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Controlling Cancer in Developing Countries

Prevention and Treatment Strategies Merit Further Study

Cancer imposes a major disease burden worldwide, with considerable variation among countries and regions. Cancers associated with bacterial or viral infections, such as cervical, liver, and stomach cancer, make up a larger share of total cases in developing than in developed countries. Lung, colorectal, breast, and prostate cancers, on the other hand, appear at higher rates in developed countries because they are related to tobacco use, diet, and carcinogens in the workplace. These cancers are becoming more common in developing countries as people increasingly adopt the living habits of wealthier nations, especially smoking.

Unless screening and prevention can reduce the incidence of cancer, the number of new cases is projected to increase from 10 million in 2000 to 15 million in 2020; 9 million would be in developing countries.

Much of what is known about cancer prevention and treatment comes from studies conducted in developed countries. Controlling cancer in developing countries is still relatively new, making it difficult to estimate the costs and cost-effectiveness of various prevention and treatment strategies. Further study of health care technologies and health service strategies, along with cost evaluations, will shed more light on which strategies are likely to be feasible and affordable. Pilot programs are an ideal way to begin controlling cancer in developing countries.

Burden of Cancer in Developing Countries

Although data on cancer cases and deaths in developing countries are more limited and less accurate than in developed countries, researchers do know that patterns and types of

cancer differ considerably between the world's richer and poorer nations. In developing countries, the top cancers among women, in order of incidence, are breast, cervical, stomach, lung, and colorectal cancer (see Figure 1). Cervical cancer accounts for the greatest number of deaths. The top five cancers affecting men are shown in Figure 2.

FIGURE 1

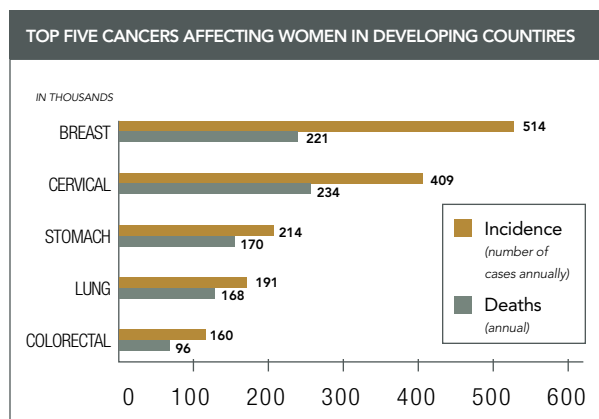
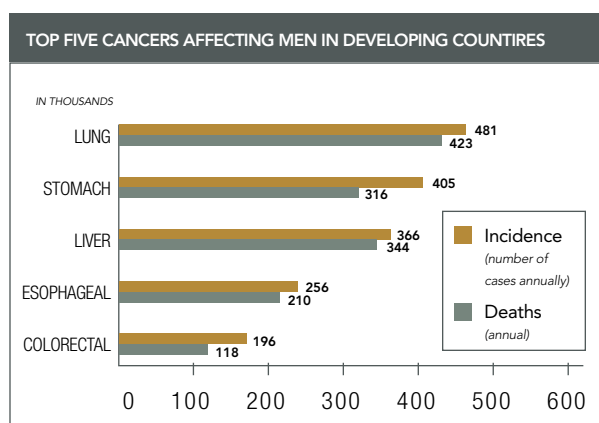


FIGURE 2



Source: J. Ferlay et al., GLOBOCAN 2002 (Lyon, France: International Agency for Research on Cancer, 2004).

The higher incidence of infection-related cancers (stomach, liver, and cervical) in developing countries reflect weak public health systems that cannot control contaminants, bacteria, and viruses, and the lack of effective preventive and screening services. Cancer of the esophagus may reflect in part the consumption of traditional beverages while extremely hot. Cancers that are becoming increasingly common in developing countries—lung, breast, and colorectal cancers—reflect longer life expectancies, the adoption of Western diets, and the globalization of tobacco markets.

Which Types of Cancer Can Be Prevented and Treated Affordably in Low-Resource Settings?

Survival rates for some types of cancers—including esophageal, liver, lung, and pancreatic cancer—vary little between developed and developing countries. For these cancers, primary prevention is the most practical and often the only possible intervention in developing countries. Currently available methods of early detection and treatment have not proven effective.

For a second group of cancers—large bowel, breast, ovarian, and cervical cancer—proven methods of early detection, diagnosis, and treatment can, in principle, be delivered through district health care facilities in developing countries. The detection and treatment of cervical cancer, in particular, is feasible and cost-effective in low- and middle-income countries.

For a third group of cancers—including leukemia, lymphoma, and testicular cancer—survival is much more likely for patients in developed countries than in developing countries because developed countries have a higher level of technology, greater infrastructure, and better medical resources, facilitating the diagnosis and treatment of these cancers. Low- and middle-income countries may not be able to match these resources for some time to come.

Types of Interventions for Controlling Cancers

PRIMARY PREVENTION

Primary prevention, which aims to reduce or eliminate exposure to cancer-causing risk factors, will be critical for controlling cancers in developing countries. The most important prevention measures are the following:

- **Immunization against or treatment of infectious agents associated with cancers.** Two vaccines are particularly important: a human papilloma virus (HPV) vaccine to prevent infection from certain types of the virus that can lead to cervical cancer, and Hepatitis B to help prevent liver cancer. The HPV vaccine can potentially prevent about 70 percent of cervical cancer cases, and international donor agencies are working to make it available at discounted prices in developing countries.
- **National tobacco and alcohol control programs.** Tobacco use is the most important cause of cancers of the lung and respiratory system and the esophagus, and it contributes to several other cancers. Excessive alcohol consumption accounts for 20 percent to 30 percent of liver and esophageal cancers. Effective tobacco and alcohol control programs include increasing taxes on the products, restricting or banning advertising and promotion, banning smoking in public places, educating the public about the health risks of excessive use, and making therapy available to combat addiction.¹
- **Programs to promote diets that include more fruits and vegetables and fewer harmful fats and processed foods.** Promoting healthy diets and exercise can take place in schools and work sites and through other public health campaigns. Promoting healthy lifestyles and curbing obesity can reduce the risk of cancer as well as the risk of many other (particularly cardiovascular) diseases.

SECONDARY PREVENTION: EARLY DETECTION OF CANCERS

The main objective of making cancer screening widely available is to detect cancer cases early enough to make curative treatment possible. Screening for liver, stomach, lung, and colorectal cancers have focused on people at higher risk for those cancers (for example, people over age 50 and smokers), but the value of early detection varies greatly with the type of cancer. For example, screening for liver cancer can result in earlier diagnosis, but because treatment of that cancer is largely ineffective, screening has not been shown to lower mortality rates.

Screening for cervical cancer has shown greater promise in developing countries. Pilot studies in six countries by the Alliance for Cervical Cancer Prevention demonstrated the cost-effectiveness and feasibility of one or two lifetime visits followed by immediate treatment, involving simple, low-cost methods.

These study results demonstrated that screening women once or twice, between ages 35 and 40, can lower women's lifetime risk of cervical cancer by 25 percent to 35 percent; conducting three lifetime screenings would reduce risk by more than 50 percent. Developing countries can adopt relatively low-cost screening approaches, such as visual inspection of the cervix, which requires one visit, or DNA testing for the HPV virus, which requires two visits (see Table 1). Both are cheaper than the traditional screening approach—the Papanicolaou (Pap) smear—conducted in higher-income countries with more advanced laboratories and infrastructure.

Breast cancer screening can include mammography, clinical breast examination, and breast self-examination. Most of the available cost-effectiveness data on these methods have come from developed countries. Research does show, however, the breastfeeding is associated with lower rates of breast cancer. Researchers recognize that screening will be more cost-effective where the incidence of breast cancer is higher. Still, as with other cancers, more studies in developing countries are needed to obtain reliable data on the true costs of these interventions.

CANCER TREATMENT AND PALLIATIVE CARE

The main methods of cancer treatment are surgery, chemotherapy, and radiotherapy, used alone or in combination. The cost-effectiveness of surgery for treatable cancers, such as breast, cervical, and colorectal cancers, may be in the range of a few to several thousand dollars per year of life saved, making these treatments potentially affordable and cost-effective for middle-income countries.

There is increasing emphasis worldwide on the development of specialized cancer centers that can apply various therapies based on scientific evidence. These centers can also provide rehabilitation and palliative care for cancer patients to relieve their suffering.

The most basic and cost-effective approach to care for terminally ill patients, especially in low-resource settings, involves using inexpensive painkillers from aspirin to opiates,

TABLE 1. COSTS AND BENEFITS OF ONCE-IN-A LIFETIME SCREENING FOR CERVICAL CANCER IN BRAZIL AND MADAGASCAR
(in international dollars*)

Country and category	Visual inspection followed by immediate treatment in one visit	DNA testing for HPV, with treatment on the second visit
BRAZIL		
Lifetime cost	\$75	\$77
Cost per year of life saved	\$113	\$155
Number of deaths averted per 1 million screened	10,399	10,235
MADAGASCAR		
Lifetime cost	\$33	\$40
Cost per year of life saved	\$167	\$332
Number of deaths averted per 1 million screened	8,815	8,676

*International dollars are converted from national currencies using exchange rates that account for purchasing power parity.

Source: Adapted from M.L. Brown et al. 2006. Disease Control Priorities in Developing Countries, 2nd ed., ed. D.T. Jamison, J.G. Breman, A.R. Measham, G. Alleyne, M. Claeson, D.B. Evans, P. Jha, A. Mills, and P. Musgrove. 577. New York: Oxford University Press.

depending on individual patients' needs. Unfortunately, opiates (such as morphine) are often scarce or unavailable because of regulatory obstacles, lack of knowledge, or misconceptions about these drugs. Other palliative care treatments include drugs to alleviate the side effects of chemotherapy or radiation, and physical therapy to alleviate disabilities following cancer surgery.

More Research Needed

To guide policymakers on the most effective cancer control strategies in developing countries, more work is needed in the following areas.

- **Clinical evaluations of cancer control interventions** should be undertaken in low- and middle-income countries, in which patients participate in randomized controlled trials (a standard scientific method to learn about the effectiveness of different therapies).
- **Health services research** is needed to determine the number, distribution, and organizational structure of cancer control programs, along with the amount of funding required to put in place a minimally acceptable level of cancer control.

- **Country-specific economic evaluations** should be undertaken to assess the resource requirements, cost, and cost-effectiveness of cancer control programs that are adapted to the needs of low- and middle-income countries.

Start Small, Scale Up Smart

Policymakers need to be aware of the long time horizons for cancer prevention and screening interventions to show results. For example, an HPV vaccination program would not prevent cervical cancer cases for many years, even decades, after the vaccine is introduced. The time lag, however, should not be an argument against taking such actions.

Because current knowledge about cancer control is incomplete, developing countries should start in small areas and gain knowledge from well-documented pilot programs. The ideal pilot studies are those in which a treatment group is compared against a matched control group of patients. Starting small might entail focusing on individuals with certain high-risk characteristics or in a limited geographic area, and scaling up should occur only after pilot programs have been shown to perform well.

¹ See also the Fact Sheets “Tobacco Addiction” and “Risk Factors” available at www.dcp2.org.

For More Information

M.L.Brown, S. Goldie, G. Draisma, J. Harford, and J. Lipscomb. 2006. “Health Service Interventions for Cancer Control in Developing Countries.” In *Disease Control Priorities in Developing Countries*, 2d ed., ed. D.T. Jamison, J.G. Breman, A.R. Measham, G. Alleyne, M. Claeson, D.B. Evans, P. Jha, A. Mills, and P. Musgrove. 569-589. New York: Oxford University Press.