



Genet Ashenafi, a 34 year old Ethiopian mother of two, has been successfully treated for cervical cancer through a joint programme of the International Atomic Energy Agency (IAEA) and the Ethiopian Government.
Photograph: IAEA

SAVING A MOTHER'S LIFE: RADIOTHERAPY OFFERS HOPE TO WOMEN WITH CERVICAL CANCER

When the sickness wouldn't go away and the bleeding persisted, Genet Ashenafi, a 34 year old Ethiopian mother of two, became alarmed. At the regional hospital, in Ethiopia's southern city of Awasa, her worst fears were confirmed. She was diagnosed with invasive cervical cancer.

Genet felt her life collapse: in less than two years she would probably be dead and the fate of her two sons left to chance. She prayed and wept. In Ethiopia, cancer of the cervix is among the most common forms of cancer in women. It is usually fatal because of late detection and the dearth of treatment facilities. An estimated 200,000 women in developing countries die from the disease each year.

In July 2001, Genet boarded a bus in Awasa, with her teenage son, and made the journey of about 300 km. north to the nation's capital, Addis Ababa. She had been referred by her hospital to Dr. Bogale Solomon, director of the Black Lion Hospital radiotherapy department.

The centre opened in 1997, a joint project between the government of Ethiopia and the United Nations International Atomic Energy Agency (IAEA). Ethiopia is the poorest country in the world to introduce radiotherapy. In its first four years the department has treated 1300 patients and the number of patients being treated is growing steadily.

Genet has joined a group of patients, mostly other women, who attend the clinic daily as outpatients. These patients are exposed to small doses of radiation, lasting one to two minutes, a process known as fractionation, that best spares healthy cells. The treatment entails directing multiple beams of radiation from outside the body at the tumour in the pelvic region. The radiotherapy machine being used is Chinese made and its radioactive source is Cobalt-60, first used therapeutically 50 years ago.

Genet was married when she was 12 years old. She had her first child at the age of 14. Her chances of being cured are good, says Dr. Bogale, an internist and Ethiopia's sole radiation oncologist. "Although her disease was too advanced to be operated on, she's an early case," he explained. "The cancer hadn't spread (out of the pelvis)."

Cervical cancer mostly affects Ethiopian women over 30 years old and peaks in the 40-45 year old age group. The rate at which it strikes is more than four times the average incidence in developed countries where routine monitoring, providing early detection, leads to usually simple and effective treatment.

Women make up about 70 per cent of the patients at the centre, and cancer of the cervix is the most common disease comprising over one-third of all female patients treated. The incidence of cervical cancer is high all across sub-Saharan Africa, where lifestyle is blamed for its proliferation. The main factors include trauma from repeated births, promiscuity, and poor hygiene linked to poverty. The spread of HIV-AIDS has also increased the risk of women getting cervical cancer.

Unfortunately, many of the patients referred to the Black Lion lab are not diagnosed until the disease is far advanced. Nevertheless 50 per cent of patients treated are still alive four years after beginning treatment, Dr. Bogale said.

Statistics reveal that the Black Lion radiotherapy department is a small beacon of light in a large and troubled sea. Ethiopia has only one radiotherapy machine to serve a population of 60 million plus. In Europe, there's one machine for every 250,000 people. Addis Ababa alone has a population of about 3.5 million.

"There is increasing recognition of cancer in developing countries," says Vic Levin, head of the IAEA section of Applied Radiation Biology and Radiotherapy. "Although the spectrum of cancers in developing countries differs from that in the more affluent world, the perception that there is less chance of getting cancer in developing countries is proving increasingly false," Levin says.

Cases have risen from two million worldwide in 1985 to five million in 2000 and are projected to reach 10 million in 2015. The waiting list for treatment at the Black Lion clinic is lengthening. The department now remains open until 10pm and treats 52 people every day. Dr. Bogale is the only radiation oncologist in the department. He's had no holiday in four years.

The IAEA's Levin says that the treatment of cervical cancer with radiation is among the oldest and most resounding success stories of radiotherapy. "The number of machines that provide the treatment across Africa nearly tripled in the 1990s, largely due to the successful transfer of technology by the IAEA," Levin said.

National cancer control programmes that offer preventive and early detection, a modest mixture of treatment by surgery, radiotherapy and chemotherapy, result in the cure of 45 per cent of all cancers in developed countries. It is a target to which a developing country such as Ethiopia and the dedicated staff at the Black Lion Hospital, can also aspire.

Meeting the need for radiotherapy services in developing countries

With the incidence of cancer on the rise in developing countries, there is an increased demand for IAEA assistance in the field of radiotherapy. Assistance through the technical cooperation programme includes the provision of radiation sources and equipment, and personnel training in the establishment and proper maintenance of radiotherapy programmes for cancer treatment. IAEA has supported a number of countries in establishing their first radiotherapy centres. Over the last seven years, modern radiation therapy services have successfully commenced in Ethiopia, Ghana, Mongolia, Namibia and Uganda. With support from IAEA, Yemen will soon join this group.

While acquiring the necessary sophisticated equipment is important, the IAEA's Victor Levin points to the even more critical elements: "Successful cancer treatment requires knowledgeable, skilled people operating well calibrated radiotherapy equipment. Our assistance attempts to provide a balance of all supporting elements including the clinical, dosimetric, safety, and maintenance."

LEARNING FROM ZTOUTI'S FARM: NUCLEAR TECHNOLOGY HELPS CROPS GROW IN MOROCCO'S SALTY SOILS

Morocco — In the midst of land near bustling Marrakesh that's dry and virtually barren, lie the green pastures of Hassan Ztouti, a Moroccan farmer. Although the soil on Ztouti's farm has too much salt in it, his crops are thriving — thanks to nuclear technology.

For more than three years, Ztouti's farm in the Sed El Masjoune region of Morocco has served as a demonstration site for growing plants in saline soils — a discipline known as biosaline agriculture. Under the programme, scientists from Morocco and other nations use proven nuclear techniques and applications to learn about the complex interrelationships between soils, water and plants.



Good irrigation practices — and radiometric gauges and tracers — are essential to the production of crops on saline soil.
Photographer: Weckind / IAEA

"We need to better understand the composition of our own soils, and that will help us tell farmers how and where different types of [salt-tolerant] plants can grow best," says M'hamed El Khadri, a microbiologist with Morocco's National Institute of Agronomic Research (NIAR). He conducted experiments at the International Atomic Energy Agency's Agriculture and Biotechnology Laboratory in Austria. The IAEA is sponsoring the multinational effort through its technical cooperation programme and has drawn on expertise from the eight countries involved.

The Moroccan institute, which is supporting the work on Ztouti's farm, tapped a new well for the demonstration project. Although the water is brackish, it nourishes salt-tolerant plants such as eucalyptus, acacia and olive trees and a mustard-type plant called rapeseed. Based on the success of the project, the government is digging another saline well to irrigate more demonstration plots.

Once the well is tapped, the aquifer will be studied, mapped and monitored. Among the questions that scientists and hydrologists need to address are: Is the aquifer big enough to irrigate an expanded plant demonstration site? How is it recharged? How salty is the groundwater? What's happening to the soil? Using such analytical tools as neutron moisture gauges and radioactive isotopes, they'll be able to answer these questions.

Worldwide, nearly 198 million acres have soil too salty for the survival of most crops. That's an area roughly the size of Pakistan, another country in the IAEA's project where saline soils also pose big challenges for agriculture. One way of reclaiming saltlands is to practice biosaline agriculture, the approach being used on Ztouti's farm in Morocco, and by farmers in Pakistan, Tunisia, and other countries engaged in the IAEA project.

In biosaline agriculture, salt-tolerant plants must be suited to soil and water conditions. Farmers also must know how much saline water to use in irrigating the plants. Besides providing sources of animal feed, bio-mass fuel and industrial raw materials, salt-tolerant plants help to conserve soil moisture, slow erosion and put a brake on the processes that turn an area into desert.