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The Global Impact of Aging: The Oldest Old



The Global Impact of Aging: The Oldest Old

Robert B. Hudson, Editor, Public Policy & Aging Report
James Goodwin, Head of Research, Age UK

Those ages 80-plus are the fastest growing sector of the world's population. In 1950, the globe held 14 million individuals over 80; in 2000, that number had increased to 69 million. By 2050, the ranks of the oldest old will swell to 379 million. The widespread assumption that the needs of this population do not differ much from the needs of those over age 60 is challenged by the latest data and compounded by the absence of systematic and rigorous evidence. Furthermore, the oldest old show more heterogeneity than the 60-plus population, as well as pronounced inequalities among individuals.

Beyond the raw numbers, the absolute and relative growth of this population, as well as the characteristics and needs of its members, is a topic of immense importance. Governments must do more, but few believe that governments can provide anything approaching all of the supports that the very old will require. Thus, how families, friends, neighborhoods, and private-sector actors respond to this growing population will be critical.

This issue of *Public Policy & Aging Report*, our second collaborative effort with Age UK, features a rich trove of articles about the oldest old, including data from, literally, around the globe. Four articles addressing major questions about the very old are interspersed with five shorter Spotlight pieces pinpointing particular concerns and studies.

Ritu Sadana and colleagues from the World Health Organization provide a broad, international review of the oldest old. In addition to noting the divergent health and functional concerns of the oldest old, Sadana and colleagues point out how variations in place of residence affect individuals in the very old population: "These geographic differences translate into a range of risks, exposures, and vulnerabilities that affect, for example, personal security, access to needed services, and capabilities and opportunities for participating in family, leisure, or civic activities." The authors call on nations to bring a social justice lens to bear in addressing the needs of this heterogeneous, significantly at-risk population.

Eileen Crimmins and Aïda Solé-Auró look at the prevalence of disease, disability, and functioning in oldest old populations across 12 European nations and the United States. They find some variation in life expectancy at

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Editor

Robert B. Hudson
Boston University
rhudson@bu.edu

Managing Editor
Greg O'Neill

National Academy on an Aging Society
goneill@agingsociety.org

Production Manager

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Life Expectancy, Health, and Functioning Among the 85-Plus Population in Europe and the United States

Eileen M. Crimmins • Aida Solé-Auró

Introduction

Living a long life in good health is a universal aim. At the oldest ages, mortality is high and disease and physical deterioration are common, although not ubiquitous. Aims for individual life cycles are to promote long lives of good quality that are characterized by independence in self-care and integration into familial and community living, along with minimal pain and suffering. National aims are to provide social support and health care that will further these individual aims in an economically feasible manner.

Surviving to become oldest old is now modal in low-mortality countries. Current life tables indicate that the average length of life is approaching 90 years of age for women and 85 years for men (Robine, 2011). As survival within the older ages has increased in recent years, the numbers of individuals above age 85 has grown—and this oldest-old population will continue to rise rapidly in many countries due to increasing survival at all ages, as well as past fertility trends. How many people fall into the 85-plus age range is very important, because society-wide disability levels and health care costs are strongly affected by the size of this group in all low-mortality countries. This article examines national variability in longevity, as well as the prevalence of disease, disability, and functioning loss among those 85 years and older in 12 European countries and the United States. Our aim is to clarify how the characteristics of the 85-plus group may be linked to past and future needs and policies (see Solé-Auró and Crimmins [2013] for a similar analysis for the 80-plus population). The countries included in our analysis are Austria, Belgium, Denmark, England, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, Switzerland, and the United States.

We expect national variability in health across these countries, because people age 85 or older have lived their lives in a variety of social, economic, epidemiological, political, and health care environments. Circumstances over the entire life span will affect health at the oldest ages. The youngest people in the group we study (with data from 2004 or 2006) were born around 1920, so most of them were exposed to the 1918 flu pandemic, along with a variety of childhood infectious diseases that are now uncommon. Because many would have been of school age during the Great Depression, members of this cohort probably have lower education levels than the

cohorts that followed them. Many people of this age also would have been in the family-formation stage during the Depression, resulting in smaller families than those of previous cohorts—and, in some cases, of later cohorts as well.

Many of the people participating in our study would have been eligible for military service during World War II and, in Europe, many people's lives were likely disrupted by the war. Members of this cohort probably were settled into occupations before the remarkable post-World War II growth in income and white-collar jobs, and thus are likely to be more agricultural than those who came after them. On the other hand, this group would have been one of the first to gain from the remarkable increase in prevention of cardiovascular mortality, and they would have received relatively generous health and retirement benefits in their older years. Although the general pattern of societal change is similar across countries, the initial conditions, historical events, and timing of changes varied markedly across countries.

Differences in Life Expectancy at Age 85

Countries where life expectancy is longer at the oldest ages are not necessarily those with the longest life expectancy from younger ages. Several studies have noted the relatively poor ranking of the United States, and the widening gap between Europe and the United States, in life expectancy at birth and at age 50 (Crimmins, Preston, & Cohen, 2011). However, the United States appears to rank relatively better in life expectancy after age 75 (Ho & Preston, 2010).

Table 1 shows life expectancy for men and women at age 85 from recent life tables provided in the Human Mortality Database (University of California, Berkeley & Max Planck Institute for Demographic Research, 2013).

Life Expectancy, Health, and Functioning Among the 85-Plus Population in Europe and the United States

Data are shown for 12 countries only, because no information is available for Greece. On average, men at age 85 can expect to live 5 to 6 additional years, and women 6 to 7.5 years. The range of life expectancy at this age across countries is fairly small—only 0.76 years for men and 1.27 for women. The United States has the longest life expectancy for men and the second longest for women. England, France, and Switzerland also have relatively long life expectancy at age 85. The countries where life expectancy is low are in northern and western Europe: Austria, Belgium, Denmark, Germany, and the Netherlands.

Explanations for the longer life expectancy at the oldest ages in the United States include two very different arguments. One line of thinking cites survival of the fittest as the reason why the oldest old fare better in a country that has high mortality up to old age. Another possible explanation is that most Americans who reach age 85 have had health insurance since they were 65 (because Medicare is virtually universal), and that Medicare provides extensive specialized treatment that may extend life. The generally longer life of very old southern Europeans relative to northern Europeans is generally assumed to reflect better diets, as well as the Mediterranean smoking pattern—among southern

European women who are now very old, smoking is quite uncommon.

In every country, life expectancy for women at age 85 exceeds that for men—although at this age, the differences are fairly small. Only in France does female life expectancy exceed that for males by more than a year and a half (1.57 years' difference); for the other countries, it ranges from a low of 0.77 (Germany) to a high of 1.28 (Denmark).

Data for Health and Disability

Our analysis of national differences in health uses information for the community-dwelling population ages 85 and older in 13 countries. All of these countries have conducted national surveys of their older populations, which provide individual-level data on a number of health indicators, risk factors, and well-being for nationally representative samples ages 50-plus: the Health and Retirement Study (HRS) in the United States for 2006; the Survey of Health, Ageing and Retirement in Europe (SHARE) for 2004; and the English Longitudinal Study of Ageing (ELSA) for 2006. This family of surveys was designed to produce comparable results across countries; the format for questionnaires, performance-based testing, and sample design has been harmonized

among the three surveys to encourage international comparisons of health conditions, family circumstances, and socioeconomic characteristics. Data from all surveys, which are longitudinal, are publicly available to researchers. Weighted analyses are used with each of the three cross-sectional data sets to provide estimates for national populations.

We used SHARE first-wave data from respondents in 11 European countries—Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, and Switzerland (for details, see Börsch-Supan & Alcser, 2005; Börsch-Supan, Hank, & Jutges, 2005). The HRS data used here are from the eighth wave of this longitudinal survey. The ELSA data were collected in the third wave of a panel survey. The United States has the largest sample size (1,277 respondents 85 years of age and older); ELSA has

Table 1. Life Expectancy at Age 85 by Gender

Country	Total	Males	Rank	Females	Rank
<i>Austria*</i>	6.11	5.46	8	6.36	11
<i>Belgium**</i>	6.13	5.26	12	6.46	10
<i>Denmark</i>	6.21	5.35	10	6.63	7
<i>France*</i>	7.05	5.92	3	7.49	1
<i>Germany*</i>	6.02	5.45	9	6.22	12
<i>Greece</i>			-		-
<i>Italy**</i>	6.49	5.64	6	6.84	5
<i>Netherlands**</i>	6.16	5.33	11	6.49	9
<i>Spain</i>	6.53	5.90	4	6.83	6
<i>Sweden</i>	6.23	5.49	7	6.60	8
<i>Switzerland</i>	6.59	5.78	5	6.95	3
<i>England**</i>	6.58	5.94	2	6.85	4
<i>United States*</i>	6.73	6.02	1	7.07	2

Note: Most recent year available: 2011; *2010; **2009. No data available for Greece.

Source: University of California, Berkeley & Max Planck Institute for Demographic Research (2013).

436 respondents who are 85-plus. Within Europe, sample sizes vary by country; Greece and Sweden have the largest samples (119 and 141 respondents, respectively) and Switzerland the lowest (44 respondents). For SHARE, the total sample size for those 85 years and older is 949. The varying sample sizes must be kept in mind when examining country differences. Response rates in SHARE were lower than those in England or the United States. Within SHARE, the response rate was lowest in Switzerland and highest in France. More details on the surveys, measures, and methods are available on the Web sites for each of the surveys (ELSA: <http://www.ifs.org.uk/ELSA>; HRS: <http://hrsonline.isr.umich.edu/>; SHARE: <http://www.share-project.org/>).

Institutionalization of the Old

Because SHARE baseline data did not specifically include the institutionalized population, we excluded data from those residing in institutions so that our analysis would be comparable across countries. However, because differences in the percentage institutionalized could affect our comparisons of other indicators of the very disabled group among community-dwelling older adults, we examined differences in the proportion of the older population in institutions. Table 2 shows that the estimated percentage of the population ages 65-plus in institutions ranges

from a low of 2.0 in Italy to a high of 6.6 in Switzerland. Generally, institutionalization is lower in southern Europe than in northern European countries. National levels of institutionalization likely reflect caregiver availability, cultural differences, and policies for payment more than the health of the older population.

Characteristics of Men and Women 85-Plus, by Country

Before we examined the health of the oldest old, we looked at how the characteristics of the samples in this age group differ across countries in ways that might be related to health (see Table 3). The average age in the group is around 88, although slightly older in England. Two thirds to 80 percent are female, meaning that any discussion of the oldest old is primarily a discussion about older women. About half of men in this age range are married, although the percentage is lower in Italy (21.3), the Netherlands (29.9), and Austria (36.9); on the other hand, marriage is rare among the women, but highest in Belgium (22.7) and Switzerland (18.2).

In some countries, almost no one has completed high school; the United States has the highest education level when considering both men and women, with almost 70 percent having completed high school. For men in Germany and Austria, this figure is even higher—an outcome that could stem from survival patterns related to World War II. At least a third of oldest-old women in Greece, Italy, and Spain live with a child. In Denmark, the Netherlands, and Sweden, on the other hand, joint residence with a child is very rare. These simple facts indicate that although the oldest old are most likely to be unmarried females with relatively low levels of education, not living with a child, they vary markedly across countries, in both their past and their current circumstances.

Disease and Disability in the Oldest Old

Prevalence of diseases. Examinations of international differences in health at younger ages have shown that in most indicators, Americans have worse health than Europeans (Banks, Marmot, Oldfield, & Smith, 2006; Crimmins, Garcia, & Kim, 2010; Martinson, Teitler & Reichman, 2011; Solé-Auró & Crimmins, 2013; Thorpe, Howard, & Galacionova, 2007). In this article, we investigate whether this pattern also holds true among the oldest old by examining national differences in the prevalence of self-reported diseases and functional problems.

The presence of diseases is reported with responses to the question “Has a doctor ever told

Table 2. Percentage of 65-Plus Population in Institutions

Country	Year	Institutional care
<i>Austria</i>	2006	3.3
<i>Denmark</i>	2007	4.8
<i>France</i>	2007	3.1
<i>Germany</i>	2006	3.8
<i>Italy</i>	2004	2.0
<i>Netherlands</i>	2006	6.5
<i>Spain</i>	2008	5.8
<i>Sweden</i>	2007	6.0
<i>Switzerland</i>	2006	6.6
<i>United Kingdom</i>	2005	5.3
<i>EU average</i>	-	3.3
<i>United States</i>	2005	4.3

Source: United States and United Kingdom, Organisation for Economic Co-operation and Development, 2005; Spain, Instituto Nacional de Estadística, 2008; other countries, Huber, Rodrigues, Hoffman, Gasior, & Marin, 2009.

Table 3. Characteristics of the 85-Plus Community-Dwelling Samples by Country

Country	N	Mean age	Percent females	Percent married		Percent with education less than high school		Percent living with a child	
				Males	Females	Males	Females	Males	Females
				<i>Austria</i>	51	89.1	76.2	36.9	2.3
<i>Belgium</i>	61	88.0	71.3	53.1	22.7	58.2	63.0	23.6	10.6
<i>Denmark</i>	71	88.3	75.2	57.9	7.8	73.7	83.7	0.0	9.8
<i>France</i>	108	88.9	69.8	52.7	13.1	69.6	97.2	5.8	18.2
<i>Germany</i>	61	89.0	79.0	49.3	5.2	13.4	67.7	0.0	30.5
<i>Greece</i>	119	88.9	62.2	54.4	6.0	83.5	94.3	27.5	39.5
<i>Italy</i>	50	89.0	69.4	21.3	2.6	95.1	100.0	49.0	45.1
<i>Netherlands</i>	82	87.9	80.0	29.9	7.9	54.7	74.7	0.0	4.7
<i>Spain</i>	123	88.5	66.7	49.5	5.9	100.0	93.0	38.6	35.3
<i>Sweden</i>	141	88.4	71.0	48.6	8.4	67.5	87.4	0.9	4.9
<i>Switzerland</i>	44	87.7	73.1	54.5	18.2	83.8	71.0	13.1	27.6
<i>Total SHARE</i>	949	88.5	72.1	44.6	7.7	69.7	84.9	16.8	27.6
<i>England</i>	436	89.9	68.0	43.1	12.6	76.5	86.6	4.7	6.6
<i>United States</i>	1,277	88.2	65.6	56.9	13.8	31.1	31.4	5.1	9.4

Source: ELSA, 2006; HRS, 2006; SHARE, 2004. All analyses are weighted.

you that you had any of the following conditions?" Conditions listed include heart disease, hypertension, stroke, diabetes, lung disease, and cancer. Most of the conditions should be readily apparent to the respondent and most would involve treatment; however, some cancer may be asymptomatic and would be reported in response to screening, which differs markedly across countries.

Among the oldest men, heart disease is most prevalent in the United States and France, the countries that rank 1 and 3 in life expectancy for men; heart disease is least prevalent for men in Austria and Denmark, countries with low male life expectancy (see Table 4). Among women, levels of heart disease are highest in the United States and Sweden, and lowest in Denmark and Switzerland. For both men and women, hypertension is highest in England and the United States. Women in Denmark, the Netherlands, and the United States, three countries with poor trends in mortality levels among women in recent decades (Crimmins, Preston, & Cohen, 2011), have higher incidence of stroke than women in other countries. American and Swiss men and American

and German women have the highest levels of diabetes. In the oldest old, lung disease is most common among German men and Danish women. Cancer prevalence is highest among Americans, both men and women, although this finding is generally thought to result from more thorough screening for cancer at older ages.

Comparing the prevalence of the listed diseases among SHARE as a total, England, and the United States indicates higher levels of disease in the United States for almost all causes, lung disease among males being the exception. The United States has particularly elevated levels of cardiovascular conditions—heart disease, hypertension, and stroke—as well as cancer. In Europe, men and women ages 85-plus have a similar prevalence of heart disease; in the United States, older men have more heart disease than older women. In continental Europe, England, and the United States, women over 85 report more hypertension than men. In all three samples, women report less cancer and lung disease than men.

The interpretation of the prevalence of disease is unclear. Do countries have higher levels of disease because more onset or incidence of disease occurs, or are

Table 4. Prevalence of Diseases by Country and Gender, Individuals Ages 85-Plus

Country	Heart disease	Hypertension	Stroke	Diabetes	Lung disease	Cancer
<i>Panel A: Males</i>						
<i>Austria</i>	9.4	35.9	17.2	17.2	0.0	0.0
<i>Belgium</i>	22.1	32.6	11.4	18.3	4.5	21.0
<i>Denmark</i>	5.6	38.9	27.8	5.6	16.7	5.6
<i>France</i>	42.6	32.7	12.0	9.2	12.3	3.2
<i>Germany</i>	18.3	32.4	25.2	0.0	29.9	16.9
<i>Greece</i>	19.9	34.8	17.2	5.4	2.4	1.9
<i>Italy</i>	27.2	26.5	7.8	12.9	0.0	4.7
<i>Netherlands</i>	22.9	13.2	10.5	5.5	0.0	5.5
<i>Spain</i>	16.3	37.8	2.0	6.5	10.2	13.0
<i>Sweden</i>	39.5	24.2	7.5	5.4	2.7	13.9
<i>Switzerland</i>	26.2	19.7	0.0	19.7	13.1	0.0
<i>Total SHARE</i>	26.2	31.2	11.5	7.9	11.0	8.8
<i>England</i>	30.7	43.1	10.2	10.3	7.6	6.7
<i>United States</i>	51.2	57.7	19.7	19.4	10.7	28.3
<i>Panel B: Females</i>						
<i>Austria</i>	19.5	23.6	9.8	6.4	0.0	3.2
<i>Belgium</i>	25.0	31.5	7.9	13.4	7.7	10.1
<i>Denmark</i>	15.7	23.5	19.6	5.9	15.7	11.8
<i>France</i>	27.1	40.9	13.6	9.8	5.1	1.4
<i>Germany</i>	29.5	46.1	7.0	19.7	12.9	4.5
<i>Greece</i>	16.7	48.3	8.9	12.8	7.4	1.9
<i>Italy</i>	18.0	38.0	0.0	7.1	13.2	14.9
<i>Netherlands</i>	19.1	25.5	18.9	12.4	9.0	5.7
<i>Spain</i>	27.7	40.1	6.4	13.1	4.9	3.2
<i>Sweden</i>	37.2	33.0	12.6	12.1	10.0	7.5
<i>Switzerland</i>	10.6	41.6	9.0	4.7	3.7	7.4
<i>Total SHARE</i>	25.1	39.6	8.5	12.5	9.0	5.9
<i>England</i>	29.5	51.5	10.7	9.1	4.2	1.6
<i>United States</i>	41.5	72.1	19.6	14.0	9.9	19.6

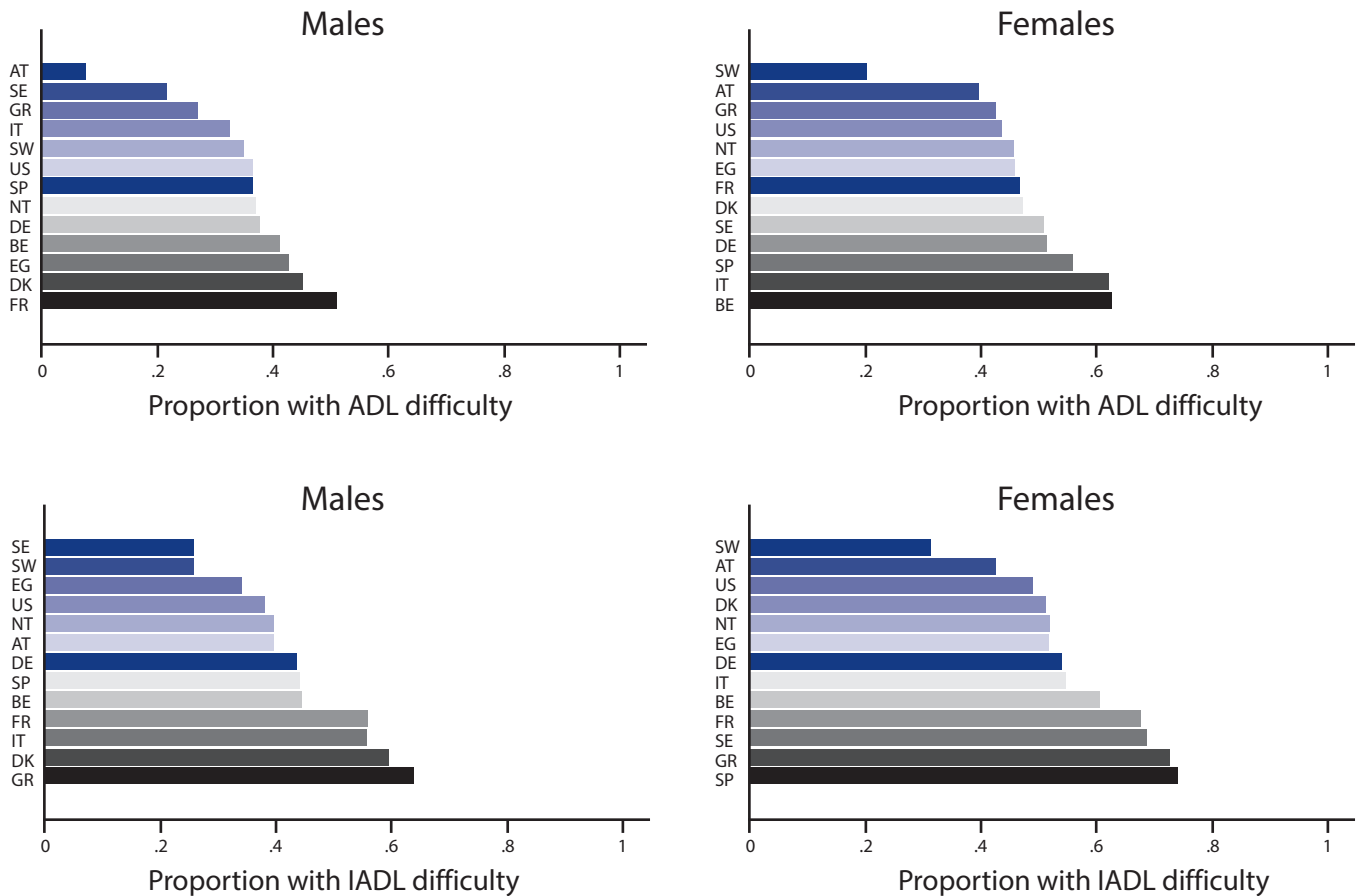
Source: ELSA, 2006; HRS, 2006; SHARE, 2004. All analyses are weighted.

levels high where treatment extends life among those with disease? The answer may not be consistent across diseases. High incidence of heart disease could reflect successful treatment; high levels of diabetes may point to national patterns of incidence related to national patterns of weight; high incidence of cancer may result from more thorough screening, as well as early detection and treatment. Although the repercussions of high levels of disease is unclear, higher prevalence is likely to be linked to higher use of medical care and increased costs. One of the sources of the well-documented higher costs for

health care in the United States is the higher prevalence of disease.

Disability and functioning. Disability and functioning ability is indicated by self-reports of difficulty in performing activities of daily living (ADLs) and instrumental activities of daily living (IADLs). ADLs represent ability to provide self-care; IADLs represent ability to live independently. The six ADL tasks include bathing and showering, dressing, using the toilet, getting in and out of bed, walking across a room, and eating. Six IADL tasks include using a map, making phone calls,

Figure 1. Proportion with at least one ADL and IADL difficulty, by gender and country.



US: United States; EG: England; AT: Austria; BE: Belgium; DK: Denmark; FR: France; DE: Germany; GR: Greece; IT: Italy; NT: The Netherlands; SP: Spain; SE: Sweden; SW: Switzerland

shopping, preparing meals, taking medications, and managing money. Figure 1 shows the proportion of men and women with difficulty performing at least one ADL and one IADL task.

Women over 85 in Switzerland are least likely to report functioning problems; functioning also appears to be relatively good among women in Austria, Denmark, England, the Netherlands, and the United States. Women in Spain report more disability or functional difficulty. The national differences for men are less clear. Men in Sweden and Switzerland are less likely to report IADL problems; men in Denmark and France are more likely to report all problems with functioning.

In general, for women, functional problems seem to be greater in southern Europe and lower in northern Europe. The range in the proportion of older people with functional difficulties is wide, from 20 percent to more than 70 percent for women, and from less than

10 percent to more than 60 percent for men. Thus, the burden of disability in the community population of this age is quite variable across countries. This outcome may be affected by patterns of institutionalization, with the most disabled people not being in the community in such countries as Sweden and Switzerland, and the highly disabled remaining in homes with their children in such countries as Italy and Spain. However, the small differences in percentages of institutionalized older adults cannot change the general pattern of differences.

Conclusion

Marked differences in health occur across countries, and disability varies noticeably in national community-dwelling populations of the oldest old. National demands for health care will vary depending on national levels of diagnosed disease, as well as standards of treatment. Approaches to fulfilling national needs arising from

Disability varies noticeably in national community-dwelling populations of the oldest old.

disability among the oldest old, both long term and short term after medical treatment, need to be incorporated into widely varying cultural and familial patterns—both of which are likely to change over time. Policies toward long-term care of people with disabilities will be very different in the set of countries where multigenerational living is relatively common. Such policies will be more complicated and expensive in countries without multigenerational households. The rise of independent living across generations is assumed to result from the increasing income, education, and migration levels accompanying economic growth. The resultant varying patterns of living arrangements may now require different types of support systems across countries. However, in every country we examined, the average person 85-plus is an older woman who neither has a spouse nor lives with a child. All countries will need to provide adequate social support for those who cannot rely on assistance from family or friends in the community.

Eileen M. Crimmins is the AARP Chair in Gerontology at the Davis School of Gerontology, University of Southern California, Los Angeles. Aida Solé-Auró is a research fellow at Institut National d'Études Démographiques, Paris.

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The Longevity Dividend

S. Jay Olshansky

Advances in public health and medicine during the 20th century yielded 3 additional decades of life for people living in developed countries. For many, the added years of life have been healthy, producing a valuable resource—an experienced, often underutilized older workforce. But all is not rosy. Humanity may have entered into a Faustian trade, because extended life has come with a heavy price—rapid increases in the prevalence of chronic fatal and disabling diseases, as well as a dramatic escalation in related health care costs.

Cancer, heart disease, stroke, Alzheimer's disease, arthritis, sensory impairments, and a large number of other maladies now common among older people are, in large measure, a product of the privilege of living long enough to experience them. Few would challenge that the trade-off of a much longer life has been worth the price of a rising tide of chronic diseases and their related costs. However, given that population aging has yet to have its greatest impact on the global burden of disease, significant challenges lie ahead.

Here's the dilemma. The current medical model approaches chronic degenerative diseases one at a time, as they arise. The underlying premise of this model is that all diseases are treated as if they are independent of each other—each having their own etiology. Scientists now know that this assumption is false. Many of the behavioral risk factors for chronic disease relate to more than one condition, and even the physiologic mechanisms are related. The vertical approach to disease treatment can be applied successfully to chronic degenerative diseases only up to a point, after which it faces diminishing returns (and even potential harm) in terms of health and longevity.

Also possible is that further reductions in death rates from currently fatal conditions may eventually lead to a longer period of frailty and disability at later ages. Why? Because the prolongation of life into the upper regions of the human life span exposes people to an expanded period of time during which frailty and disability may arise.

The problem is that underlying most of what goes wrong with our bodies as we grow older are basic biological processes of aging, which advance regardless of the diseases that are commonly expressed throughout the life course. Even if deaths from most of

today's major killers are reduced dramatically, the biological processes of aging march on, unaltered by any progress made against specific diseases.

In 2006, my colleagues and I coined the phrase *the longevity dividend* as a way to describe the economic and health benefits that would accrue to individuals and societies if healthy life is extended (Olshansky, Perry, Miller, & Butler, 2006). The longevity dividend is a horizontal approach to public health based on a broader strategy to foster health for all generations by developing a new model for health promotion and disease prevention. The longevity-dividend model seeks to prevent or delay the root causes of disease and disability by attacking the one major risk factor for them all—biological aging.

Evidence from a broad range of animal research demonstrates that biochemical mechanisms influencing how quickly aging occurs are adjustable—and there is reason to believe that the same mechanisms exist in humans. Precisely how decelerated aging might be accomplished in humans has yet to be deciphered, but delayed aging, at least, has now been demonstrated to be a plausible method of improving public health. Recent empirical research by Goldman and colleagues (2013) has found that slowing down the processes of aging—even by just a moderate amount—would yield dramatic health and economic benefits.

Embracing a new model for health promotion and disease prevention in the 21st century offers an opportunity to give the gift of extended health and economic well-being to current and future generations.

S. Jay Olshansky, PhD, is a professor in the School of Public Health at the University of Illinois at Chicago.

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Changing Family Demographics, Multigenerational Bonds, and Care for the Oldest Old

Judith G. Gonyea

The rapid aging of the world population, particularly the dramatic growth in the oldest old population, has captured the attention of policymakers globally. Much of this interest is driven by concerns about the public costs of population aging, especially rising fears that as more and more citizens survive to advanced old age, nations' public pension and health care systems will be overwhelmed. Within the United States, for example, demographers project that by 2030 the older adult population will grow to be twice as large as its current size, reaching 72 million people 65 years and older and 9.6 million individuals 85 years and older. And, in 2031, the United States can anticipate an additional surge in its oldest old population as the very first members of the baby boomer cohort celebrate their 85th birthdays. By 2050, the oldest old will make up 24 percent of older Americans and 5 percent of all Americans. Furthermore, 5 percent of this future oldest old cohort will be centenarians (He, Sengupta, Velkoff, & DeBarros, 2005). Given societal aging, some suggest that the definition or chronological age marker of the oldest old may need to be raised upward from 85 to 90 or even 95.

The Importance of Family and Social Connection

As a result of this global shift in age demographics, a growing number of nations are grappling with or reexamining the question of what constitutes their social responsibility to promote a secure, positive later-life experience for their oldest citizens. Much of the discussion about the appropriate public role, both in the United States and abroad, is based on assumptions about the role and availability of family, particularly in regard to long-term care. It is beyond dispute that throughout the world families have been, and continue to be, the backbone of nations' elder-care systems. Historically, when an older person needed support, family provided it—but high mortality meant that a smaller proportion of the population reached old age and needed care. Furthermore, high fertility in years past meant that ample numbers of family members were available to share the provision of care. However, as fertility and mortality rates have declined, especially in developed nations, the proportion of the older population has grown while the number of younger family members available to care for older relatives has decreased.

Because individuals' lives are intertwined with their families' lives, this article examines how shifts in family structure and patterns of family formation, as well as broader societal changes in gender roles, may affect future care of the oldest old. Given that families are the backbone of the long-term care system, providing the vast majority of personal assistance to older adults, greater understanding is needed regarding how such changes as longer life spans, women's increased labor force participation, and the growing complexities of families may affect flows of assistance, resource sharing,

and kinship obligations. Solutions to the pending long-term care crisis depend on recognition that family (i.e., informal) care and paid (i.e., formal) care are not two separate worlds. Indeed, the family is the primary structure within which care is provided to individuals from birth to death.

Yet, given shifting demographic trends and cohort successions, it is important to raise a cautionary note regarding the limitations of any such predictions. The current cohort of the oldest old differs from today's broader older population, or the young old, in many important ways. An example is the sex ratio or the number of men per 100 women in the U.S. population: Among the oldest old (ages 85 and older), there are 43 males for every 100 females. This ratio is much lower than the 76 men per 100 women in the current young old cohort (ages 65 to 84), and evidence suggests that a further narrowing of this sex ratio will occur in future older populations (He et al., 2005). Indeed, immediately striking is that the social world of the oldest old is largely female.

The characteristics of the oldest old are not fixed, either absolutely or relative to the norm of other age groups. The process of cohort succession suggests that the oldest old of the future will differ from those of the present in a number of important ways. One often-cited example is that the rise in advanced education among the U.S. baby boomer generation will result in an older cohort that is more highly educated than previous ones. These same phenomena also apply for making predictions about American families of the future. Due to demographic, social, and economic trends, future cohorts of U.S. families will differ from those of the present in patterns of formation, composition, or roles and demands.

To be sure, greater longevity is a global success story. Indeed, in many countries, older adults not only are living longer but also are living healthier and more independent lives. Yet there is no denying evidence showing that the incidence and prevalence of disability increases with advanced age. In the United States, individuals ages 85 and older are seven times more likely to require assistance with personal care than those 65 to 74 years of age (National Center for Health Statistics, 2007). However, individuals show tremendous variability in healthy or successful aging. Past research has underscored how structural factors, such as education, income, and wealth, may affect opportunities for healthy or successful aging. A growing body of literature also shows that social connections and social capital can influence individuals' opportunities for successful aging (Cornell, 2011). Studies of the social networks of older adults, including the oldest old, have shown that friendships are important for morale, psychological well-being, and physical health (Ashida & Heaney, 2008; Fiori, Antonucci, & Cortina, 2006). When older adults lack immediate family members or close kin, they often develop stronger relationships with more distant relatives and friends. Yet, throughout the world, the provision of ongoing personal and household care to oldest old individuals is largely carried out by close relatives, even if that closeness is defined through marriage rather than blood.

Family Demographics and Social Change

The demographic shift in developed nations from societies with high mortality and high fertility to societies with low mortality and low fertility has changed the age structure of most families from that of a pyramid to a beanpole (Bengston, 2001). In essence, contemporary families in developed nations have more generations alive, but fewer members in each generation. Only 21 percent of Americans born in 1900 had any living grandparents by the time they reached age 30; in the year 2000, 76 percent approached their 30th birthday with at least one living grandparent (Uhlenberg, 1996). Undoubtedly, intergenerational relationships between grandparents, their children, grandchildren, and even great-grandchildren will play a greater role in family life in the future. Contrary to common beliefs, much of the flow of assistance is downward from parents to their adult children and grandchildren; only with advanced old age does the flow of support turn primarily upward (Agree & Glaser, 2009).

Family structures in the United States, as in many other countries, are evolving with changing marriage, fertility, divorce, and cohabitation patterns. This growing complexity of families has implications for

intergenerational bonds and care of the oldest old. The 2010 Census revealed that only 21 percent of U.S. households now fit the definition of a so-called traditional family—that is, a married couple with children under the age of 18 (U.S. Census Bureau, 2010). In fact, family demographers and social scientists have increasingly moved away from the framework of a uniform family life cycle. For example, Cherlin (2010) noted that research during the past decade

has demonstrated a troubling divergence in the family patterns of Americans according to education and income, with several indicators moving in encouraging directions (e.g., less divorce) for the best-educated segment of the population while remaining the same or moving in discouraging directions (more divorce) for the less educated. (pp. 403–404)

Reinforcing these divergent pathways in the United States is the fact that education has emerged, more so than in the past, as a key determinant in individuals' choice of marital partner. The U.S. marriage market is now segmented into three very separate submarkets: college educated, high school degree and some college, and less than high school education. And, although college-educated women are more likely to marry than their less educated counterparts, they typically marry at older ages (Cherlin, 2010). The median age at first marriage has continued to rise in the United States throughout the past decades; in 2010 it increased to about 28 years of age for men and 26 years of age for women (Kreider & Ellis, 2011). This upward trend in age of first marriage is also found among European Union countries, where the average age for men and women is about 30 years old and 28 years old, respectively (Eurostat, 2012).

Divergent paths in U.S. divorce trends based on education have also been evident. Divorce rates rose dramatically in the 1960s and 1970s for all U.S. adults; however, since the 1980s, the probability of divorce has declined for married couples with college degrees—although it has remained constant, or even increased, for couples with less formal education (Martin, 2006). Overall, both in the United States and the European Union, about one third of first marriages end in divorce after 10 years (Eurostat, 2012; Kreider & Ellis, 2011). For some of these individuals, remarriage is a choice or an option. In 2009, about one in five men and women ages 50 to 69 in the United States had married twice—although the number of American adults who have never married has also

dramatically increased. Between 1986 and 2009, the proportion of U.S. adults ages 45 to 54 who reported themselves as never married rose 300 percent (Kreider & Ellis). Some of these never-married individuals may instead be entering into cohabitating unions.

Americans (across all educational levels) are increasingly cohabitating prior to marriage, instead of marriage, or after divorce. A comparative analysis of cohabitation by never-married women in the United States and 11 other Western countries, however, revealed that the United States had the shortest average duration of a cohabitating union—a median of 14 months—compared with a median duration of 40 months for unions in Canada and 50 months for unions in France (Heuveline & Timberlake, 2004). Because same-sex marriage remains illegal in most states within the United States, cohabitation remains the only option for many lesbians and gay men. The 2010 U.S. Census showed a total of 131,729 same-sex married couple households and 514,735 same-sex unmarried partner households (U.S. Census Bureau, 2011).

One of the most dramatic changes in the United States has been the proportion of children born outside of marriage. In today's society, about four out of every ten births (41%) are to an unmarried woman. Yet, in 1960, only five in 100 births happened outside of marriage (Child Trends, 2012). Once again, statistics show an education divide—that is, childbearing outside of marriage is still relatively uncommon for college-educated women but has increased among less-educated women in their 20s and 30s (Kennedy & Bumpass, 2008). Although Americans still use the term *single parent* to describe any unmarried parent, the majority (58%) of these births to unmarried women now occur within a cohabiting union—with, however, substantial variation by age, racial and ethnic group, and economic status (Martinez, Daniels, & Chandra, 2012). The European Union shows a similar pattern of birth outside of marriage: In 2010, some 38 percent of children were born outside of marriage to cohabiting couples or a single mother in the European Union. In fact, extramarital births represented the majority of live births in Iceland, France, Sweden, Estonia, and Bulgaria in 2010. However, some European Union countries still have very low proportions of births outside of marriage (e.g., Greece, 7.4%, and Turkey, 2.6%; Eurostat, 2012).

These shifting patterns of marriage, divorce, and cohabitation within the United States have resulted in more adults experiencing multiple intimate partnerships in their lives and more children experiencing the multiple partnerships of their parents as they grow up. In fact,

Cherlin's (2009) comparative cross-national analysis of fertility and family surveys during the 1990s revealed that children in the United States were more likely to experience two or three parental partnerships by age 15 than children in other Western nations. These changes have resulted in more re-formed and blended families, in which children belong to multiple family units.

The other area of tremendous change has been the dramatic increase in women's labor force participation, in the United States and throughout the world, since the 1970s. In 2009, 59 percent of working-age women in the United States were in the paid labor force, a figure expected to increase by another 9 percent by 2018. In fact, among countries studied by the U.S. Bureau of Labor Statistics (2011), only two—Canada and Sweden—had higher labor force participation rates for women. Furthermore, the age group that will experience the largest growth in labor force participation is older women. By 2018, the number of women ages 65 to 74 in the workforce will increase by almost 90 percent to 2,030,000; the number of women ages 75 and older in the labor force will grow by about 62 percent and add an additional 336,000 workers (U.S. Bureau of Labor Statistics).

Family Care, Gender Roles, and Future Care of the Oldest Old

Women not only comprise the majority of the oldest old but also are overwhelmingly the care providers to this population. Although women tend to be the primary caregivers to family members throughout their lives, when they need care themselves, their spouses are less likely to be alive or able to help. Thus, daughters, daughters-in-law, or sisters typically step into this role—making long-term care truly a women's issue.

A substantial body of research confirms that families do want to provide the care for their oldest members; however, greater longevity, coupled with broader societal shifts, may simply overwhelm and overburden many families. As individuals increasingly live into their 8th, 9th, and even 10th decade of life, the so-called younger generation providing this elder care is likely to be old itself. The possibility of facing 2 or 3 decades of providing elder care, perhaps to multiple family members, may tax the health and economic well-being of this next generation of female family members.

Complicating the ability to make predictions about family members' future availability in providing elder care is that research is relatively sparse on intergenerational norms and patterns of reciprocity in re-formed or blended families, including different-sex or same-sex cohabiting unions. The growing complexities

in family life mean that many of the future oldest old will have an expanded network of kin and quasi-kin that could include current and former partners, half-siblings, stepchildren and grandchildren, and children and grandchildren born outside of marriage and raised by a current or former partner. Yet, it is unknown how individuals related through these complex family connections will view their obligation or responsibility to support each other, particularly late in life. Ultimately, a sense of responsibility may depend most on whether the existing bond strengthens, weakens, or simply dissolves over time. The importance of learning more about these complex ties or relationships is underscored by the fact that—whether due to divorce, never marrying, cohabiting, or widowhood—one in three baby boomers in the United States is approaching midlife and late life unmarried (Lin & Brown, 2012). This trend is significant because marital status has long been linked to economic resources, social integration, and mortality (Lin & Brown).

Projections of the labor force participation of older women suggest that a significant proportion may have to balance paid work with family demands. Women in this middle generation may also increasingly experience caregiving pressures from both directions as they find themselves sandwiched between demands from their parents and their children (Gonyea, 2008). Grandparents are currently the primary care providers for about 30 percent of preschool children whose mothers are employed (Laughlin, 2010). In fact, the poor U.S. economy and difficult housing market have contributed to a rise in multigenerational households; about 16 percent of Americans live in a household that contains either two adult generations or a grandparent and at least one other generation (Pew Research Center, 2010).

The psychological and physical health costs of caregiving are well documented. Cognitive impairments, particularly Alzheimer's disease and other dementias (which are much more prevalent in the 85-plus population) can dramatically compromise a family's quality of life. In end-of-life care, families are coping not only with day-to-day caregiving responsibilities and often difficult health care decision making but also with anticipatory grief related to their loved one's impending death. Caregiving also takes a financial toll; in addition to the obvious out-of-pocket costs that families assume in providing elder care, they are subject to broader, long-lasting financial impacts. Studies in the United States (Evercare, 2007; Rose & Hartmann, 2004) have shown that more than half of women reduce their work hours, pass up promotions, quit their job, or take early retirement to

attend to caregiving responsibilities (i.e., child care, spousal care, elder care). Consequently, U.S. women wind up working, on average, 12 years less than American men over the course of their careers—which is conservatively estimated to represent a \$324,044 loss in wages, pension, and Social Security benefits (MetLife, 2011). In essence, many of these women are potentially sacrificing their own financial security in old age.

Finally, regarding the issue of future care for the oldest old, concern must be voiced once again about the longer-term implications of the troubling divergence in U.S. family patterns according to education and income. Indeed, the phenomenon of cumulative advantage and disadvantage can occur at the individual, the family, and the generational level (O'Rand, 1996). The evidence is overwhelming that young adults with lower educational attainment face lifelong disadvantage in the labor market, in wages, and in wealth accumulation and are ultimately more likely to face poverty in advanced old age. Thus, the bifurcation of U.S. society into the haves and have-nots is likely to become more pronounced in the oldest old population in the next decades. This social inequality will have profound impacts not only on the most vulnerable of the oldest old but also on their families.

Global aging is one of the most important phenomena of the 21st century. Although this extraordinary demographic shift has captured worldwide attention, ironically, the increasing number of families that will be providing elder care, as well as the strains of that care on families, have not. Yet as the world population ages and community-based care of elderly and disabled individuals is emphasized, families increasingly will find themselves responsible for this care. To develop effective social policies and avoid a looming caregiving crisis, the diversity and changing nature of families, as well as the social forces affecting them, will need to be better understood and recognized.

Judith G. Gonyea, PhD, is professor and chair of the Department of Social Welfare Research at the Boston University School of Social Work.

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Health and Cognition in Old Age: Separating Cause and Effect

Ian J. Deary • John M. Starr

Does being smart keep you healthy or does being healthy keep you smart? Our follow-up studies of the Scottish Mental Surveys of 1932 and 1947 have given us a privileged vantage for answering that question (Deary, Gow, Pattie, & Starr, 2012).

Since the late 1990s, we have been following up with people who took a validated test of general intelligence at age 11. This sample of people includes the Lothian Birth Cohorts of 1921 (LBC1921) and 1936 (LBC1936), which comprised 550 and 1,091 relatively healthy individuals when we first recruited them. Our teams see them every 3 years—from age 79 for the LBC1921 and age 70 for the LBC1936—for cognitive and medical testing, as well as brain imaging. In this article, we address the following question: What is the advantage of knowing the childhood cognitive-ability score of an individual one is seeing in old age?

First, we found that intelligence is quite a stable trait: About half of the differences among people in their youth carry through to old age, with considerable shifting of cognitive rank among participants between childhood and old age.

Second, with childhood cognitive ability held constant, we found small contributions to healthy cognitive aging from a variety of sources. Genetic factors appear to account for about a quarter of the cognitive changes from youth to old age. We found that not smoking, being physically fitter and more active, being male, having healthier white matter in the brain, and having more education all contributed slightly to having even better old-age cognitive ability than one would expect given one's score at age 11.

Third, knowing childhood cognitive ability can detect instances where apparent effects on cognitive aging are actually outcomes of the lifelong stable trait of intelligence. Thus, for example, moderate alcohol drinking, a low body mass index, more social and intellectual interests, and low levels of a blood marker of inflammation all appeared to be related to better cognitive ability in old age—until we took into account the childhood intelligence score, at which point the influence of these factors disappeared almost entirely. Our conclusion was that higher childhood cognitive ability often contributes to positive health outcomes and higher cognitive ability in old age, and that the latter two can appear to correlate and lead to wrong conclusions.

Fourth, knowing childhood cognitive ability in people who are older has helped us appreciate how much this factor contributes—alongside education and social class—to health, illness, and longevity throughout the life course. People with higher cognitive test scores in childhood tend to live longer, and we are trying to discover why. Cardiovascular disease is the leading cause of death in the United Kingdom, and we observed that the effect of childhood cognitive ability on cardiovascular mortality occurs largely in people who die before age 65. On the other hand, we have found that lower childhood cognitive ability is associated with dementia, which occurs mainly after age 65 and is now the third most common cause of death among UK women. Living longer is all very well, but an increased burden of disability may accompany this longevity. Higher childhood cognitive ability protects against disability, an effect that appears to be independent of the effect of childhood cognitive ability on any specific disease.

Fifth, although people age physically, psychologically, and socially in similar ways, the process of aging shows discernible and distinct patterns. Childhood cognitive ability predicts which pattern of aging someone is likely to follow; those with high well-being across all domains tend to have higher cognitive scores, whereas those who remain physically fit but are in lower spirits tend to have lower cognitive scores.

The cohort studies we have undertaken, though exacting, have been valuable, because having that one rare ingredient—childhood cognitive ability—has proven to be important for understanding cognitive aging and cognitive epidemiology, as well as for teasing out the life-course entanglements of body and brain.

Ian J. Deary, PhD, is professor of differential psychology and director of the Centre for Cognitive Ageing and Cognitive Epidemiology, Department of Psychology, at the University of Edinburgh, United Kingdom. John M. Starr, MD, is professor of health and aging and director of the Alzheimer Scotland Dementia Research Centre, Departments of Geriatric Medicine and Psychology, at the University of Edinburgh, United Kingdom.

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Health After 85—The Case of the Missing Data

Tom Kirkwood

Although the 85-plus segment of the population is growing faster than any other age group, thorough knowledge about what life is like for those reaching advanced old age is extraordinarily lacking. These individuals have generally been excluded from surveys and other studies on the grounds that they are likely to be frail, cognitively impaired, and harder to contact than younger age groups. Yet the relatively few studies that have specifically targeted people age 85 or older have shown that they can be successfully included, provided that the research methodology is appropriate to this potentially vulnerable population. Furthermore, the likelihood of living in a care home is much higher by the age of 85, and these individuals need to be included in studies to get a complete picture.

Teasing out the complex factors contributing to health in old age is a key challenge in planning for the care needs of today's and tomorrow's populations, in order to maximize health and quality of life in old age and minimize dependency (Kirkwood, 2008). To address this challenge, the Newcastle 85+ Cohort Study was launched in 2006. The study aims to do the following:

1. Assess, in great detail, the spectrum of health in the oldest old.
2. Examine the associations of health trajectories and outcomes with biological, clinical, and social factors as the cohort ages.
3. Identify factors that contribute to the maintenance of health and independence.
4. Advance understanding of the biological nature of human aging.

The study was designed to approach every individual born in 1921 who was registered with a participating general practitioner. Because effectively everyone this old is registered with a National Health Service general practitioner, this approach permitted full coverage of the target population. A research nurse visited participants in their homes to complete a multidimensional health assessment. Home visiting was important because a comprehensive 2-year pilot study had shown that recruitment would have been cut by more than half if participants had been required to attend a clinic. Furthermore, recruitment was carefully designed in order to reach those in care homes or with dementia, individuals who are notoriously more difficult to recruit into such studies.

Unsurprisingly, advanced old age was found to be accompanied by significant prevalence of age-related diseases. Most 85-year-olds had between three and six chronic diseases, with 75 percent having four or more diseases (Collerton et al., 2009), and some evidence of frailty (Collerton et al., 2012). Surprising, however, was that by far the majority self-rated their health and quality of life as good (37%), very good (30%), or excellent (11%), and a significant fraction (20% for both sexes combined) had none or few limitations in activities of daily living (Jagger et al., 2011). This finding confirms the enormous diversity among 85-plus individuals with respect to all aspects of their health and well-being.

Tackling the immense challenges of delivering equitable and effective health care for growing numbers of the oldest old urgently requires evidence-based knowledge about the health and well-being of today's 85-plus population. Researchers need to discover the diverse health needs of the oldest old, to conduct trials revealing how to address those needs, and to construct an integrated data resource that can illuminate underlying trends. This task will not be easy, but it is high time to begin.

Tom Kirkwood, PhD, is dean of aging and director of the Newcastle Initiative on Changing Age (<http://www.ncl.ac.uk/changingage>).

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Population Aging, Longevity, and the Diverse Contexts of the Oldest Old

Ritu Sadana • Andrea D. Foebel • Alicia N. Williams • John R. Beard

Introduction

Populations throughout the world are rapidly aging. Although initially driven by decreasing mortality in early life followed by falling fertility, in higher income countries this demographic transition is now largely driven by increasing survival at older ages. The unprecedented increases in longevity are expected to continue, in pace with overall socioeconomic development (Oeppen & Vaupel, 2002). Current trends suggest that the shift to older populations and increased longevity are inevitable and predictable (United Nations [UN], 2011).

All countries are experiencing population aging, even if each is at a different stage and pace. One indication of population aging is the time required for the proportion of individuals age 65 or older to increase from 7 percent to 14 percent of the total population. An important change is that in the past, this transition sometimes took more than a century. For countries experiencing the same transition in the 21st century, the shift is much more rapid: Many low-income and middle-income countries—including Cuba, the Islamic Republic of Iran, Mongolia, the Republic of Korea, and Thailand, among others—will double their population of people ages 65 and older within 20 years (Kinsella & He, 2009).

It is noteworthy that the 10 countries with the highest average life expectancies at the end of the 20th century—nine countries in Europe, plus Japan—continue to measure gains in life expectancy at age 60 over the past decade, many with a narrowing of the gap between male and female life expectancies at birth (World Health Organization [WHO], 2012). These gains are substantial. High-income countries on average gained 3 years of life expectancy at age 60 during the past decade—from 18 to 22 years for men and from 23 to 26 years for women (WHO, 2012). This trend indicates that, in the future, the oldest ages groups are likely to be among the fastest growing subpopulations in these countries (Christensen, Doblhammer, Rau, & Vaupel, 2009).

Aging is a process that starts at birth and should be viewed from a life-course perspective (Bartley & Blane, 2009). Moreover, chronological age may neither correspond to an individual's health status nor be a reliable measure of variation in physical or cognitive functioning across the life course (Lazarus & Harridge, 2010). Yet age groups are a common feature of population health metrics, and age-specific approaches are relevant to understanding and meeting the needs of the oldest age groups (Fried, 2011). Consequently, to take stock of the increasing proportion and numbers of

people ages 65 and older, an expanded classification distinguishes the *young old*, 65–74 years of age; the *old*, 75–84 years of age; and the *old-old*, or *oldest old*, 85 years of age and older. This article aims to raise awareness of the diverse contexts of the oldest old globally and to advocate that understanding these contexts can provide insights for policymaking and investments in the health sector and beyond.

The Oldest Old

Many more individuals now live beyond the age of 85 years. However, significant gaps remain in understanding the drivers and nature of increasing longevity. The evidence is inconclusive on whether longevity is associated with an increase, a delay, or a compression of associated morbidity (Fries, 1980; Gruenberg, 1977; Manton, 1982). However, longevity in those over 85 may reflect improvements in socioeconomic conditions across life, increased coverage of health services, and advances in medical treatment. Concerted policies in some high-income countries, as well as natural experiments, demonstrate that rapid improvements in population longevity can be achieved through policy and social change. As an example, mortality rates among the oldest old in the former German Democratic Republic leveled down within a decade of unification to the prevailing rates in the Federal Republic of Germany (Vaupel, Carey, & Christensen, 2003).

The oldest old, however, are not a homogenous group. This fact is reflected in increasing diversity of health and functional status with age, as well as by the diverse places where people live. These geographic differences translate into a range of risks, exposures, and vulnerabilities that affect, for example, personal security, access to needed services, and capabilities and opportunities for participating in family, leisure, or civic activities. Differing policy environments, from local to national levels, also characterize where people live. Variations in policy—and

the various degrees of leadership and regulatory processes that result—determine how state and nonstate actors could promote well-being for and respond to the needs of older populations, including the oldest old (Blas et al., 2008).

How Many Oldest Old and Where Do They Live?

More than half a billion people in the world were older than 65 years in 2010. Of these, 8 percent (approximately 42 million people) were older than 85 years, and their numbers are projected to increase to more than 147 million by 2050 (UN, 2011). This jump represents a projected 350 percent increase in 40 years, a rate approximately twice as fast as the expected increase in the population over age 65 (National Institute on Aging & World Health Organization, 2011). Among the oldest old, centenarians represent a special group: Their presence globally is expected to increase approximately tenfold, to more than 3 million people, during the period from 2010 to 2050.

Worldwide, the majority of older adults live in low-income and middle-income countries, where the fastest population aging is occurring. Although Japan currently has the highest proportion of older people, China and India have the largest numbers of older people. For the world's oldest old, approximately 60 percent live in high-income countries and 40 percent in low-income and middle-income countries—but this proportion is projected to switch by 2050 (see Figure 1).

Based on projections to 2100, the oldest old will be concentrated in countries that are currently categorized as less economically developed—albeit the economic status of many countries is expected to change during the century. Given the current sex gap in life expectancy, it is unsurprising that more women make up the oldest old globally: In 2010, women accounted for approximately 56 percent of the world's population over the age of 65, and 67 percent of the world's oldest old. These proportions are projected to remain through 2050. Another demographic feature is that the proportion of oldest old in 2010 varies across countries (see Figure 2 for a selection), because increases in life expectancy at older ages are still generally observed in higher income countries. Within countries, continued rural to urban migration (often for economic reasons) means that many rural areas have a disproportionate proportion of older adults, including the oldest old.

It is well documented that genetic, environmental, and social influences are important determinants of longevity. Sometimes these factors are concentrated in particular locations, places the United Nations calls *longevity villages*, where more than 7.5 of every 100,000 inhabitants are centenarians—places also popularized as *blue zones* (Buettner, 2008). In the contemporary context, these locations include historically isolated places, as well as places that attract older adults, such as Loma Linda, California, United States; the Nicoya Peninsula, Costa Rica; Okinawa, Japan; and Sardinia, Italy. Another operational

Figure 1. Proportion of the population over age 85: 2010 and projections for 2050 and 2100 worldwide, based on current economic status.

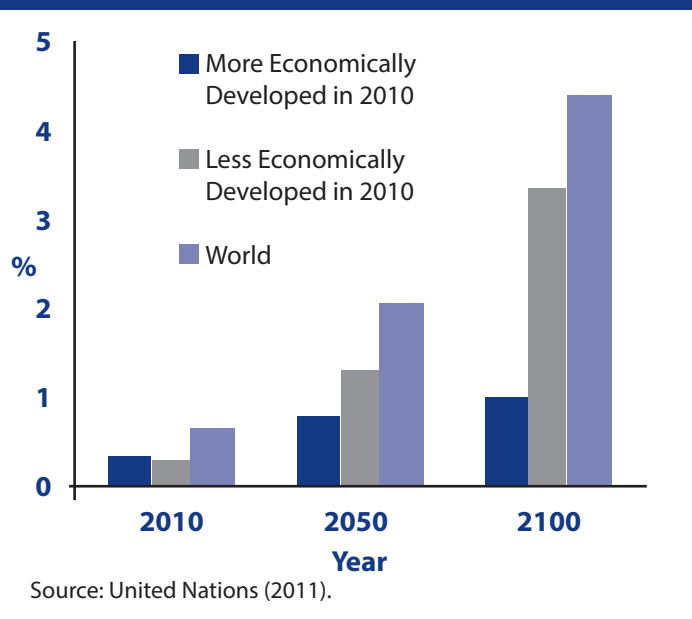
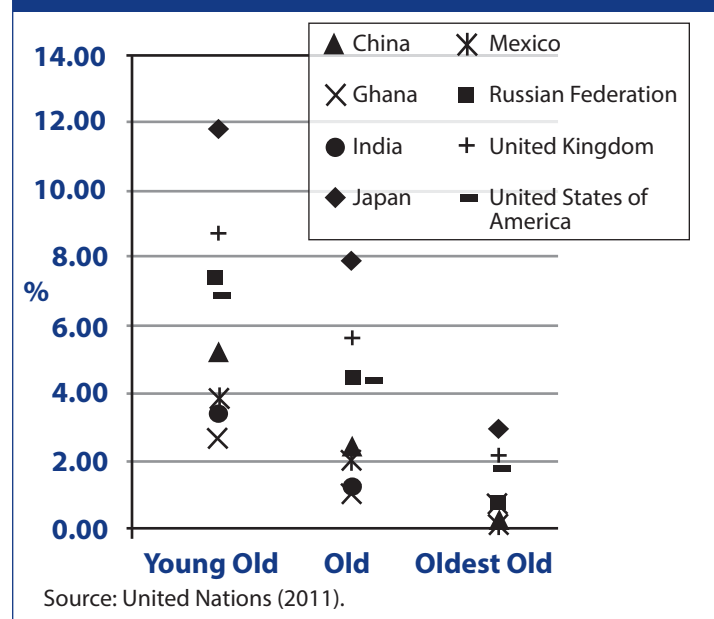


Figure 2. Proportion of the population in young old, old, and oldest old age groups: 2010 in selected countries.



Box 1. Sarcopenia and Frailty: Significant Overlap and Increased Prevalence in the Oldest Old

- Sarcopenia is defined as age-related decrease in muscle mass. Contributing factors to sarcopenia include age, sex, and level of physical activity; resistance exercise can slow the development of sarcopenia. (Cruz-Jentoft et al., 2010; Sayer et al., 2013)
- Frailty is a late-life syndrome of vulnerability to adverse health outcomes characterized by a phenotype that includes muscle weakness, fatigue, and inflammatory pathway activation. (Fried et al., 2001)
- Approaches to identify sarcopenia and frailty include the following:
 - Traditional measures of muscle mass (though time consuming or costly).
 - Identification of clinical biomarkers. Some blood markers include the acute-phase protein C-reactive protein (CRP), the inflammatory cytokines interleukin-6 (IL-6) and tumor necrosis factor- α (TNF- α), and D-dimer.

definition for longevity is the age at which the largest number of deaths occurs in any given population, which can often be much higher than life expectancy at birth.

The Distinguishing Characteristics of the Oldest Old—Unique and Diverse

Research on the oldest old, in particular centenarians in high-income countries, has considered to what extent individuals are exceptional or unique. For example, earlier research suggested that the oldest old may demonstrate on average better health with a rapid decline, relative to those who die younger (Hitt, Young-Xu, Silver, & Perls, 1999). Others document that social networks may be important to longevity, because older adults with higher social capital exhibit less loneliness and anxiety and report greater happiness (Litwin & Shiovitz-Ezra, 2010). More recent evidence estimates that the burden of disease in older populations is heterogeneous and varies across countries (Murray et al., 2012). Cross-sectional data from 10 European countries, collected through the European Commission–sponsored SHARE study, found that the oldest old (noninstitutionalized) report an increasing proportion of disabilities and request more personal care and practical assistance (Andersen-Ranberg, Petersen, Robine, & Christensen, 2005).

Although increasing prevalence of geriatric conditions, including sarcopenia and frailty, is found among the oldest old (see Box 1), these individuals can also differ significantly in their risk of physical and cognitive impairment, as well as in the occurrence of multiple morbidities.

Evidence from around the world documents that some oldest old experience active aging and report good health, whereas others experience risks, illnesses, and disabilities and do not always obtain needed services (Kowal et al., 2010). Also present among the oldest old are substantial unmet health needs, including treatable risk factors, such as high blood pressure (He, Muenchrath, & Kowal, 2012), and basic living conditions (see Box 2 contrasting two oldest old).

Health and Well-Being of the Oldest Old—A Marker of Social Justice

How well society meets the needs of the oldest old is a marker of social justice. For the beginning of life, the infant mortality rate is a commonly accepted indicator of overall societal development. Increasing longevity is also a marker of overall development, whether measured by life expectancy or healthy life expectancy at older ages. Yet including in the assessment how well societies are meeting the specific needs of the oldest old introduces accountability based on older people's rights to have their needs fulfilled, not on charity. From an equity perspective, much needs to be done in meeting the care needs of the oldest old, because considerable variation exists within and across countries, with levels of independence and multiple morbidities varying systematically by socioeconomic group, gender, and place of residence. Based on studies in high-income countries, similar systematic variations are also found in relation to the use of health services, including hospitalization or longer term institutionalization (Van Kan et al., 2009). Moreover, older people are often overlooked with respect to health and social services, and may not be offered treatment due to their chronological age. This failure to regard older adults' needs is a recognized marker of discrimination, called ageism (United Nations Department of Economic and Social Affairs, 2009). In addition, the oldest old are usually excluded from most health research, particularly within randomized clinical trials (Herrera et al., 2010).

As a first step toward changing this situation, better evidence on the health status and needs of the oldest old is required. Gaps in current knowledge are particularly large for low-income and middle-income countries,

Box 2. Madame Desbrosses and Herr Wirz: Contrasting Context



Mme. Desbrosses, an 87-year-old widow, was brought to a nursing home facility in Port-au-Prince, Haiti, after the loss of her only daughter. Although she survived the devastating earthquake in 2010, the women’s ward of the home was destroyed. She lives in a seven-person tent while waiting for appropriate accommodation.



Jumping headfirst from high altitudes is 87-year-old Helmut Wirz’s passion. The former pharmacist discovered bungee jumping at age 75. “When I’m standing up there, I feel completely calm,” he says. Helmut held the record as the oldest bungee jumper in the world for many years and has no plans to switch to playing chess or bowling any time soon.

Source: HelpAge International & World Health Organization.

the oldest old. These data will be discussed in detail with policymakers and researchers in each country to support improved policies and interventions. This process will include a detailed review of existing national studies; for example, researchers in South Africa have documented the demographic trends and policy implications of the oldest old within the four major racial groups (Joubert & Bradshaw, 2005).

In parallel, synthesizing global evidence on what programs and services can meet the needs of older adults—whether at home, in the community, or within a facility that provides ongoing care—is needed. The point is to better equip health and social systems to offer a continuum of care, integrate social and medical services, and scale up existing services in anticipation of population aging and longevity. For example, rather than maintaining a separate cadre of health workers, existing health workers need training and practical experience to meet the care needs of the oldest old and to be able to respond to their diverse needs for services or assistive devices, whether episodic, long term, or palliative.

In addition, evidence is needed regarding policy options and interventions that have been evaluated and demonstrated to meet the diverse needs of the oldest old. Such evidence includes what has been done in the health sector and across sectors, at both local and national levels, that enables individuals to participate in social processes. For example, evidence from longitudinal studies documents that urban environments can be more supportive of older adults (Beard & Petitot, 2010), and much is to be learned from interventions coordinated by cities (see Box 4).

Approaches to Better Meet the Diverse Needs of the Oldest Old

More people benefiting from longer lives can legitimately be regarded as a great success of social progress and overall development. Yet this success comes with challenges. As noted, the diversity of the oldest old is associated with a variety of needs—physical, social, and mental—that health and social systems throughout the world should be equipped and supported to meet. Although some of the oldest old will continue to live independent and active lives, many will require increasing support and a mix of social and medical services, including informal care, assistive devices, formal treatment, rehabilitation, and palliative care.

To foster a coherent policy response, societies around the world need better information and tools to ensure the health and well-being of the oldest members of their populations. One key challenge is to provide a

because most current evidence on older adults, and particularly the oldest old, comes from high-income countries (see Collerton et al. [2007] on a rare longitudinal study focusing on the oldest old). In an effort to increase the global evidence base, the World Health Organization (WHO), with support from the U.S. National Institute on Aging, is coordinating the Study on Global AGEing and Adult Health (SAGE) to compile comprehensive longitudinal information on the health and well-being of adult populations and the aging process (see Box 3). Following individuals from China, Ghana, India, Mexico, the Russian Federation, and South Africa, this study included nearly 1,000 people older than 80 years in its first wave; a second and third wave of data collection will follow these old adults as they transition to

Box 3. SAGE Data Study and Methods

The World Health Organization Study on Global AGEing and Adult Health (SAGE) is a longitudinal study with nationally representative samples of people ages 50-plus years in China, Ghana, India, Mexico, Russia, and South Africa, and includes a smaller sample of adults ages 18–49 years in each country for comparison.

Wave 1 (2007–2010) included 34,124 respondents and 8,340 comparison individuals. In four countries, a subsample of 8,160 respondents in Wave 1 was followed from the 2002–2004 World Health Survey (referred to as SAGE Wave 0). Wave 2 data collection was completed in 2012, following up all Wave 1 respondents, and will be available for analysis during 2013. Wave 3 is planned for 2014–2015.

For all sites, the study protocol included standardized survey instruments, set of methods, interviewer training, and translation procedures, with the SAGE questionnaire including the following:

1. A household questionnaire about the dwelling, income, transfers in and out of the household, assets, and expenditures.
2. An individual questionnaire with items on health and its determinants, disability, work history, risk factors, chronic conditions, caregiving, subjective well-being, health care utilization, and health systems responsiveness.
3. A proxy questionnaire about health, functioning, chronic conditions, and health care utilization.
4. A verbal autopsy module questionnaire to ascertain the probable cause of death for deaths in the household in the 24 months prior to interview or between interview waves.
5. Anthropometric measurements, blood samples and blood pressure measurements, physical function tests (vision tests, timed walk tests, spirometry), and cognition tests (SAGE Wave 1).

Source: Kowal et al. (2012).

comprehensive range of services to the oldest old that support independence and provide care in an equitable and efficient way, to meet their needs without discrimination and with dignity. This challenge includes addressing noncommunicable diseases and functional decline, as well as improving the design of health systems to provide appropriate chronic care.

However, because the oldest old may undervalue their needs, be slow to express them, or wish to avoid stigma associated with assistive devices, poor health and functional decline may not be reflected in demand (WHO, 2013). A supply-side approach might therefore only meet selective needs. Because better-educated individuals are likely to be more health literate, their demands may be better expressed and met. Without outreach to those who are less educated, this context is likely to increase health inequities. In addition, other social norms—such as gender roles and relations, which might prevent women or men from obtaining services they need, or higher social class, which allows some individuals to better navigate through various administrative systems—may systematically shape demand in highly inequitable ways (WHO, 2013).

From a broader, governmental perspective, sustainable systems need to be designed that, on one hand, reflect the social values of a country and, on the other, respect the oldest olds' right to health and other services. Ideally, such systems will include a coordinated approach to social, economic, and health policy, as well as integrated medical and social services. Given the inevitable increase in need, the challenge all countries face is to avoid placing unsustainable financial burdens on individuals, families, or the state.

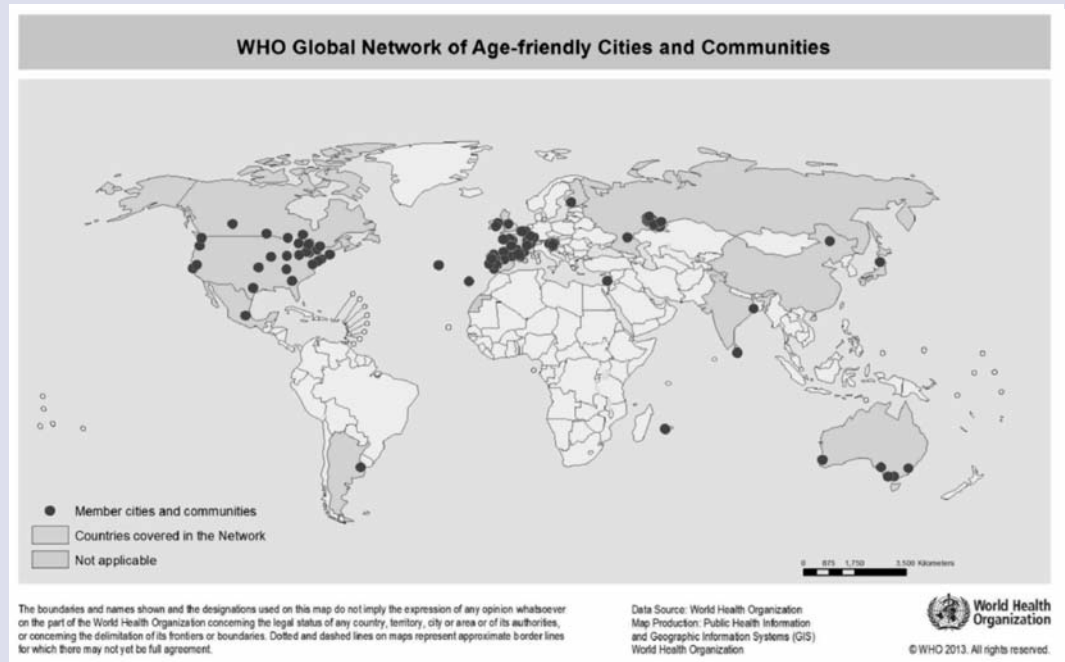
With its member states, as well as other stakeholders and nongovernmental partners, WHO has undertaken initiatives to raise awareness of these and other key challenges associated with aging and health, and is increasing efforts to develop policy options regarding what can be done in practice, both now and in the future (see Box 5).

Part of this process will require readjustments of priorities and investment strategies in line with the demographic realities of aging populations, accompanied by research and innovation. At the same time, each society needs to better harness the experience and talents of older people, including the *doyens* and *doyennes*, the oldest old.

Ritu Sadana, ScD, is lead specialist in the Department of Ageing and Life Course, World Health Organization, Geneva. Andrea D. Foebel, PhD, is a postdoctoral fellow working with InterRAI and the Department of Ageing and Life Course, World Health Organization, Geneva. U.S.-trained geriatrician Alicia N. Williams, MD, is an intern with the Department of Ageing and Life Course, World Health Organization, Geneva. John R. Beard, MBBS, PhD, is director of the Department of Ageing and Life Course, World Health Organization, Geneva. The views expressed in this article are

Box 4. The WHO Global Network of Age-Friendly Cities and Communities

The WHO Global Network was established in June 2010 as part of a broader response to the rapid aging of the world's population. Its objective is to foster the exchange of experience and mutual learning between cities and communities worldwide that create accessible and inclusive physical and social urban environments for older residents to enable healthy, active aging and good quality of life in older age.



The network currently has 137 member cities and communities in 21 countries worldwide, and membership is expanding rapidly (see map). Through its 10 affiliated programs in nine countries, the network reaches out to hundreds more cities and communities enrolled in age-friendly programs.

Specific age-friendly interventions are unique to each city, with initiatives targeting older populations in general, including the oldest old. Some noteworthy examples include the following:

- Akita (Japan) has implemented a support system for older residents linked to geographic information systems technology to show on a map those who need support.

- New York City (United States) opened 10 innovative senior centers and published age-friendly business guides that allow older people to remain active in the community.
- Rockingham (Australia) has undertaken a large-scale development of “ageing in place” accommodation, with care options adapted to the different needs of older adults.

The network aims to connect those cities to allow for the sharing of best practices globally. Furthermore, indicators to monitor and evaluate progress in physical and social environments, services, and well-being of older resident that will provide benchmarking across cities are currently under development in collaboration with the WHO Centre for Health Development in Kobe, Japan.

Source: World Health Organization (2007a, 2007b).

those of the authors and do not necessarily represent the decisions, policies, or views of the World Health Organization. We acknowledge Kristine Goulding and Lisa Warth for their preparation of Box 5.

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Box 5. Selected Global Commitments Addressing Aging and Health

- 1999:** World Health Resolution on active aging (WHR 52.7)
- 2002:** United Nations Madrid International Plan of Action on Ageing (MIPAA) adopted at the 57th Session of the UN General Assembly (R57/167)
- 2005:** World Health Resolution on strengthening active and healthy aging (WHR 58.17)
- 2012:** World Health Day focused on aging and health (8 April 2012); World Health Resolution on strengthening noncommunicable disease policies to promote active aging (WHR 65.3), including a mandate for the *WHO World Report on Ageing and Health*, expected in 2015.

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age 65, with people in France and the United States marginally having the longest life expectancy. Explanations for this longevity differential vary from the survival of the fittest (the less hardy having died at earlier ages) to diets that may contribute to long life among southern Europeans. Despite the obvious differences in health, disability, and longevity patterns they report, it is difficult to draw grand conclusions, leading to a call for heightened research efforts. The one general finding Crimmins and Solé-Auró highlight is that “in every country we examined, the average person 85-plus is an older woman who neither has a spouse nor lives with a child.”

Judith Gonyea turns attention to family demographics and how they contribute to the well-being of the very old. Noting that families have been and continue to be the principal source of social and psychological support for individuals of advanced age, she explores how the changing makeup of families will affect support for very old people. Gonyea makes a particularly interesting point regarding how multiple family-formation (and family-dissolution) patterns may lead to a variety of parental partnerships, a state of affairs that will have consequences for both elders and children. The potential good news is that this trend may result in more possible caregivers; the potential bad news is that the attachments of these family members may not be as strong as the bonds in historically traditional families.

June Andrews addresses what is emerging as the greatest concern centered on the oldest old: heightened levels of Alzheimer's disease and other dementias. The author calls for refinement of the interventions used for dementia patients, with reduced emphasis on acute-oriented methods

in favor of greater attention to the environment—because, as she notes, a person who can function reasonably well in a very familiar environment may become completely disoriented when placed in an unfamiliar one, especially if it is an institutional setting. Andrews concludes that, with no cure for dementia in sight, societies need to provide greater support for caregivers, more early diagnosis, better environmental design, and increased support and training for health care and social workers.

In the Spotlight essays, S. Jay Olshansky discusses the tricky balance between longer life and the chronic, disabling, and fatal diseases that these added years may bring; Ian Deary and John Starr present a quick overview of their findings from the Lothian Birth Cohorts study. Tom Kirkwood reports on the Newcastle 85+ Cohort Study, which assessed the health status of the oldest old, as well as outcomes related to biological, clinical, and social factors. Wan He discusses an investigation of people ages 90-plus, which finds these very old individuals much more likely to be widowed, to live in poverty, or to have one or more disabilities. Finally, David Foot's nuanced view of the economic consequences of population aging, which many observers fear is a time bomb, points out that although population aging poses many challenges, it also affords some opportunities.

The editors of *Public Policy & Aging Report* are pleased to bring readers this informative collection of articles about the situations, status, perceptions, and needs of the oldest old, a critical subgroup of older people in the world population. We hope to foster insight about these individuals, inspire additional research, and encourage creative solutions for population aging that benefit all ages in all societies.

What About the 90-Plus Population?

Wan He

In the United States, the term *oldest old* often refers to people ages 85 and over. But increases in life expectancy at older ages have led to rapid growth of the 90-and-older (90-plus) population, which has been growing faster than younger age groups among the 65-and-older (65-plus) population—including those ages 85 to 89. This trend is projected to continue for the next few decades.

What is known about people ages 90-plus? A recent Census Bureau report, *90+ in the United States: 2006–2008*, presents an overview of the characteristics of this population group (U.S. Census Bureau, 2011). The study found that the 90-plus population is overwhelmingly White (88.1%). A considerable proportion (61.3%) have completed high school or more advanced education. Social Security income represents almost half of their personal income. Living arrangements for the 90-plus population vary greatly by race and Hispanic origin, with 40 percent of the Whites living alone, compared with half that proportion for Asians and Hispanics.

A key issue for the rapidly growing 90-plus population in the United States arises from their health and disability status. More than 8 in 10 (84.7%) have one or more physical limitations, and almost everyone residing in a nursing home (98.2%) has some type of disability (see Figure 1). Difficulties with instrumental activities of daily living (IADL), such as visiting a doctor's office or shopping, are the most common type of disability. Mobility difficulty is a close second. When looking internationally, a Census Bureau study using data from the Study on Global AGEing and Adult Health (SAGE) found that mobility limitations also are a top

disability among older people in low-income to middle-income countries (U.S. Census Bureau, 2012). However, limitations in activities of daily living (ADL), such as dressing or bathing, are more prevalent than difficulties with IADL in the SAGE countries (China, Ghana, India, Mexico, the Russian Federation, and South Africa).

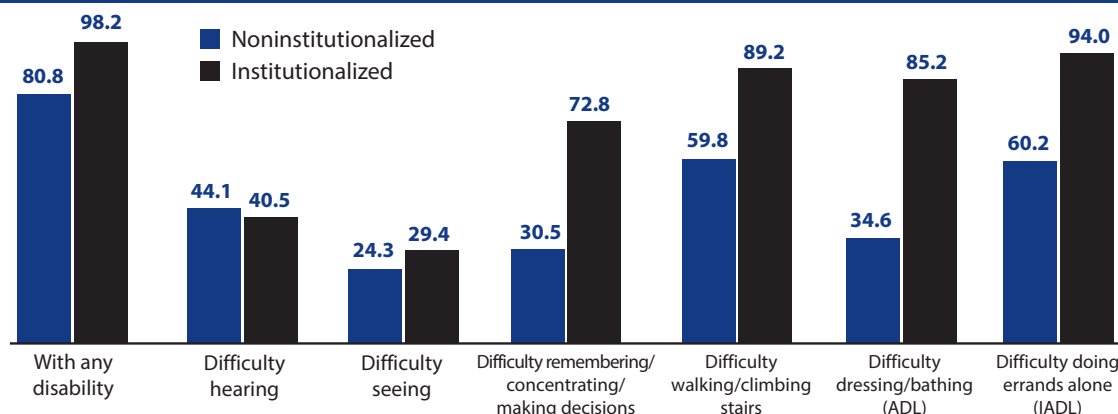
So, how are people ages 90-plus in the United States different from their younger counterparts among the 65-plus population? Compared with those ages 65–89, or even just the 85–89 age group, individuals ages 90-plus are much more likely to be widowed, be in poverty, have one or more disabilities, reside in a nursing home, or live alone. Imagine a society less than 40 years from now, in 2050, in which 20 percent of the total U.S. population would be 65 years of age and older, and 1 in 10 of this 20 percent would be 90 and older. Are families and society prepared for the tremendous challenges posed by this demographic phenomenon?

Wan He, PhD, is a senior demographer in the Aging Studies Branch, Population Division, U.S. Census Bureau.

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Figure 1. Percentage with disability for population ages 90 and older, by living arrangement and type of disability: 2008.



Source: U.S. Census Bureau, American Community Survey, 2008.

Notes: In 2008, the Census Bureau changed the way it asks about disability status in the American Community Survey. "Institutionalized" includes the population ages 90 and older living in institutional group quarters, such as nursing facilities and skilled-nursing facilities.

The Global Impact of Dementia in the Fourth Age

June Andrews

Dementia is the name given to specific symptoms caused by a range of diseases, the most common being Alzheimer's disease. Other diseases—such as vascular disease, the second most common cause of dementia—also result in dementia symptoms. Nongovernmental organizations supporting and advocating for people with dementia and their caregivers are almost universally known as Alzheimer's organizations, a convention that has emerged because in some languages the word *dementia* has offensive connotations. These organizations are interested in all diseases that cause dementia even if dementia is not in their name. Supported by such overarching entities as Alzheimer's Disease International and Alzheimer Europe, together they play a crucial role in raising political awareness of dementia.

Good policy reasons lie behind raising the linguistic point that distinguishes between Alzheimer's and dementia. Faced with news about developments for Alzheimer's disease, for example, it is important to question whether a report really means Alzheimer's or refers to all forms of dementia. Policymakers who understand the multiple layers of meaning will help in decision making, even if by convention the term *Alzheimer's* continues to be used to describe all forms of dementia. Furthermore, even if an Alzheimer's vaccine were available, people would still develop dementia due to other causes—and, because the disease processes are very long, such a vaccine would be inappropriate, too late, or unaffordable for the more than 35 million people who currently have dementia (Alzheimer's Disease International, 2010). Researchers and policymakers need to be realistic but remain positive, an approach that requires clarity about the limits of what could be achieved in the medium term if a pharmacological cure were developed. More pressing in the immediate and the foreseeable future are such concerns as the personal, societal, and global costs of dementia, as well as how best to support the growing numbers of people affected.

Increasing evidence from health economics research offers insight into the scale of the problem. In developed countries (e.g., Canada, the United Kingdom), for example, dementia costs add up to more than those for cancer, heart disease, and stroke combined—and the number of people affected is going to double in the next 20 years (Alzheimer's Research UK, 2010; Alzheimer's Society of Canada, 2009). This increase in numbers is going to be even greater in developing countries, rising as life expectancy improves (Alzheimer's Disease International, 2010).

The differences in the etiology of dementia can significantly affect treatment decisions for patients, families, and clinicians. Working out what causes a particular case of dementia starts with taking a careful history of the patient. For example, a former scientist with dementia might still be much better at math than her doctor. What matters is whether the patient shows a significant decline from what she used to be able to do. A gradual decline in cognitive ability over time is more likely to be Alzheimer's disease. A deterioration that is stepwise and sporadic, on the other hand, may indicate the series of mini-strokes that underlie vascular dementia. A range of sophisticated scans and tests can help refine a potential diagnosis. In Alzheimer's, for example, scans show the brain shrinking as cells wither and die. With vascular dementia, brain cells die as the blood supply is cut off in areas vital for thinking.

Making this distinction is important because, for example, giving a patient medications that help with Alzheimer's dementia at certain stages would be pointless if Alzheimer's is not the problem. In addition, people who have Lewy body dementia are vulnerable to terrible side effects from antipsychotic medication, and prescribers must balance risks. For the family, knowledge of disease presentation and progression takes away some of the shock at each stage and helps them stay alert for warning signs. For example, if your father has Alzheimer's disease and wakes up one day a great deal worse than he was yesterday, he may have a treatable condition unrelated to the dementia, such as an infection, and will get back to where he was once the infection clears. Keeping people with dementia as well as possible is important not only because they are entitled to be healthy but also because it avoids or

How to maximize quality of life for people with dementia is the most important policy issue in dementia care worldwide.

delays costs to family finances and local or national health systems.

To date, dementia has no cure. However, although vascular damage is irreversible, the risk of further deterioration can be reduced with approaches similar to those for cardiac rehabilitation. For example, Australia uses the catchphrase “What is good for your heart is good for your head” to educate the public about healthy lifestyle choices (Alzheimer’s Australia, 2013). Any public health policy that is already working to reduce the incidence of heart disease through diet, weight control, exercise, and so forth also helps decrease cases of dementia. In addition, minimization of dementia symptoms requires social and mental stimulation, as well as specific factors in environmental design, including increased light levels and exposure to daylight (Dementia Services Development Centre, 2012). Furthermore, the value of exercise, even after symptoms of dementia have appeared, cannot be overstated.

Dementia symptoms include short-term memory loss, decline in reasoning skills, and difficulty with learning anything new. For individuals over age 85 in particular, these symptoms not only cause severe stress but also affect recently acquired mobility or sensory impairments, which people with dementia may not remember how to handle. These effects, in turn, lead to an incapacity to cope with ordinary, everyday life. The number of people who have dementia increases with age. By the time they are over 85, people have a 20 percent to 30 percent chance of having dementia (Alzheimer’s Research UK, 2012). To some extent, dementia risk does depend on lifestyle issues, including lack of exercise, smoking, alcohol use, and poor management of depression or diabetes—all of which can affect the underlying disease. However, other factors also can increase or decrease dementia symptoms, despite the fact that these factors have no apparent effect on the underlying disease.

To illustrate, an 85-year-old woman living alone who washes and dresses herself, cooks her meals, and does her chores as she has done for the last 30 years in the same house may show few signs of dementia. However, if

she is moved to a new house with an unfamiliar design, she may immediately become quite hopeless at doing tasks she used to relish. Her nutrition and sleep will suffer. It is as if she developed dementia in 2 days. Similarly, an 85-year-old man with dementia admitted to a hospital may be transformed from being

independent to needing a care home—not by a sudden worsening of the underlying illness, but because of what is happening to him in the hospital. Due to the dementia, he can’t easily adjust to this new environment. He may fail to eat and drink as he normally did, leading to a urinary tract infection and delirium. He may shout at people and in response get sedated. His underlying disease has not altered, but he now appears and feels incompetent and stressed. His life partner is allowed to visit only twice a day, and is ignored when offering help and information. These deeply stigmatizing situations are to a large extent preventable and lead to unnecessary expense, both for individuals and for society.

How to maximize quality of life for people with dementia is the most important policy issue in dementia care worldwide. Of concern is that governments are making dementia more expensive for their citizens and health care systems, as well as even more disagreeable for patients and their families, by wasting resources on costly interventions that either make no difference or make the situation worse. As the previous example illustrates, many hospitals and hospital systems are like machines designed for turning an old man who copes in spite of some brain pathology into a candidate for immediate and urgent institutionalization.

So, how can policies serving Fourth Age people—those over the age of 85—be improved? At this writing, Pope Benedict XVI has just retired from leading a complex international organization at age 85. Eamon de Valera, former president of Ireland, was over 90 when he gave up office. Ken Dodd, an 85-year-old British stand-up comedian, does 5-hour shows to packed audiences. Fauja Singh, the world’s oldest marathon runner, took up running at age 89. These famous men are not typical, of course, but it is important to remember them when asking what the less visible people over age 85 are really like. Fewer working Fourth Age women are highly visible, partly because women born before 1928 are less likely to have had highly visible lives.

To fill some of the gaps in knowledge about people ages 85-plus, Age UK (2013) has focused attention on the Fourth Age in a new publication titled *Improving Later*

Life. Understanding the Oldest Old. Even there, some authors could only extrapolate from what is known about people over the age of 65. For example, England's national clinical director for dementia writes about a dementia strategy that has no specific policies for people over age 85—the age group that all public-health and disease-management strategies have been striving to create. However, older people are selectively excluded from drug trials and are often left out of disease-specific research because they typically have more than one disease. The result: Policy for Fourth Age individuals has little research evidence to support it.

One significant exception is highlighted in the Age UK (2013) publication. Tom Kirkwood started the Newcastle 85+ Study in northeast England in 2006 (Newcastle University Institute for Ageing and Health, 2012). The largest of its kind, this study looks into the health of more than 1,000 people ages 85-plus. Commentators have been astounded by the results (Hetherington, 2012). In this group, 80 percent need little

better condition also. From all indications they will need to be, because of three issues that are coming to the fore.

First, policy directions are leading to a sustained focus on care in the community, because people want to continue living in their own homes as they age. Second, the global economic downturn has highlighted that societies cannot continue to institutionalize people with dementia at the current rate; not enough personal or state wealth is available to make it feasible. Third, the chance of having dementia increases with age—up to a 30 percent risk for people in their 90s—so a large number of those Third Age children are going to have to care for their Fourth Age parents, keeping them at home for as long as possible. If individuals and families and nations are to survive well in the absence of an Alzheimer's cure or cures for dementia-related illness, then a policy of educating individuals on how to reduce or avoid dementia symptoms, so that they will be better able to shoulder the burden of care, must be put into place. Use of the term *burden* does not imply that people do not

want to provide this care, which may be undertaken from a sense of love, duty, or reciprocity, or even for pleasure. Nonetheless, it helps if caregivers have resources that show them how to make the task easier.

The good news is that much can be done. Research has highlighted which dementia problems are worst for family caregivers, and easy guides

The chance of having dementia increases with age—up to a 30 percent risk for people in their 90s.

care and have rated their quality of life very high. These people are survivors—they have lived through poverty, infections before antibiotics, wars, poor employment conditions, childbirth, epidemics, and crossing the road. They are happy and independent and have, on average, another 5 or more years of life to come. More than half still have their own teeth.

But despite these encouraging statistics, policymakers need to be concerned about the other 20 percent of this cohort, a group that will increase in size at the same rate as the general population of people over 85. Kirkwood's UK-based study is set against a background where those over 85 are the fastest growing group in the population (as they are in many other countries), a fact that needs to be taken into account when planning future services for frail elders. Kirkwood has pointed out that, contradicting all forecasts, life expectancy worldwide has increased in a linear fashion for the last 200 years. People are reaching old age in better condition. Thus, those entering the Third Age—typically referring to those over age 65—likely will be in

are available that demonstrate evidence-based nonpharmacological solutions that families can apply (Andrews & House, 2010). In addition, evidence shows that housing and public buildings can be designed in ways that reduce the symptoms of dementia (Dementia Services Development Centre, 2011). Furthermore, caregiver education and post-diagnostic counseling for people with dementia are promising areas of development. Policymakers must implement strategies that will delay institutionalization of individuals with dementia for as long as possible. A good first step is education for health and social care workers regarding practical family support and management of the psychological and social problems presented. The enemy of this comprehensive education is dementia-awareness training for professionals—a superficial introduction to some basic facts that is no substitute for a proper education and training about dementia.

Alzheimer's Disease International (2012) has identified raising public awareness of dementia as a global priority, an effort that can support clinical case

finding in the community. Policies must be created so that teams of nonmedical staff can diagnose noncontentious cases of dementia and immediately start supporting the families of these patients. This step would reduce the tremendous bottleneck of people waiting to see specialist staff, such as psychiatrists of old age, who are in short supply and are best qualified to handle complex issues. Over a 3-year period from 2007 through 2010, by setting challenging targets for the National Health Service, Scotland managed to increase the number of people diagnosed by 30 percent (Scottish Government, 2013). Almost 70 percent of the people who had been waiting for a diagnosis in Scotland now have one, compared with only 30 percent in some parts of England (Alzheimer's Society, 2013).

In conclusion, more people are going to reach the Fourth Age in a world without a cure for dementia. Historical policies that failed to diagnose people and failed to support their caregivers have led to expensive but unsatisfactory care. Thus, new policies must focus on early diagnosis, environmental design, support for caregivers, and education for health and social care workers. Understanding what is practical and what makes a difference for people with dementia is urgently needed in order to prepare for the ever-growing numbers of the oldest old. Policymakers and health care organizations worldwide should have seen the Fourth Age coming, because it is what they have always wanted.

June Andrews, MA, RMN, RGN, is director of the Dementia Services Development Centre in the School of Applied Social Science at the University of Stirling, Scotland.

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An Older, Wiser World: Some Economic Consequences of Population Aging

David K. Foot

Population aging is now a well-recognized feature in nations around the globe. The world's 65-and-older population is projected to triple by midcentury, from 516 million in 2009 to 1.53 billion in 2050, and the world's 85-and-older population is projected to increase more than fivefold, from 40 million to 219 million (U.S. Census Bureau, 2009).

Although population aging has many determinants—such as better health and longer life expectancy—the common and most dominant characteristic that countries with aging populations share is sustained below-replacement fertility. An average of 2.1 children per woman (to account for women who do not give birth) is considered sufficient to sustain a population through internal growth. Many countries now have a lower fertility rate. The United States has one of the highest fertility rates (1.9) in the developed world—but even replacement fertility would not be sufficient to prevent the U.S. population from aging, because rising life expectancy increases both the median age and the proportion of older adults in the population.

Some of the changes caused by population aging pose difficulties to society; others are beneficial. For example, an older society requires fewer goods per capita—a situation detrimental to the business of manufacturing and selling goods. But an aging society requires many more services, and that means new business opportunities. An aging population can be expected to reduce spending on education but accelerate spending on health care, because older people require less formal education but more health care than younger people (Foot & Gomez, 2006).

Slower workforce growth is inevitable in aging populations; where fertility is below replacement level, the shrinking number of children will inevitably produce smaller worker and consumer populations. Given that workforce growth historically has been the crucial determinant of a country's economic growth, it is not surprising that government and business leaders fear a decline in material living standards if their country's working-age population does not keep pace with the world's growing economies. However, countries with slow-growing or even shrinking populations do not automatically experience declines in material living standards. As long as economic growth exceeds population growth, even if both are negative, per capita incomes increase. Furthermore, reducing the growth (and especially the size) of the human footprint has environmental benefits.

How might countries with older populations offset slower workforce growth? One strategy is to let countries with younger populations specialize in low-wage, labor-intensive jobs while they develop a highly skilled, technology-based workforce at home. In short, nations can compensate for a larger population of retired people by enhancing workforce productivity with the best technology. In addition, promoting other measures—such as flexible working hours, elder care, and prorated benefits for part-time workers—and eliminating age discrimination, as well as policies that discourage partial retirement, would likely increase older people's participation in the labor force (Foot & Venne, 2011).

Countries with older population profiles also need to explore changes to their taxation policies. With relatively fewer workers, government will have to move gradually from taxation of labor income to taxation of capital income. In a society with large numbers of people in their prime earning and spending years, a tax system based on income and sales taxes makes sense. Such a system will not make as much sense for a future in which more income will be generated by technology and capital. A country with an aging population must consider increased taxes on dividends, capital gains, and corporate profits, as well as taxes on foreign exchange transactions and such, which currently are not taxed.

That the globe is graying lies beyond doubt, but the reality of this demographic fact is a far cry from the gloom-and-doom portrait painted by countless pundits who exaggerate the implications of increased longevity and lower birth rates worldwide. If the world's nations prepare for the coming demographic shift with creative policies, everyone can both enjoy its benefits and manage its inevitable challenges.

David K. Foot, PhD, is professor emeritus, Department of Economics, University of Toronto.

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