

VIEWPOINT

Challenges to Cancer Program Development in Low- and Middle-Income Countries



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INTRODUCTION

The Millennium Development Goals (MDGs) were established in 2000 to address the inequities in health, education, gender, environment, and economics of the poorest nations in the world. Absent from the targets set by the MDGs, however, was the devastating health impact that noncommunicable diseases have on both developing and developed nations. A high-level meeting of the United Nation's General Assembly in 2011 addressed this omission and presented a unique and historic opportunity for international leaders to commit to prevention and control of noncommunicable diseases.¹ Cancer is one of the leading noncommunicable diseases that must be viewed as a major public health threat to life and economic survival, particularly in low-resource countries. The World Cancer Declaration was proposed in 2013 by the Union for International Cancer Control to call on government leaders and stakeholders to work together to decrease the cancer burden worldwide.²

Between 1990 and 2013, global deaths from cancer rose from 5.7 million to 8.2 million, and this number is expected to rise even further. Of the 14.9 million new cancer cases that occurred in 2012, 8 million occurred in developing countries.³ The increase in morbidity and mortality as a result of cancer is fueled by population growth, aging, and less mortality from infectious diseases as well as the adoption of western diets and lifestyles, particularly in low- and middle-income countries (LMICs). Most developing countries are not positioned to meet this rapidly rising cancer burden. The infrastructure needed to launch a cancer treatment program in low-resource countries that

addresses the screening, diagnosis, treatment, and palliation needs of the cancer patient becomes a daunting task and often results in loss of the political will needed to ensure sustainability. Numerous challenges exist to cancer program development, and there is constant competition from other equally pressing health and environmental issues that pull on the resources allotted to cancer care. In resource-poor settings, where there is limited government buy-in and poor awareness, cancer program development may not be feasible in the short term. In such settings, efforts should be geared at awareness, education, and primary prevention. If the potential for improving infrastructure and resources exist, those countries must acknowledge the social, political, technologic, cultural, and financial barriers they face and work systematically to rise to these challenges to achieve successful and comprehensive implementation.

Barriers to Cancer Care Program Development in LMICs. The barriers to cancer control in LMICs are multiple and diverse but not insurmountable. Attempting an overly ambitious and grand-scale cancer control in the first phase of program development can be overwhelming and a setup for defeat. Initial planning focusing on a specific demographic group or on specific grouping of cancers, such as breast and cervical cancer in women, will allow an efficient infrastructure to be put in place and tested and, equally important, will provide the initial data to demonstrate effective outcomes. Subsequent phases of program planning could then be launched from an already tested foundation that will allow scaling up of technology, a trained health worker force thus broadening of the scope of care and the type of cancers that could be addressed.

The first step in program planning is establishing the burden of disease. This will facilitate the program to be focused and specialized and benefit from limited resource assignment.

The following barriers to cancer care program development will be discussed:

1. Poverty
2. Governmental funding, policy making
3. Lack of human capacity
4. Health infrastructure
 - a. Lack of cancer registry
 - b. Diagnosis
 - c. Availability of treatment: Radiation therapy, chemotherapy, surgery
5. Palliative care

Poverty. Since the MDGs were adopted in 2000, the proportion of the 1.9 billion people living in extreme poverty around the world has decreased by 50%.⁴

Although MDG Goal 1: Eradicating Extreme Poverty, has been included as one of the profound achievements of the MDGs and more than 1 billion have been removed from extreme poverty, the final report of the 15-year Declaration acknowledges that the poorest and most disadvantaged are being left behind as 836 million people around the world are still surviving on less than \$1.25 a day in 2015 (Fig. 1). All developing regions except sub-Saharan Africa had met the goal of halving extreme poverty by 2011, leaving more than 40% of the sub-Saharan population currently lagging behind the rest of the world.⁴

Poverty, referred to as a cancer-causing agent by Dr. Samuel Broder, former National Cancer Institute director, was found by Ward et al to positively influence mortality rates in both men and women among a heterogeneous group of cancers.⁵ The World Health Organization (WHO) has declared

poverty the single largest determinant of health. They have proposed *The Solid Facts* to bring better awareness of the importance of health, meaningful work, and connection to community as strategies to improve the health of nations. Public health policies that remove the barriers to health care, including cancer care, and legislation that protects citizens from stigmatization and guarantees minimum income are a sound start to breaking down barriers to national cancer care.⁶

Government Funding, Policy Making. Worldwide, \$6.5 trillion (USD) was spent in 2011 for health care. In almost all countries in the world, health care expenditure is made up of a combination of private spending and public sector spending. The public-sector spending is heavily influenced by policymaking decisions and generates the most debate as to how much a country should actually spend on health care and what approach a country should use to influence how much should be budgeted for taking care of its citizens' health.⁷ Total health expenditure is usually allotted as a percentage of the country's gross domestic product (GDP) and therefore varies greatly from country to country. At the extreme, the United States allots almost 18% of its GDP to health care spending. Total health expenditure per US citizen is approximately \$8300, almost half of which (49.6%) comes from private spending. At the other end of the spectrum, Qatar has the world's lowest health expenditure, using only 1.8% of its GDP for health. Qatar spends \$1622 per person, with <1% funded by the private sector. To contrast, total health expenditure for an Eritrean citizen is \$16, half of which is subsidized by the government.⁸ Factors such as a country's population age and demographic needs, average income, external funding, and ability

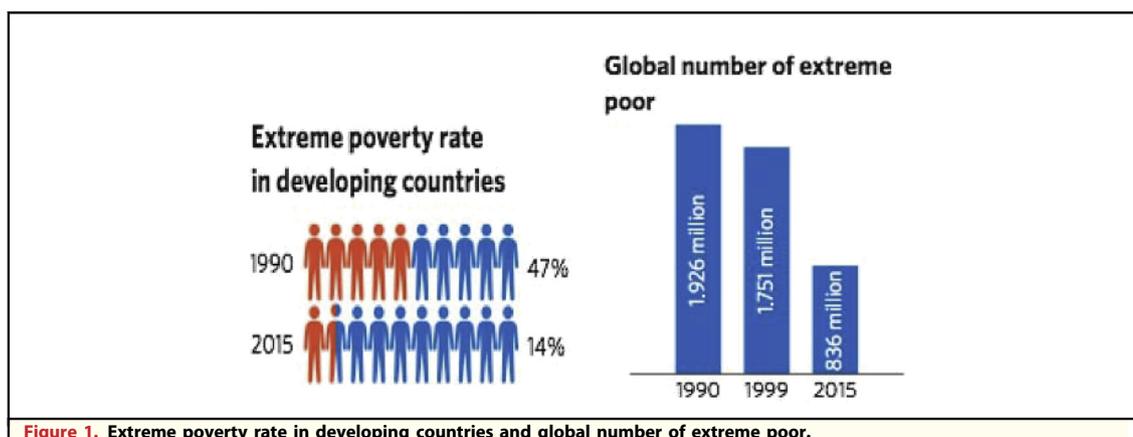


Figure 1. Extreme poverty rate in developing countries and global number of extreme poor.

of its citizens to pay for service are all taken into account when health expenditure is budgeted.

The challenge to establishing cancer care programs in LMICs is to find support for a “new” health entity not previously budgeted for or funded in the past 15 years. The emphasis of the MDGs was squarely on maternal/infant health and infectious diseases. It is not uncommon, therefore, for an LMIC budget to be heavily focused on infectious diseases and HIV/AIDS (Fig. 2).⁹

Lack of Human Capacity. The recent Ebola virus (EBV) outbreak in West Africa highlighted the lack of health workers in the region; specifically in Liberia and Sierra Leone, Ebola contributed to the deaths of 8.07% and 6.85% of the health workforce (physicians, nurses, and midwives) in their respective countries.¹⁰ As these countries emerge from the devastation of EBV, introducing cancer care treatment programs into a weakened and fragile

health system would require not only training of physicians and nurses but also community health workers who would be vital to the advocacy and awareness needed for prevention and screening.

Before the Ebola outbreak, there were only 51 physicians in the entire country of Liberia.¹¹ The Liberia College of Physicians and Surgeons had embarked on an ambitious residency-training program for physicians in internal medicine, pediatrics, obstetrics and gynecology, and surgery in October 2013, as part of a 10-year strategic plan to train specialists in health care. The 3-year program will graduate its first residents from each of the specialties in 2017.

Throughout most of the developing world, health worker shortages exist (Fig. 3),¹² but these shortages are most pronounced in sub-Saharan Africa, where almost 80% of sub-Saharan countries have failed to meet the WHO’s minimum recommendations for health workers.¹³ One strategy for

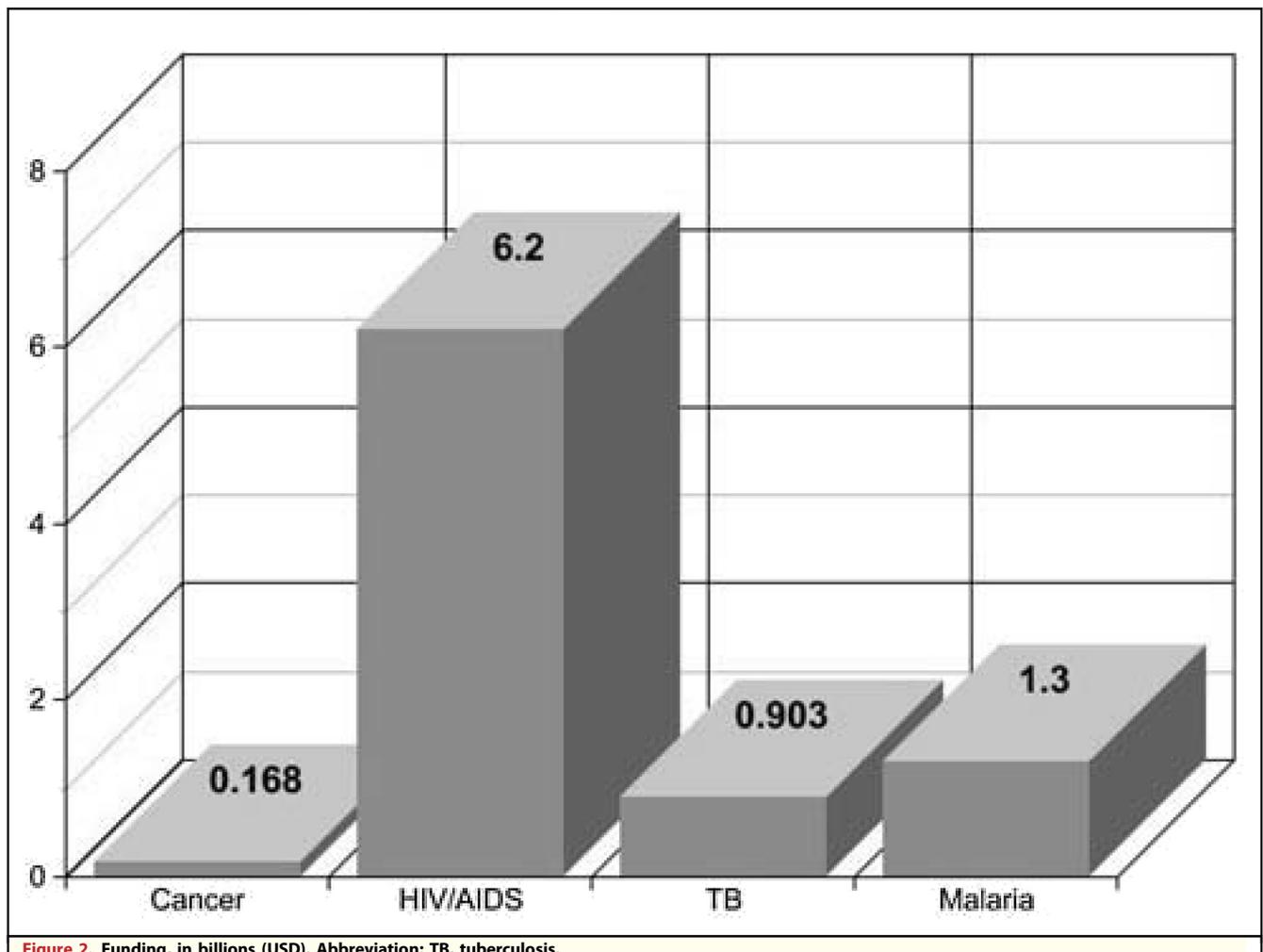
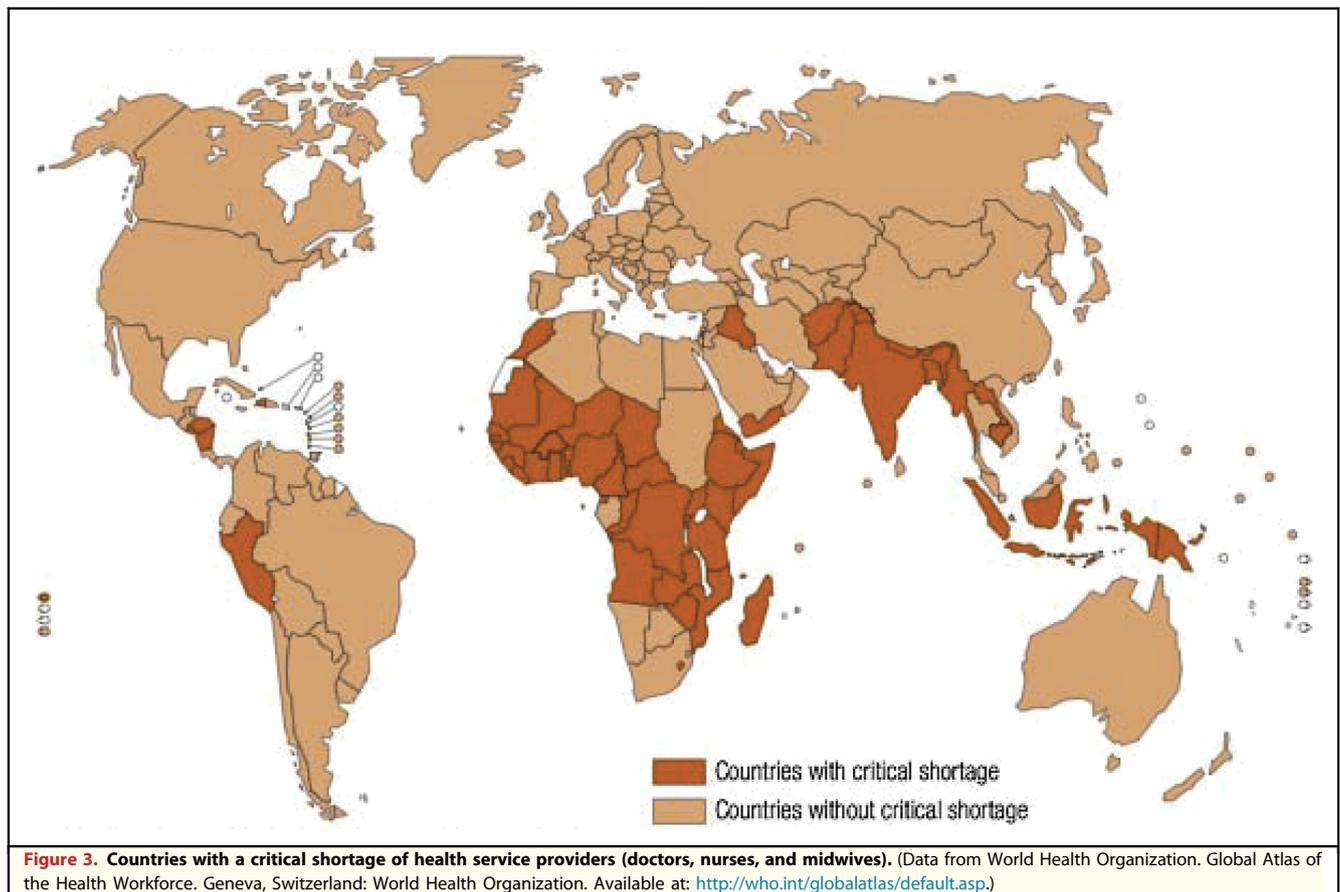


Figure 2. Funding, in billions (USD). Abbreviation: TB, tuberculosis.



strengthening training for cancer care is the twinning collaboration between high-income countries (HICs) and LMICs (HIC-LMIC collaborations) that has been successful in pediatric oncology.¹⁴ Similarly, the collaboration between the University of Michigan and Komfo Anyoke Teaching Hospital (KATH) in Ghana has resulted in a breast cancer research collaborative and international breast registry that can serve as a model for research and academic exchange.¹⁵ LMICs should strive to decrease the “push” factors by working within the partnerships to improve education locally, ensure professional opportunity and advancement, stimulate jobs and increase salaries, and work with international partners to improve technology training. Although the “pull” factors are more difficult to control, because they revolve around immigration policies, HICs should strive to do the majority of training in the local countries, hire local nationals for their projects, and advocate against immigration policies that perpetuate the “brain drain.”

Health Infrastructure. In some LMICs, infrastructural deficits may be difficult to overcome without

partnerships. Utilizing the expertise of foreign institutions and cancer alliances, LMICs can avoid costly mistakes and redundancy as they lay the foundations for cancer care delivery. Alliances such as the 2006 collaboration between the National Cancer Institute and the International Atomic Energy Agency with its Program of Action for Cancer Therapy have been forged to address the multiple challenges of cancer care in LMICs.¹⁶

Infrastructure challenges to cancer care program development in LMICs require strong governmental commitment and both public-private partnerships. These challenges fall under several categories.

Data Gathering and Cancer Registry. A system that would allow the program to define and quantitate its burden as well as evaluate its impact and correlate cause of death is crucial for allotting resources, budgeting, and program development and expansion. Cancer registries should have input from local physicians and should be defined in advance and designated as population-based or hospital-based before planning and implementation. Training of

registrars with basic medical and or public health knowledge is at the heart of a successful program, and all legal aspects and confidentiality must be incorporated into the initial planning.¹⁷

Diagnosis. Availability of pathology is the one service that standardizes and accurately identifies the burden of cancer. Pathology services are limited in resource-poor countries because of lack of trained personnel, lack of equipment, and absent qualification standards. In the United States, the ratio of pathologists to population is approximately 7:100,000, whereas in eastern, central, and parts of southern Africa the ratio is 0.08:100,000.¹⁸ Similarly, in West Africa the number of pathologists varies, from Ghana with 20 pathologists for 22 million people to Liberia where there is 1 pathologist. Several approaches have been proposed to provide pathology services in LMICs while these shortages are being addressed. One such approach is the use of telepathology. This relies on the electronic transmission of pathology images between 2 distant locations for diagnostic, educational, or research purposes. Telepathology systems can be either image based, real-time robotic or visual slides. The latter 2 allow the consulting pathologist to view the entire slide for more comprehensive diagnosis.

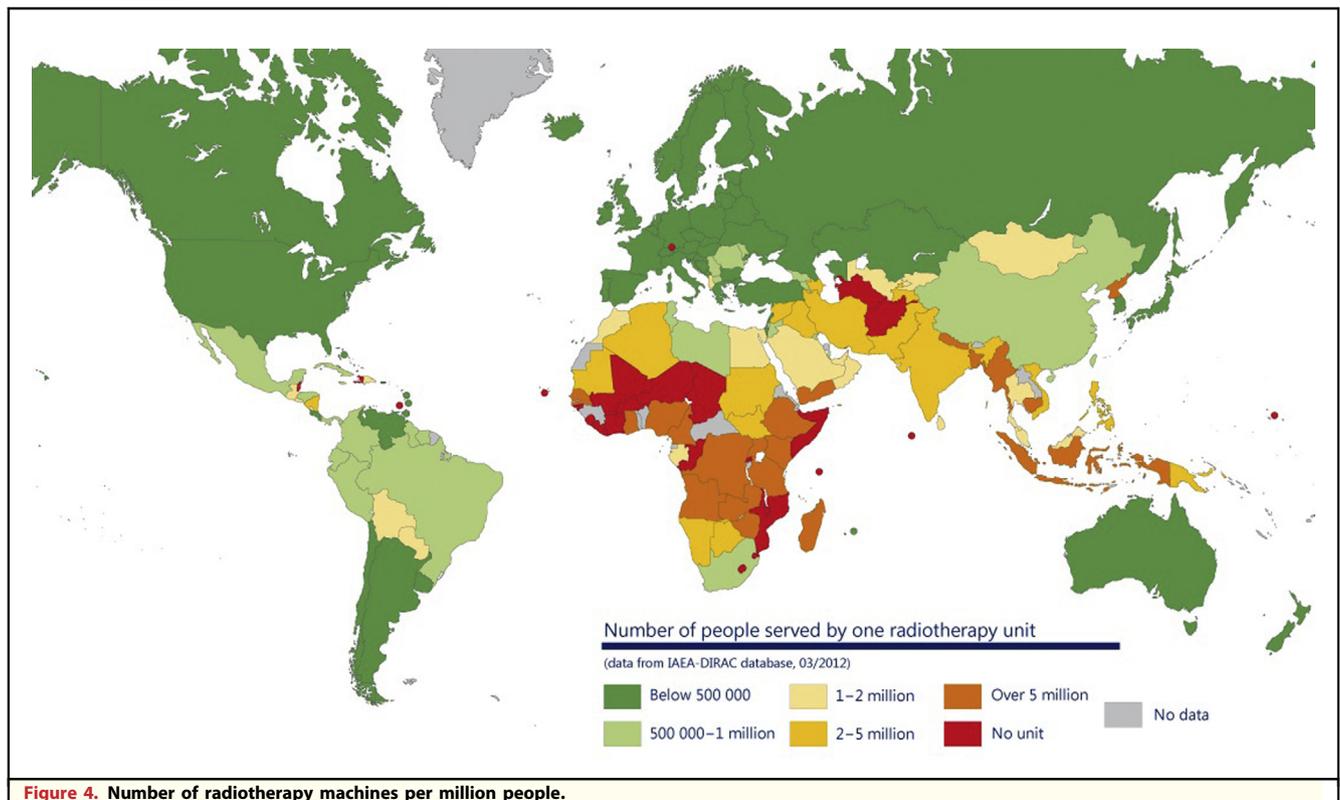
Treatment. Modalities of treatment that should be available include chemotherapy, surgical oncology, and radiation.

Chemotherapy. Access to drugs is an essential component of a cancer treatment program, but often its acquisition is challenging because of the high cost of drugs. The World Trade Organization (WTO) regulates the purchase of all goods, including medicinal drugs. The Treaty on Trade Related Aspects of Intellectual Property Rights, negotiated in 1994, mandated that any country seeking to trade with international members must follow strict rules on intellectual property to protect those intellectual property rights. Because medicines fall under the treaty, there was disagreement between HICs and developing nations regarding releasing of patents for medicines to be used for the public health good. The Doha Declaration, which was completed in 2003, aimed to lower trade barriers around the world, making patented drugs more readily available to LMICs.¹⁹ Through compulsory licensing, governments could authorize the production of patented drugs for domestic use by a third party, without the consent of the patent holder. The initial declaration did not address the impact felt by countries unable to manufacture drugs and unable to import these generic medicines under the compulsory

licensing. By 2003, a resolution by the WTO members made changes that allowed the export of generic pharmaceuticals. Although all WTO member countries are allowed to import, more than 30 developed countries have waived their right to do so.^{20,21} Embedded in these agreements is the fundamental human right of all nations to have access to essential medications.

Radiation Therapy. Distribution and availability of radiation therapy varies around the world, with most HICs having at least 1 radiotherapy unit for every 250,000 persons, compared with LMICs, where 1 unit services 5–20 million persons. As many as 36 countries around the world have no radiation therapy units (Fig. 4),²² leaving limited options for treatment. The process of acquiring radiation therapy capabilities requires a commitment from government, in collaboration with private donors and NGOs, for funding, trained personnel, and a safety infrastructure. The International Atomic Energy Agency, an independent organization that reports to the United Nations General Assembly, has provided help to LMICs in developing the capacity needed to launch sustainable and successful programs. Of debate is deciding which type of radiation therapy machines (linear accelerator [linac] or cobalt) should be introduced to low-resource countries. The modern linac machines offer precise dosimetry, less toxicity, and fewer environmental and personnel radiation hazards compared with the more durable, dependable, cheaper, and intuitive cobalt machines. The hefty price range for the linac machines, the constant need for repair, and the more sophisticated training requirements, however, can be a major drawback to its implementation in LMICs.²³

Surgery. Training of local physicians in surgical oncology procedures is essential to management of the increasing number of cancer cases in LMICs. The revolution in technology has given rise to a new generation of surgeons adept at minimally invasive procedures. In most developed countries, laparoscopy and robotics are now routinely used for surgical management of cancer.²⁴ However, in many LMICs, using such technology is prohibited by cost of equipment, lack of repair services, and availability of mentors. As LMIC surgeons traverse the learning curve associated with acquiring these skills for cancer surgeries, keeping procedures simple, improving training in open techniques, and re-education of anatomic pitfalls would best serve LMIC surgeons as they are introduced to the field of surgical oncology. Throughout the developing world, there is great variation in length and quality of



surgical oncology training. In a recent review, shortening the duration of training without compromising program integrity, tailoring training to meet specific country needs, and, for countries without domestic programs, partnering with countries that offer fellowships were some of the recommendations made to increase the global surgical workforce.²⁵

Palliative Care. The inability of most developing countries to adequately treat advanced cancers has resulted in a large number of patients with life-threatening illnesses and poor quality of life. For many terminally ill patients in developing countries, the need for emotional and spiritual support and the management of physical pain remain unmet. Physical pain, one of the most devastating burdens to both patient and families, continues to be the biggest challenge in cancer care; clearly, comprehensive guidelines for delivering palliative care are needed for LMICs. The WHO strategy for establishing palliative care involves governmental policy, education, and drug availability.²⁶ Currently almost 80% of the world’s opiates are used in HICs, with United States, United Kingdom, and Australia among the largest consumers (68%). Only 6% of the world’s opioid supply is used by LMICs.²⁷ Barriers

to both availability and use of opioids occur, and overcoming governmental control and patients’ perceptions is necessary to increase opioid uptake in developing countries.

CONCLUSIONS

During the past 15 years, while the world was focused on the treatment of infectious diseases, chronic diseases, including cancer, have emerged as the largest contributor to global mortality. By 2030, the global cancer incidence is expected to approach 21.4 million cases and account for 13.2 million deaths.²⁸ In the post-MDG era, a new set of Sustainable Development Goals were adopted at the United Nations in September 2015 at a high-level plenary meeting of the General Assembly. Sustainable Development Goal 3: “Ensuring healthy lives and promoting well-being for all at all ages,” will target the full range of noncommunicable diseases, including cancer.²⁹ With almost 80% of the cancer burden arising in the developing world, it becomes necessary for LMICs to take the first steps in developing the infrastructure that would provide cancer screening, prevention,

treatment, and palliation. Development of centers that focus on cancer care is not without its challenges. Strong government support and buy-in from local and international stakeholders become a necessary step in preparing LMICs for handling this new epidemic.

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