The International Atomic Energy Agency is working to ensure improved health for all, particularly children and women, in partnership with its 132 Member States, other United Nations organizations, and donors. Its programme of technical activities is fully supportive of the recommendations adopted in 1990 by the international community during the World Summit for Children*, particularly the statement “enhancement of children's health and nutrition is a first duty”.

This brochure explains the Agency’s technical approach and programming targeted at or directly benefiting the health status of children in developing countries. It identifies technologies which can be used in synergy between the Agency’s programme and other national, international, and non-governmental organizations with the objective of developing joint field activities.

The Agency’s programme to improve child health includes four principal components: technologies for evaluating child nutrition and dietary status; technologies for control of communicable diseases; technologies for screening childhood diseases, and training and equipment for radiation therapy. The Agency’s technical co-operation programme incorporates a science and technology paradigm that begins with basic and applied research on human health topics relevant to nuclear medicine and radiation biology through the Agency’s Research Contract Programme and Co-ordinated Research Projects. The outcomes from research are validated and adapted through technology transfer in national, regional, and inter-regional technical co-operation projects. Partnerships with development organizations help sustain these benefits.

Fortifying Child Nutrition

An estimated 200 million children under the age of five in the developing world suffer from chronic malnutrition due to lack of essential proteins, vitamins, and minerals. The results are poor growth, impaired mental development, and increased susceptibility to communicable diseases.

The Agency is working with a network of research institutions in Latin America, Africa, and Asia to promote the use of nuclear techniques in understanding the root causes of malnutrition, providing data on micronutrient requirements, and testing sustainable interventions. Stable isotopes are being used to measure the energy and protein needs of the most vulnerable members of the population, i.e., infants, children, pregnant and lactating women.

Isotope techniques are also being used to detect and help devise better ways to treat the “hidden hunger” of vitamin and mineral deficiencies.

In Chile, evaluations conducted in 1999 contributed to the Government’s decision to modify its policies for pre-school programmes supplying food and milk fortified with iron and zinc. Within a year, anaemia was reduced from 30% to 5% among the 1.3 million targeted children. This Chilean experience has prompted the Governments of Cuba, Mexico, and Brazil to develop similar programmes in a regional initiative funded by the Agency.

Under an Agency programme started in 2000, eight countries (China, Indonesia, Malaysia, Pakistan, Philippines, Thailand, and Vietnam) have recently completed isotope-based tests measuring the bioavailability of micronutrients in pre-school children and lactating and pregnant women fed on iron-fortified foods including noodles, wheat flour, fish and soy sauce. Tests are now underway to determine which form of iron should be used particularly in baby and infant foods. The national governments and food industries in China, Thailand, and Indonesia have been very receptive to these studies and are developing national policies on food fortification. Food fortification is perceived as having a more desirable impact in improving nutrition standards than simply providing micronutrient supplements.
Controlling Communicable Diseases

Children are particularly susceptible to communicable diseases of the poor such as malaria and tuberculosis (TB). TB is the greatest single infectious cause of mortality worldwide, killing about two million people annually, including 250,000 children according to UNICEF. About 90% of malaria cases worldwide occur in Africa, and each year about 1.8 million people die of malaria on the continent, of whom 1.6 million are children (WHO, 1997).

The Agency’s programme on communicable diseases is focused on the application of radionuclide-based techniques in the control of malaria and TB as well as other diseases such as hepatitis, leishmaniosis, Chagas disease, Dengue fever, and filariasis. Its aim is to strengthen institutional capacity and to build technical competency in radionuclide-based molecular and radioisotope-based techniques in order to detect and counter the spread of communicable diseases in recipient Member States.

For example, a regional project entitled "Isotopes for Control of Human Communicable Diseases" was initiated in 1997 with the objective of validating new protocols that could enhance the capacities of health centres in sub-Saharan Africa to diagnose drug resistance in malaria and TB. Six countries participated in this programme: Kenya, Mali, United Republic of Tanzania, Zambia, and Zimbabwe. Additional projects were also launched in Ghana, South Africa, and Uganda to support national control programmes.

Screening for Childhood Diseases

Screening is an important technique for evaluating specific characteristics of human health in target populations. It is particularly important tool for systemic intervention for those diseases that can be mitigated at an early stage of development. Nuclear medicine plays an important role in diagnosing congenital diseases. The use of radioimmunoassay (RIA) techniques are well established in developing countries and the introduction of bulk reagents have reduced the cost of large-scale screening programmes to be practical even for low-income countries and least-developed countries. This simple technique uses a blood sample, usually a finger prick, collected on filter paper and tested for a specific immunological response to a radionuclide that chemically reacts to "mark" the antibodies naturally fighting the disease.

Improved diagnostics for children with urinary tract infections (UTI) is the objective of a new project in Colombo in Sri Lanka to establish nuclear imaging services at the Lady Ridgeway Hospital for Children, one of the largest hospitals for children in the world. Sri Lanka has a high incidence of UTI and only 15% of children requiring such studies can be supported. The new nuclear imaging unit will meet the need and improve paediatric sub-specialities. A project in the Latin America Region seeks to improve treatment of urinary tract problems by standardizing diagnostic techniques in nuclear nephrology.

Measuring Iron Absorption: A Better Way

The conventional indicator of minimal absorption is the chemical balance technique which measures the difference between the amount of a mineral eaten and the amount in the faeces. This method is insensitive, imprecise, and time and labour consuming.

By contrast, isotope techniques

— directly and accurately measure iron and other mineral bioavailability from single foods and total diets;
— facilitate reliable evaluations of the numerous factors that influence mineral absorption; and
— help identify those food- or fortificant-based interventions most likely to succeed in target populations.
Treating Cancer — Providing Hope

Approximately 1 out of every 600 children in the world will develop cancer between birth and the age of 15 years according to the Department of Child Health at the University of Newcastle Upon Tyne (UK). Two-thirds of the children treated in Europe and North America will be cured. In contrast, the vast majority of an estimated 32,500 children who developed cancer in sub-Saharan Africa during 1996 will die of their disease. As a result of cancer being an increasing cause of death in developing countries, children suffer when a family member (caregiver) dies from cancer. The estimated 10 million cancer cases worldwide in 2000 were more or less divided between developing and developed countries. In the next 15 years, two-thirds of the projected cases will be in developing countries. By providing radiotherapy treatment to those caregivers with cancer, the possibility to raise a child out of adolescence is increased.

The Agency programme in Applied Radiation Biology and Radiotherapy supports curative and palliative treatments of hard cancers as a defined intervention within national cancer programmes. The Agency programme involves developing the required medical infrastructure for cancer management. This is a substantial undertaking involving long-term programming.

The Agency field programme in radiation therapy is extensive and broad-based supporting aspects of radiotherapy, medical physics, and radiation protection. For 2001-2002, the planned programme in radiation therapy includes two complementary subprogrammes which focus on breast and cervical cancer and on the quality of therapy in cancer treatment.

Advancing New Technologies

Isotope techniques are being applied in developing countries where they produce benefits for millions through improved nutrition, screening for communicable diseases, and availability of radiotherapy. The Agency is eager to make its technology available to Member States, other international organizations, or institutions in order to reach more children throughout the world. Using nuclear technologies would contribute to achieve a greater impact and to improve the health status of children, particularly in developing countries.