear sciences and applications to improve nutrition in a collaborative and thematic context.

TC projects and CRPs generate data for national policy decisions. While the studies are necessarily small, they provide useful data to substantiate evidence for national and regional policy decisions and recommendations.

CRPs help to harmonize methods. For example, by developing a standardized method for measuring body composition in infants and young children, it was possible

to systematically evaluate changes in body composition in malnourished children following refeeding programmes at different sites in various countries. Similarly, harmonized body composition and energy expenditure protocols have led to integrated reports across countries that have defined body fat and physical activity levels. Harmonized protocols to measure lactation performance, infant growth and maternal nutrition are also currently being developed. These coordinating efforts will help to define nutritional requirements for mothers and babies, as well as the benefits of exclusive breastfeeding. The numerous methodology manuals on stable isotope techniques in nutrition that have been published by the IAEA and distributed freely are a great capacity building resource, and the collaborating centre is pleased to have contributed to these achievements.”

The manuals can be downloaded from the IAEA Human Health Campus nutrition pages at: nucleus.iaea.org/HHW/Nutrition/index.html

— By Anura Kurpad, St John’s Research Institute, Bangalore, India

Promoting Good Nutrition through Isotope Techniques in Morocco

“Morocco is undergoing a nutrition transition characterized by problems related to undernutrition being replaced by problems related to overweight and obesity, which can exist together with micronutrient deficiencies if a high calorie diet is consumed that does not contain enough fruit and vegetables.

Rates of exclusive breastfeeding, which is the cornerstone of good, early nutrition, continue to decline, with a drop from 32% in 2004 to 15% in 2006.

In children under five years, 15% are stunted and more than 30% are suffering from micronutrient deficiencies, including iron, vitamin A, folic acid and iodine deficiencies. A third of pregnant women and women of childbearing age are anaemic, compared to only 18% of men, and the prevalence of folic acid deficiency in women of childbearing age is 25%. Obesity and overweight, caused by changes in lifestyle, diet and levels of physical activity, are prevalent in more than 40% of adults.

To overcome these challenges, the government, with local and international



partners, developed the National Strategy for Nutrition 2011–2019, to promote healthy lifestyles, to strengthen professional capacities and coordination between partners, and to develop research work in the area of nutrition.

Morocco uses nuclear techniques to study the role of body fat as an indicator of health risk in obese children and adolescents; to determine the relationship between maternal body fat and birth weight; to evaluate interventions aimed at promoting vitamin A supplementation and oil fortification for nursing mothers; and to assess the nutritional status of the elderly.

The doubly labelled water technique is used to evaluate total energy expenditure for children and adolescents, and to estimate physical activity so that interventions that are aimed at promoting healthy life styles can be assessed.”

— By Professor Hassan Aguenou and Dr Imane Elmanchawy of the Joint Unit for Nutrition and Food Research at Ibn Tofail University, National Centre for Nuclear Energy, Sciences and Technology (CNESTEN), Morocco

Improving Nutrition in Thailand

“Support from the IAEA through its national and regional technical cooperation activities, as well as various CRPs, has enabled Thailand to generate evidence that is useful when developing nutrition policy and programmes. The IAEA has assisted Thailand in establishing capacity in the use of stable isotope

Children drinking a dose of deuterium-enriched water.

(Photo: S. Henriques, IAEA)



Thai children enjoying lunch that includes rice fortified with vitamin A, iron and zinc. An IAEA study using stable isotopes demonstrated that there was an increase in vitamin A stored in children eating fortified rice.

(Photo: T. Pongcharoen, Bangkok)

Facilities for measuring micronutrients in blood at the Cheikh Anta Diop University, Dakar, Senegal.

(Photo: N. Mokhtar, IAEA)

techniques to improve micronutrient nutrition by evaluating strategies to enhance the bioavailability and efficacy of foods fortified with micronutrients, and in establishing reliable instrumentation and facilities to assess body composition, energy expenditure and breastfeeding practices, with a view to preventing and controlling non-communicable diseases. These increased capacities are useful in order to evaluate the impact and effectiveness of nutrition interventions, especially among vulnerable population groups such as children and women. The IAEA's support has also strengthened collaboration with internationally renowned scientists and reference laboratories to ensure the quality of research in the application of stable isotope techniques to evaluate nutrition programmes. The capacity developed in Thailand can be extended to neighbouring countries through training, expert visits and appropriate technical

assistance aiming at alleviating malnutrition in South East Asia."

— By *Pattanee Winichagoon, Mahidol University, Bangkok, Thailand*

IAEA-Supported Studies Influence Nutrition Supplementation Policy in Senegal

"In Senegal, the IAEA has helped build technical capacity in the use of nuclear techniques to evaluate national nutrition programmes targeting vulnerable populations such as women and children. For example, through a national TC project, the benefit of a food supplementation programme for pregnant and lactating mothers was evaluated. This provided key information to government policymakers on the food quality needed for an optimal pregnancy outcome and for infant and child growth and the results were taken into account in the national policy on micronutrient supplementation.

In addition to providing training, the IAEA has also contributed to the upgrading of the infrastructure of the Nutrition Unit at the Cheikh Anta Diop University, Dakar, that includes providing support for an isotope ratio mass spectrometry facility that will provide training and analytical services to the region.

The Nutrition Unit is now part of the national committee on nutrition and provides advice, services and expertise in order to improve nutrition in Senegal."

— By *Salimata Wade, Cheikh Anta Diop University, Dakar, Senegal*

