# What can Nuclear Medicine Physicians and Radiologists do for Global Health?

Nearly two-thirds of the world's population, 4.7 billion people, does not have adequate access to radiological services.[1] Improving access to radiological services means promoting health equity and raising the health standards of the masses in impoverished countries. Furthermore, epidemiological data of populations and countries and disease patterns can be gathered from imaging data. Researchers can track the changing disease trends and progressions through diagnostic exams from around the world. Global radiology is a newly emerging field that integrates radiology and global health and seeks to increase access to radiological services.

Developing countries are facing a double burden of diseases: A rise in both communicable and noncommunicable diseases. Medical imaging is crucial for both infectious and chronic diseases. The world's population is aging and there is increased adoption of Western lifestyle. By 2030, about 70% of cancer deaths will be in resource-poor countries.[2] Cancer cases in poor countries tend to present at advanced stages. If detected early, one-third of all cancer mortality can be prevented.[3] Additionally, more than 80% of cardiovascular deaths occur in developing nations.[4] Myocardial perfusion imaging is important in the management of cardiovascular disease. Cancer and heart disease have a huge economic impact in terms of increased health expenditure, lost earnings, and years of life lost (YLL). Therefore, helping to reduce premature deaths due to chronic diseases is working toward United Nations Millennium Development Goals 1 and 6: Eradicate Poverty and Combat diseases.[5] America plans to accept more and more refugees each year. Hence, it is necessary to be familiar with diseases of the third world countries. In the past decade, Burmese have been the largest group of refugees resettled to the United States.

Like many other developing countries, Myanmar has many problems: Civil war, drug problems, human rights violations, economic sanctions, and natural disasters. It is one of the least developed country (LDC) in Southeast Asia, and has the lowest government spending per person on health in the world.[6] Healthcare is supposed to be free but in reality, patients have to pay out of pocket. There are very few medical aid organizations in Myanmar and most operate on a small scale. The country of about 53 million people has only four computed tomographies (CTs) and four magnetic resonance imagings (MRIs) (each representing 0.075 machine per million population).[7] Compared with this, Japan has 46 MRIs, 102 CT, and 4 Positron emission tomographies (PETs) per million population.[7] The first and only PET/CT in Myanmar started operation only in 2015. One study stated that there should be at least one PET per million people.[8] There is a call for using PET/CT as the first rather than the last test in the assessment of cancer[9] Like other tropical countries, the machines have to be kept in air-conditioned rooms with humidity control. There are frequent power outages and voltage fluctuations even in the largest city. There are only seven physicians working in nuclear medicine in Myanmar including military physicians, and the country has to send doctors to Singapore for fellowship training. Most general practitioners in Myanmar are not aware of the indications for ordering nuclear medicine tests. Hospitals lack trained personnel to operate the equipment and radioisotopes, such as technetium-99m (Tc99m) are in short supply. Fludeoxyglucose (FDG) does not require a nuclear reactor for production, and it is a versatile radiopharmaceutical with major applications in oncology, cardiology, and neurology. FDG can be made with tabletop cyclotrons that are logical and cheaper alternatives to nuclear reactors.

American College of Radiology, Radiological Society of North America, the American Roentgen Ray Society, and Royal College of Radiologists are actively supporting global health programs. In America, radiology residency programs are implementing international rotations. Residents and fellows can gain valuable experience and see a rich variety of interesting pathologies. Today, an epidemic in a remote corner of the world can quickly grow into a pandemic and reach our doorsteps in a short time. So, doctors in Western countries must be able to recognize all types of diseases. There are many ways that radiologists and nuclear medicine physicians can participate in the global health work.

- Donating new and used equipment, spare parts, and providing radioisotopes: In rich countries, the lifetime of an equipment is usually under 5 years, whereas in poor countries, outdated equipment are still kept in use. Helping to set up picture archiving and communication systems (PACS) and radiology information systems (RIS) in poor countries is beneficial and cost-effective in the long run because stored images

can be used for clinical and research purposes to better serve the needs of local populations. Monetary donations are also much needed because there are costs to maintain, operate, and repair imported instruments. The donated equipment does not always have to be expensive. Supplying portable ultrasound machines to mobile health teams will go a long way in the care for pregnant patients in poor countries

- Offering training programs for doctors, medical physicists, and technicians: Universities can invite and sponsor health workers for training. The training courses and continuing education can also be in the online distant learning mode
- Sending experts to train health workers in their native countries: There are "visiting professor" programs to train local doctors. Doctors can also volunteer for clinical practice in underserved regions of the world for a period of time
- Reading images via telenuclearmedicine and teleradiology: This has some obstacles because most developing countries have limited internet access with low bandwidths. Many hospitals in the third world still use the traditional analog films. However, films can be converted to digital images and transmission is possible even with low bandwidths
- Forming partnerships between hospitals: This way, new innovative solutions and discoveries can be shared.

Currently, many radiology projects overseas are being run in isolation as individual programs. Social radiology is a new concept where individuals, NGOs, and radiological societies from all over the world connect, coordinate, and collaborate to provide quality care. It can be viewed as an information infrastructure or a web-based platform that is interactive and evolving.[10] It allows all of us to come together in the virtual social space. Winston Churchill once said, "We make a living by what we get, but we make a life by what we give." As doctors we have an obligation to make a difference in the lives of millions of people around the globe. Healthcare is a human right and we should strive to eliminate health disparities. There is a need to increase both the quantity and quality of imaging services worldwide. The ultimate long-term goal should be achieving self-sustainability in poor countries. Global health work is a chance for radiologists to connect with communities, rather than sitting in front of a computer screen. To conclude, anybody can contribute to global health, including nuclear medicine physicians and radiologists.

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