55-year-old man living in a major U.S. city feels short of breath and a squeezing pain blooms in his chest. He reaches for the phone, calls 911 and then takes an aspirin from the medicine cabinet to chew as he waits for the ambulance to arrive. A short time later, he is at the hospital undergoing an operation to implant a stent to save his heart—and his life.

This scenario plays out daily in industrialized nations like the U.S., but in developing countries the story is quite different. In poor regions, heart disease often goes undetected, especially in the young. A 30-year-old man might never have had a blood pressure cuff on his arm and has no idea that he is suffering from severe hypertension. And if a heart attack strikes, he might not have access to a stocked medicine cabinet or an emergency room. Instead, he may live in a remote village without transportation or the funds to pay for a bus or a taxi if one were available. In places like this, a heart attack spells an almost certain death sentence, and preventative medications, such as statins, are unheard of.

Historically, low- and middle-income countries have put few of their scant resources toward addressing the suite of so-called “noncommunicable diseases” (NCDs) that include cardiovascular disease, diabetes, chronic respiratory ailments and cancer. That’s a big problem because together, they account for almost two thirds of deaths worldwide. And, by some estimates, low- and middle-income countries account for 80 percent of the burden of heart disease.

But the tide is beginning to change. A key turning point came in 2007, when a series of articles published in The Lancet sounded the alarm, drawing the global health community’s attention to the many lives claimed by these diseases in the developing world. That’s a big problem because together, they account for almost two thirds of deaths worldwide. And, by some estimates, low- and middle-income countries account for 80 percent of the burden of heart disease.

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Against this backdrop of growing awareness of the problem, the U.S. Institute of Medicine (IOM) produced a consensus report on heart disease in developing countries in 2010. It called for case studies to assess the needs of these countries, a crucial step toward developing priorities and plans for allocation of precious resources.

Case studies offer an important window into cardiovascular disease. Heart attack, hypertension and stroke remain key concerns as waistlines around the globe continue to expand and other lifestyle changes spread. Developing countries are certainly not immune to the growing obesity epidemic. The driving factors behind obesity in poor regions are manifold: Access to cheap packaged foods can increase empty calorie
Take to Do More?

the resources countries need to tackle chronic diseases

“Heart attack, hypertension and stroke remain key concerns as waistlines around the globe continue to expand... developing countries are certainly not immune to the growing obesity epidemic.”
intake, while safety concerns in certain densely populated urban areas can discourage physical activity. And although it might be difficult for some in the West to fathom, in some places, a slim figure is something to be actively avoided. For example, some people in South Africa strive to be overweight because they view thinness as a sign of HIV/AIDS.

As an important step toward the kinds of case studies recommended by the IOM, several case presentations were made at a workshop they coordinated that focused on decision-making at the country level for control of chronic diseases, including building better health systems and employing public health and policy approaches. These presentations were from Kenya, Grenada, Bangladesh and Rwanda—widely diverse countries with a range of approaches to handling this suite of diseases.

**LOCAL NEEDS AND COSTS**

Consensus is growing that low- and middle-income countries should develop their own programs to address their national NCD disease burden. In many countries, simply reallocating resources toward more cost-effective interventions would save untold sums and greatly improve health. In southwestern India’s Karnataka State, switching to more cost-effective services in the basic health care package would drop per capita public health spending by half—and reduce total deaths by 28 percent. In China, providing a combination of drugs for those at high risk of heart disease would cost $1.02 per year per person. Meanwhile, it would cost just 35 cents a year per person to target obesity in India through a mass media campaign—coupled with better food labeling and marketing restrictions on high-fat and sugary foods.

But it is not always simple to discern a developing country’s needs when it comes to NCDs. For example, less than half of countries surveyed by the World Health Organization (WHO) tally deaths or risk factor data from these diseases in their national health reporting; only about a quarter collect and publish such data. Many developing countries have no idea of the scope of the problem, associated costs, the burden on the health system or how well certain interventions will translate into local settings.

WHO created a data collection template to help countries collect crucial information. Their “STEPwise approach to Surveillance of NCD Risk Factors”, or STEPS survey, asks questions such as: Do you currently use any smokeless tobacco products such as snuff, chewing tobacco or betel? During the past 30 days, how many times did you have six or more standard drinks in a single drinking occasion? On average, how many meals per week do you eat that were not prepared at home? The questionnaire provides a way to monitor disease trends and compare them with those of other countries. For example, preliminary numbers from Rwanda’s Ministry of Health STEPS survey of 7,241 people showed that only 2.9 percent had high cholesterol while 16 percent had systolic blood pressure readings of 140 to 155—stage 1 hypertension—which can lead to deadly or disabling stroke, heart attack, aneurysms and more. But some low-income countries cannot even afford to hire the staff to conduct a survey.
In 2012, an Institute of Medicine report, “Exploring Country-Level Decision Making for Control of Chronic Diseases,” summarized reflections on the persistent paucity of data and resources for data collection from the case presentations at the workshop held the prior year. It found, for example, that in Bangladesh, the country’s Urban Health Survey collects data on tobacco use among men, but excludes women. “The reason,” the authors explained, “is that smoking is viewed as extremely inappropriate for women in Bangladesh, so few of them are thought to smoke; nonetheless, the precise numbers cannot be known if the data are not collected.”

Lack of funding impacts the system in myriad ways. In 2001, the government of Kenya formed a new division to address chronic noncommunicable disease. However, more than a decade later, the division remains grossly understaffed, according to information provided in the Institute of Medicine case report by Gerald Yonga, chair of medicine and cardiology at Aga Khan University in Nairobi. Countries also face real challenges in keeping programs running over the long term. For example, in Grenada, the Retina Resources Foundation did a great deal of surveillance and screening and even treated some patients with diabetic retinopathy, but the program was not sustained.

In some countries, the biggest challenge to accurately gauging NCD program costs is that the relevant services, providers, drugs and supplies are not yet a standard part of the health care system. This means that information on costs might need to come from other sources, such as estimates of disease burden made on the basis of local hospital admissions and data collected from research studies. Health officials may also use implementation costs from other types of health programs to assess the cost of getting a heart disease or diabetic program off the ground. For example, an initial assessment of a country’s maternal–child health programs could offer statistics on the number of trained medical personnel, such as surgeons, that might be available for NCD procedures.

To help countries project the costs of local health interventions, the World Health Organization produced a user-friendly tool for Microsoft Excel that estimates the cost of potential programs, making it compatible with even very basic computers. The default spreadsheet includes country-specific demographic and epidemiological data compiled by WHO—and shares their standardized protocols for disease management. By inputting more specific data on the disease burden and local treatment guidelines, countries can tailor cost to their own situation and estimate cost-effectiveness to decide which programs to prioritize.

Another WHO initiative, the CHOICE project (Choosing Interventions that are Cost-Effective) provides health officials with information that can help them decide which programs will most improve their nation’s health—programs that are within their budgets. A 2010 study using this model found that the best investment for lowering cardiovascular disease in Vietnam would be health education that urged people to lower salt intake, costing about $118 per disability-adjusted life year (DALY) avoided, meaning that it would cost $118 for every year of healthy life saved. For individual patients, researchers found that treatment of systolic blood pressure above 160 cost just $7 per DALY averted.

This tool has also been used to estimate staffing costs. For example, a registered nurse’s yearly salary in Mali, Nigeria, and parts of West Africa is about $12,409. But across the African continent and in parts of the Middle East, costs are drastically different. In Egypt, Yemen and Iraq, that same nurse is paid $3,047. In contrast, the cost for one minute of television advertising—which could be used for public health awareness campaigns—is far cheaper in West Africa, $2,235, compared with $4,824 in Africa’s northeast. This illustrates that it’s important for countries to develop information about costs in their own health system to help them decide how to allocate their scarce health dollars among the NCD prevention and treatment choices.

“You have to have the right interventions for the right context. As we design large-scale interventions, we can learn a lot from case studies.”

Anjuli Gupta, NCD Synergies Program Manager, Partners In Health

MOVING FORWARD

Given the enormity of the problem, countries need to move forward now using the best available data. Some have already initiated programs to tackle the NCD epidemic. Some 92 percent of countries have a plan or policy in place, but only about two thirds of those are funded or implemented, according to WHO. Many focus only on a single disease or risk factor. For instance, more than 80 percent of countries have policies in place addressing tobacco use—but lack a holistic strategy for mitigating and treating noncommunicable diseases.

Countries will approach the NCD problem in many ways. Rwanda is planning to integrate prevention and control of noncommunicable diseases into its primary health care system. The country is starting with a real advantage. It has at least four communicable diseases into its primary health care system. The country is starting with a real advantage. It has at least four sources for health data and already collects routine information in its health management information system, in addition to data from population-based surveys such as STEPS and routine surveillance using WHO guidelines as well as ad hoc estimates from different sources.

Ultimately, real progress will require a wide range of actions. Those measures include training health care providers to detect and diagnose chronic ailments, educating patients and the general public, having affordable medications available and outfitting clinics and hospitals with needed equipment and supplies such as blood pressure cuffs and glucose monitoring test strips.

With more information, more lives can be saved. Clogged coronary arteries are a common cause of heart attacks in plac-
es such as the U.S., but that's not always the case in sub-Saharan Africa. A 2008 study there found that even though 44 percent of patients with newly diagnosed cardiovascular disease ultimately had heart failure, only 10 percent had the blocked arteries seen in coronary heart disease. According to a 2013 report in the Journal of the American College of Cardiology—"Heart Failure," “In rural Rwanda, the causes of heart failure are almost exclusively nonischemic [not caused by a blockage] even though patients often present with advanced symptoms.” Researchers are working to discover why.

What is known is that untreated strep throat causes rheumatic heart disease much more frequently in sub-Saharan Africa than in industrialized nations with easy access to penicillin. In Rwanda, many parents first seek treatment for their children from traditional healers; even if a clinic is nearby, delayed access to antibiotics may allow rheumatic heart disease to set in, causing permanent heart damage.

Meanwhile, researchers from Rwanda's Ministry of Health and Harvard Medical School noted in 2013 in the SA Heart Journal, the official publication of the South African Heart Association, that while the country established treatment guidelines for congenital heart disease in 2012, minimal medical infrastructure made it difficult—or impossible—to examine children for rheumatic heart disease as part of routine pediatric care. Although most hospitals had x-ray machines, only three specialist facilities in major cities had electrocardiograph machines that were consistently available.

That same article proposed that the country should install a digital medical records system for heart disease patients similar to the nation's existing HIV/AIDS “TRACnet” informatics system. Doing so, they say, “would lessen the time between research and action and improve long-term prognoses,” particularly for those suffering from rheumatic heart disease.

**RESEARCH REMEDY**

In the quest for solutions to improve cardiovascular health, formal clinical trials can generate key information about successful interventions. Toward that end, the Global Alliance for Chronic Diseases will certainly help. The primary objective of this young organization, formally launched in 2012 and funded by entities including the U.S. National Institutes of Health and U.K. Medical Research Council, is to jointly develop, fund and manage collaborative research programs across the spectrum of chronic disease worldwide. The ethos of the organization is to "get on with it" and get studies up and running in order to inform health policies.

The alliance's first program addresses hypertension, with 15 studies launched in 11 low- and middle-income countries; its next program will look at type 2 diabetes in a similar fashion. The hypertension initiative is analyzing interventions ranging from salt reduction and educational programs to mobile technology and the repurposing of existing HIV infrastructure. In India, for example, the program is helping to coordinate a clinical trial testing a combination blood pressure pill in place of the standard three-pill treatment to see if the simplified drug regimen yields better results.

The alliance embeds policy makers within the process. Research teams are required to have a relevant policy partner. It's a way to increase the chances that discoveries will impact policy, bringing health programs to the most affected communities.

It is important to note that members of the alliance collectively represent over 85 percent of the world's public funding for medical and health research. The active participation of three important developing countries—China, India and South Africa—has resulted in a more robust, culturally appropriate research agenda and a more internationally inclusive grant-making and peer review processes. In 2014, the alliance will be chaired by China and represented by the Chinese Academy of Medical Sciences, with the World Health Organization acting as an observer to help ensure the flow of information between these two global institutions.

Addressing noncommunicable diseases in developing countries will not be easy. In 2010, more than one third of low-income countries had absolutely no designated funds for NCDs. Making matters worse, there's a persistent lack of interest by donors in supporting care for these diseases, particu-
ularly for low-income nations. Ministries of health in some developing nations have reached a saturation point with HIV/AIDS funds that they can spend efficiently, yet they struggle to provide even basic care for high blood pressure and cancer screening because the basic interventions that would work for these noncommunicable illnesses are so poorly defined and understood in low-resource settings.

Given this situation, we must strive to improve access to care for cardiovascular disease and other chronic diseases. The Institute of Medicine committee concluded that it is “eminently possible to achieve better control of CVD and related diseases in developing countries.” Indeed, it is not only possible—but imperative.

Deaths Due to Cardiovascular Disease (per 100,000), 2004

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