Today's Research on Aging

Program and Policy Implications

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Noncommunicable Diseases Among Older Adults in Low- and Middle-Income Countries

Noncommunicable diseases (NCDs) such as heart disease, cancer, diabetes, and lung disease are no longer only a problem for wealthy countries. These former "diseases of affluence" are now the leading causes of death in all the world's regions except sub-Saharan Africa (WHO 2011a). And NCDs kill people earlier in poorer countries: The toll NCDs are taking (measured by years of life lost) on people ages 60 and older in low- and middle-income countries is much greater than for people in high-income countries (see Figure 1).

The National Institute on Aging (NIA) supports a variety of research on the patterns and dynamics of NCDs among older adults in low- and middle-income countries. This newsletter highlights some of the recent research by NIA-supported investigators and others that can inform policies and programs to prevent, delay, and treat NCDs.

Epidemiological Context

NCDs, also known as chronic diseases, do not pass from person to person, in contrast to infectious diseases. Chronic diseases are of long duration and generally progress slowly (WHO 2011a). The most common NCDs are cardiovascular diseases (including heart disease and stroke), diabetes, cancer, and chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma). The most important modifiable risk factors for NCDs are unhealthy diet, physical inactivity, tobacco use, and excessive alcohol consumption. These factors may all be affected by lifestyle choices that are often influenced by economic development and urban living.

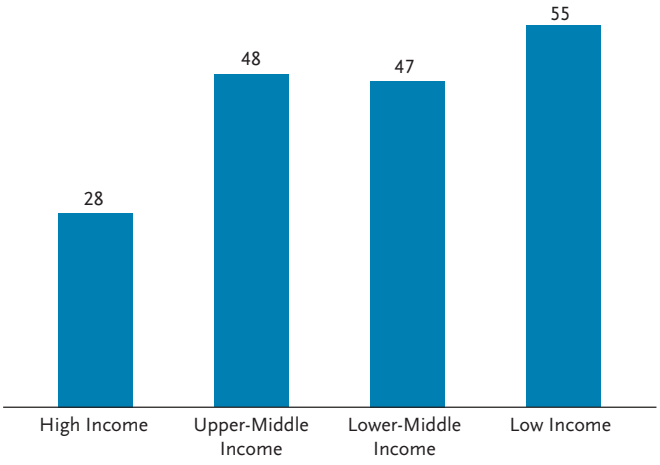
A number of interrelated trends have led to the growing burden of NCDs in low- and middle-income countries. These include a decline in the share of deaths from infectious disease due to improvements in nutrition, public health, and medicine; longer life expectancies as more children survive into adulthood; and population aging, as women have fewer children and older people represent a greater proportion of the total population. This shift in disease patterns is characterized by a decline in deaths from infectious diseases of childhood and an increase in NCDs of adulthood, known as

In This Issue

This publication summarizes research related to the objectives of the National Institute on Aging, with emphasis on work conducted at the NIA demography centers. Our objective is to provide decisionmakers in government, business, and nongovernmental organizations with up-to-date scientific evidence relevant to policy debates and program design. These newsletters can be accessed at www.prb.org/TodaysResearch.aspx.

Figure 1
Noncommunicable diseases take a heavy toll on adults in low- and middle-income countries.

Thousands of Years of Life Lost Per 100,000 Adults Ages 60 and Older



Source: World Health Organization (WHO), *The Global Burden of Disease: 2004 Update* (Geneva: WHO, 2008).

Box 1
Combating the Dynamics of Aging

"Awareness of population aging and its consequences is by now quite widespread in European policy circles; but the issue is only just reaching the radar screens of most low-income nations. What steps should low-resource countries take (and when), in advance of the demographic, epidemiologic, and economic transitions associated with population aging? Industrialized nations experienced population aging after they became wealthy; most low-resource countries will have to cope with this transition prior to becoming wealthy. Minimal attention has been given to the dynamics of health and their economic consequences in developing countries, which are now among the fastest aging nations. ...While the demographic changes occur over a timeline measured in decades, the development of new institutions and systems, including sound pension and insurance systems, need to be set up decades in advance of any transition. ...However, longitudinal studies, most especially ones that combine health and economic status data within the same study, are needed to understand many of the dynamics of aging. ... Over the past several years, [the U.S. National Institute on Aging] has encouraged efforts to develop nationally comparable representative studies in low-resource countries."

Source: Richard Suzman, guest editorial, *Global Health Action Supplement* 2 (2010), accessed at www.globalhealthaction.net/index.php/gha/article/view/5480/6043, on July 12, 2012.

the epidemiological transition. These changes reflect advances in socioeconomic development and progress in battling the most virulent infectious diseases. But the unprecedented pace of population aging is helping to fuel the growing burden of NCDs in low- and middle-income countries: While high-income countries such as France and Sweden had 100 years to adjust as the proportion of older adults doubled from 7 percent to 14 percent, countries such as China, Brazil, and Thailand have experienced that shift in less than one quarter the time (Kinsella and He 2009). The challenges facing low-resource countries confronting demographic and epidemiological transitions is great, and the data needed to make important decisions is only now becoming available (see Box 1).

Disease Patterns

The prevalence of chronic disease and the biological markers that often precede disease (such as high blood pressure and obesity) vary widely among and within countries (see Box 2, page 4). Higher education and income levels have been associated with better health and longer lives in high-income countries, but researchers are finding different patterns in low- and middle-income countries. Monteverde and colleagues (2010) examined the impact of education levels on deaths related to being obese or overweight among individuals ages 60 and older in Mexico and the United States, using data from the Mexican Health and Aging Study and the U.S. Health and Retirement Survey. They found a much stronger connection between the likelihood of death and lower levels of education in the United States than they did in Mexico.

Researchers in India found a pattern opposite from that seen in the broader population in high-income countries. Using pilot data from the Longitudinal Aging Study in India (LASI), Lee and colleagues (forthcoming) found an association between higher socioeconomic status (SES) and increased risk of hypertension among older Indians. Overall, they found twice the risk of cardiac conditions for older Indians who had higher education levels compared with their less-educated counterparts. Similarly, analysis of a comprehensive survey of Costa Ricans ages 60 and older showed that the prevalence of hypertension and obesity and the likelihood of NCD-related deaths were greatest among better-educated and wealthier individuals (Rosero-Bixby and Dow 2009). These researchers suggest that behaviors associated with urban living and economic development—including sedentary lifestyles and high-fat and high-calorie diets—may blunt or erase the health advantages conferred by education and income in low- and middle-countries. A comparison of results from identical analyses using data from Taiwan, Costa Rica, and the United States also challenges "the commonly held assumption that more educated individuals have healthier biological profiles than their less educated peers" (Goldman et al. 2010). Among older adults in Taiwan and Costa Rica, biological markers for chronic diseases such as diabetes, hypertension, and cardiovascular disease do not help explain differences in self-rated health and functional limitations.

Poor conditions suffered early in life may also affect patterns of NCDs among older adults in low- and middle-income countries. A review of studies that examined associations between early life conditions and older adult health (in Brazil, China, Costa Rica, Mexico, and Puerto Rico and in major cities in Latin American and the Caribbean) suggests that early life environment plays an important role in adult health (McEniry, forthcoming). While the exact mechanisms have not been identified, the authors found several strong associations between:

- *In utero* and early infancy exposure to poor nutrition and infectious diseases (independent of other early life and adult conditions) and adult heart disease and diabetes.

- Poor nutrition during childhood and difficulties in adult cognition and diabetes.
- Specific childhood illnesses such as rheumatic fever and malaria and adult heart disease and adult mortality.
- Poor childhood health and adult chronic diseases, functional limitations, and diabetes.
- Poor childhood SES and adult mortality, functional limitations, disability, and cognition.
- Parental survival during childhood and adult cognition, disability, and functional limitations.

Specifically, among rural-born older adults in Puerto Rico, the probability of developing heart disease was 65 percent higher for those who experienced seasonal malnutrition *in utero* than for their counterparts born during or soon after harvest (McEniry and Palloni 2010). In urban Latin America, researchers found strong links between malnutrition in early childhood and self-reported diabetes in older adults (Palloni et al. 2006). In China, individuals who rarely or never suffered from a serious illness during childhood and those who received adequate medical care during illness had significantly lower likelihoods of suffering cognitive impairment, disability, or poor health at ages 80 and older (Zeng, Gu, and Land 2007). These researchers argue that the impact of poor early life conditions may be contributing to rapid increases in NCDs in low- and middle-income countries.

Risk Factors

The social and economic transitions that take place as countries go through the process of economic development may explain some of the differences between the patterns of mortality and morbidity seen in low- and middle-income countries and the patterns observed in high-income countries. For example, a comparison of NCD-related disability levels among older adults in Mexico and the United States found lower levels of disability in Mexico than in the United States (Wong et al. 2011). These difference may reflect the fact that compared with older adults in high-income countries, older adults in low- and middle-income countries are more likely to have had lower levels of exposure to NCD-risk factors associated with urban living (such as smoking, sedentary lifestyles, and processed foods).

The challenge for middle- and low-income countries is to minimize or avoid the negative impact of lifestyle changes that accompany modernization and urbanization. There is evidence that countries may go through a "lifestyle transition," as people adopt and then later abandon unhealthy behaviors, with richer and better-educated people at the forefront of the changes (Wong et al. 2008). In Mexico, more-educated older adults were more likely to smoke than older adults with less education, but the opposite pattern was true in the United States. The United States used to have a higher prevalence of smoking among older adults but is in the process of a transition away from smoking, whereas Mexicans have not started the transition away from this unhealthy behavior. Researchers have also found evidence of declining obesity levels and increasing physical activity among older adults in the United States but not in Mexico.

In the wake of economic development and urbanization in low- and middle-income countries, NCDs may become concentrated among people with lower education and income levels (Fleischer, Roux, and Hubbard 2011). Researchers analyzed older adult populations in 70 low- and middle-income countries and found a trend toward increasing markers of NCDs among people of lower SES as countries became more urban. Specifically, in the least urban countries, adults with higher education levels were more likely to be overweight or obese while the opposite was true in the most urban countries, particularly among women.

Health Care

The volume and complexity of ongoing health care needs of older adults with NCDs will challenge the health care systems of low- and middle-income countries. These health systems have been more focused on treating infectious disease, and the prolonged nature of NCDs will likely increase health care costs. In addition to the costs of treating NCDs themselves, there are also health care costs resulting from conditions associated with NCDs. Evidence indicates that NCDs play a major role in the rapid physical declines that contribute to disability levels in low- and middle-income countries (Sousa et al. 2009; and Chiu, Wray, and Ofstedal 2011).

How do low- and middle-income countries address the health care needs of older people, including those who already show signs of NCD-related health problems? Providing older people with access to affordable health services has been effective in some settings. In Taiwan, the introduction of national health insurance led to an increase in the proportion of older adults with hypertension who sought medical care and/or took medication for their condition (Prakash and Ofstedal 2010). In Mexico, the introduction of an income support program aimed at poverty alleviation among the elderly ages 70

Box 2
The Study on Global Ageing and Adult Health

The Study on Global Ageing and Adult Health (SAGE) is tracking the health and health care access of 35,000 people ages 50 and older in China, Ghana, India, Mexico, Russia, and South Africa. These six low- to middle-income countries are among the world's 50 most populous and together account for 42 percent of the world's population ages 50 and older (He, Muenchrath, and Kowal 2012). The study provides comparable country-level data to help researchers and policymakers understand the factors influencing the similarities and differences in the health of older adults across low- and middle-income countries

Chronic Diseases: In the SAGE study, researchers classified hypertension (high blood pressure) as a chronic condition rather than a risk factor. Hypertension was the most common chronic condition in all six countries. The share of people ages 50 and older with hypertension ranged from 32 percent to 78 percent (WHO 2012). In all six countries, a larger share of women had hypertension than men (He, Muenchrath, and Kowal 2012). Urban dwellers were more likely to be diagnosed with hypertension than rural residents, except in Mexico where rural residents were only slightly more likely to have received a hypertension diagnosis than urban residents.

Older people with chronic conditions were more likely also to be diagnosed with depression (He, Muenchrath, and Kowal 2012). For example, older Ghanaians with arthritis were six times more likely to be depressed than those without arthritis. In a comparison of SAGE results from India and China, researchers found much higher levels of multiple chronic conditions in India than in China (Kowal et al. forthcoming). When compared to their Chinese counterparts ages 60 to 69, roughly twice as many Indian women had multiple chronic conditions and more than four times as many Indian men.

Risk Factors: The SAGE findings show that high levels of risky health behaviors often continued into older ages, particularly among men (He, Muenchrath, and Kowal 2012). More than half of older Chinese and Indian men still smoked tobacco, and the majority of older Ghanaian, Mexican, and Russian men reported daily moderate or heavy alcohol consumption. While men were much more likely to smoke than women in all six countries, the SAGE data do show evidence of lifestyle changes toward healthier behavior. A greater number of older Ghanaian men had given up smoking than were still smoking, and about the same percentages of current smokers and past smokers were recorded for Mexican men.

Preventive Health Behaviors: About 65 percent of older Chinese had diets with adequate fruit and vegetable intake, compared with 9 percent of older Indians. Urban residents in India, Russia, and South Africa were somewhat more likely than their rural counterparts to have adequate levels of fruits and vegetables in their diets; in Mexico, the opposite pattern was evident. A majority of older adults engaged in moderate or high levels of physical activity except in South Africa. In Ghana and India, rural older people were more likely to engage in moderate or high physical activity levels than urban dwellers in those countries.

Health Care: Having a chronic condition, particularly diabetes and hypertension, increased the likelihood that an older person sought medical care in the previous year. Older people with diabetes and hypertension were significantly more likely to see a doctor than older people without each of those conditions, except in Mexico. In Mexico, Russia, and South Africa, respondents told interviewers that most of their health care was free. In China, Ghana, and India, the bulk of the cost of medical care was borne by the patients or their families. The researchers found evidence of an unusually high burden of health care costs in India: Older Indians had the largest percentage of people receiving outpatient health care (88 percent) and an extremely large share (94 percent) paid out-of-pocket for their outpatient care.

Future waves of SAGE data will provide the longitudinal information needed to inform policy by examining trends and shedding light on some of the health, cultural, and contextual differences.

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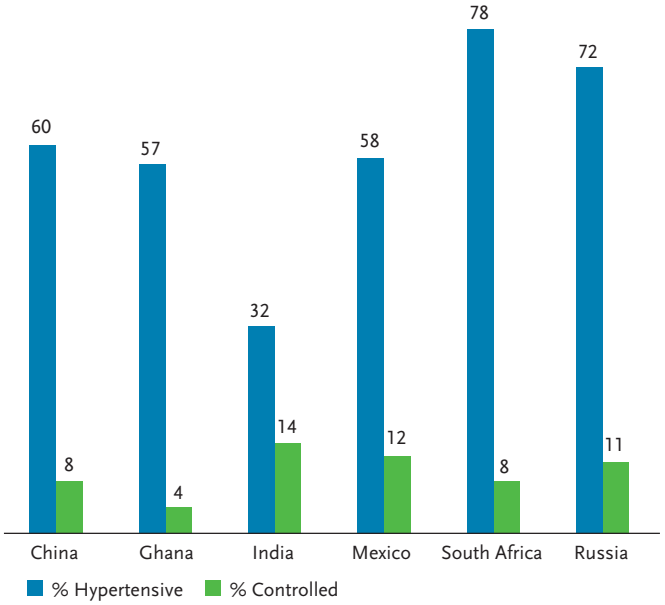
Figure 2
A small share of adults ages 50 and older with hypertension receive effective treatment across six countries.



Source: World Health Organization, Study on Global Ageing and Adult Health (SAGE), 2007-2010.

and older led to an increase in the number of doctor visits and the amount of medicine purchased (Aguila et al. 2011).

According to WHO, low- and middle-income countries do not appear to be successfully treating people with even the most common risk factor for NCDs—high blood pressure (WHO 2012). While the share of older people with high blood pressure ranged from 32 percent to 78 percent in the six countries tracked in the Study on Global Ageing and Adult Health (see Box 2, page 4), only between 4 percent to 14 percent were receiving effective treatment (see Figure 2). Evidence from a WHO analysis suggests that providing multi-drug therapy for those at high risk of cardiovascular disease is extremely cost-effective at less than US$1 per person a year in low-income countries (WHO 2011b). However, identifying at-risk individuals is no easy task: Despite a national program in hypertension detection and education, one out of four older Costa Ricans were unaware that they had high blood pressure (Méndez-Chacón, Santamaría-Ulloa, and Rosero-Bixby 2008). Given that rising levels of NCDs will take a heavy toll not only on human health and well-being but also on economic growth and development, Bloom and colleagues (2012) urge governments, civil society, and the private sector to commit to combating these diseases.

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The NIA Demography Centers

The National Institute on Aging supports 14 research centers on the demography and economics of aging, based at the University of California at Berkeley, University of Chicago, Duke University, Harvard University, Johns Hopkins University, University of Michigan, National Bureau of Economic Research, University of Pennsylvania, Princeton University, RAND Corporation, Stanford University, Syracuse University, University of Southern California/University of California at Los Angeles, and University of Wisconsin-Madison.

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For More Information

Aging in Asia
www.ncbi.nlm.nih.gov/books/NBK92618/pdf/TOC.pdf

Chinese Longitudinal Healthy Longevity Survey (CLHLS)
http://centerforaging.duke.edu/chinese-longitudinal-healthy-longevity-survey

Costa Rican Longevity and Healthy Aging Study (CRELES)
http://ccp.ucr.ac.cr/creles/

Health and Retirement Study (HRS)
http://hrsonline.isr.umich.edu/

The Longitudinal Aging Study in India (LASI)
www.hsph.harvard.edu/pgda/lasi.html

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www.mhasweb.org

NIA Initiative on Global Aging
www.nia.nih.gov/research/dbsr/initiative-global-aging

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http://prehco.rcm.upr.edu/

Salud, Bienestar y Envejecimiento en America Latina y El Caribe (SABE)
www.ssc.wisc.edu/sabe/home.html

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www.who.int/healthinfo/systems/sage/en/index1.html

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http://www.usc.edu/dept/gero/CBPH/network/resources/studies/sebas.shtml

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