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ACKNOWLEDGMENTS

Preparation of this review was supported by grants to L.K.T. from the Biotechnology and Biological Sciences Research Council (grant number BB/H008217/1) and the European Research Council under the European Community's Seventh Framework Programme (FP7/2007-2013)/ ERC Grant agreement no. 249640. The authors thank W. Marslen-Wilson, M. G. Shafto, and S. Shafto for helpful comments on an early draft and D. Samu and D. Meunier for help with figure preparation.

10.1126/science.1254404

REVIEW

Economic and social implications of aging societies

Sarah Harper

The challenge of global population aging has been brought into sharper focus by the financial crisis of 2008. In particular, growing national debt has drawn government attention to two apparently conflicting priorities: the need to sustain public spending on pensions and health care versus the need to reduce budget deficits. A number of countries are consequently reconsidering their pension and health care provisions, which account for up to 40% of all government spending in advanced economies. Yet population aging is a global phenomenon that will continue to affect all regions of the world. By 2050 there will be the same number of old as young in the world, with 2 billion people aged 60 or over and another 2 billion under age 15, each group accounting for 21% of the world's population.

By the end of the 21st century, demographic trends will converge with declining births, stabilization in population size, and aging populations across the globe (*1*). The age composition of the world's population will alter as median ages rise and a proportionate shift from younger to older people continues. At the turn of the millennium, there were more people over 60 than under 15 in Europe. North America will follow by 2030, Latin America and Asia by 2040. In terms of absolute numbers, the Asian/Pacific region is already the oldest, and by the middle of the century will hold two-thirds of the world's then 2 billion elders (aged 60 years or over). The worldwide numbers of those aged 80 and above will show an even greater rate of increase, rising from 69 million to 379 million by 2050, when nearly 10% of the developed world will be over 80 (*1*) (Fig. 1).

Europe's demographic structure in particular is predicted to age substantially. By 2060, those under 15 in the EU27 countries (European Union members, 2007–2013) will be around 14%. There will be nearly twice that proportion over 65, as this age group will increase from 87.5 million in 2010 to 152.6 million by 2060. Perhaps most striking of all, those aged 80 and over will constitute around 12% of the European population; this group is expected to almost triple in size, from 23.7 million in 2010 to 62.4 million in 2060. The demographic outlier is Africa, which will continue to grow and remain young, with one-third of its population still under 15 by the middle of the century (*1*).

Drivers

The conventional belief is that population aging is driven by falling mortality rates and increasing longevity. Although this is an important component of the process, it is widely accepted that the major driver is falling fertility, which fundamentally alters the subsequent age structure of a population and, if sustained, leads to increasing median ages and demographic aging (*2*).

Falling fertility or childbearing

Two-thirds of the world's countries now have childbearing rates or total fertility rates (*3*) near or below replacement level, crudely defined as 2.1. These are diverse and drawn from most world regions, including Asia (for example, Hong Kong,

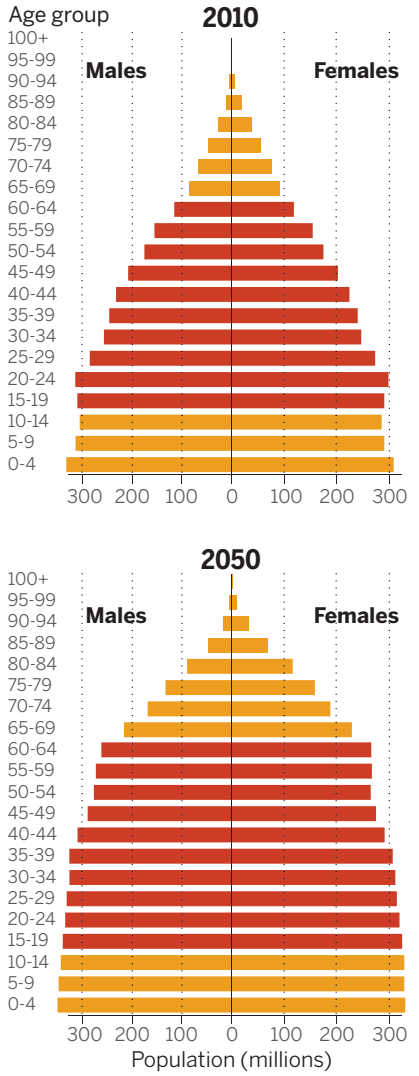

Fig. 1. World population pyramids. Population age structure for 2010 and projections for 2050 are shown. The working-age proportion is shown in red. Source: (*1*).

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Singapore, Korea, Japan, Thailand, Myanmar, and Vietnam), the Americas (Argentina, Chile, Canada, and the United States), the Middle East and Africa (Mauritius, Iran, Tunisia), and Europe (every EU27 country, with a EU average of 1.6) (*4*) (Fig. 2).

Such low fertility may be due to technological advances and changes in the labor market that have altered the costs and rewards of marriage and child rearing (*5*–*7*). It may be that ideational changes have accompanied increased affluence, leading to a focus on individual autonomy and self-realization (*8*, *9*). Some demographers argue that the evolutionary link between sexual activity and procreation has been broken through the introduction of modern contraception, and that reproduction is now merely a function of individual preferences and culturally determined norms (*10*, *11*).

Some Asian and European countries may well be in a so-called low-fertility trap (*12*). This can result from both demographic and sociological factors: Fewer potential mothers in the future will result in fewer births, while ideal family size is declining among younger generations as a consequence of the lower childbearing they see in previous generations (*12*, *13*).

Falling mortality

A second key driver is falling mortality or death rates. Until recently, declines in mortality were focused on infant and child deaths. As more and more young people survived, the average life expectancy of the population increased. In advanced economies throughout the 20th century, there was a steady reduction in mortality across the life course. In mid-19th-century England, for example, half the population had died before their mid-40s. Today, half the English population can expect to survive until their mid-80s.

The drivers of life extension appear to be fourfold: healthy living, disease prevention and cure, age retardation or senescence prevention, and regenerative medicine. The first two brought us gains in life expectancy from birth seen over the past 150 years. They now promise to extend life expectancy for many in the advanced economies to over 100 this century (*14*).

Will increases in life expectancy be accompanied by increases in life extension, or will we see a compression of longevity after age 100? In countries such as Japan where there are sufficient numbers of very old people, the distribution of deaths above the mode is sliding to higher ages. This "shifting mortality" scenario suggests that with an increase in centenarians we should also expect to see an increase in supercentenarians. However, successful age retardation and regenerative medicine may be needed to achieve real radical extension of human life (*15*).

Implications

It has long been recognized that population aging has implications for societies and economies (*16*). It affects labor markets, patterns of saving and consumption, families and households, networks and social interaction, health and welfare services, housing and transport, and leisure and community behavior. In addition, the knowledge of both longer lives and the aging of the population influences not only social and economic policy and political decisions, but also the attitudes and behaviors of individuals (*17*, *18*). Are the financial and health institutions and programs designed for the demographic structure of the 20th century appropriate for the 21st century? Of particular interest is the capacity of individuals and households to make the relevant adjustments (e.g., to savings behavior, labor productivity, family and intergenerational transfers, and investment in their own human capital) and the capacity of 21st-century institutions to make the relevant adjustments to facilitate this.

As discussed above, the aging of populations is caused by two distinct trends: Older people are living longer, and at the same time younger people are having fewer children. The resulting challenges can be grouped into those that arise from (i) persistent below-replacement fertility and the changing age structure of the population, (ii) the increasing longevity of the older population, and (iii) the interaction of the two. Decreased fertility leads to demographic deficits and labor market concerns, in particular over reduced economic growth and the ability of nations to finance public welfare programs at a time when the number and percentage of those who are economically active are declining. Increased longevity raises concerns about the capacity of nations to finance and reconfigure health and long-term care provision, in advanced as well as emerging economies. Emerging economies will still be tackling acute and infectious diseases and relatively high levels of infant and child mortality, while at the same time addressing a growing number of frailer older adults who require long-term care. The interaction of the two trends creates challenges around issues of inter- and intragenerational fairness—that is, fairness and equity within and between different generations.

Demographic deficits and labor market concerns

Declining and aging populations are often viewed as having negative effects on economic growth and employment (*19*, *20*). These concerns are encompassed in the notion of the "demographic deficit" (*21*). This relates to the age-structural transition approach that examines the cohort composition of a population, considering the proportion of old and younger dependents in relation to productive adults, and how this will alter over time. In general, productive capacity varies across the life course, flowing from a period of childhood dependency through high productive potential in adulthood, then returning to a decrease in productive capacity in old age. The macroeconomic effects will differ depending on the age composition of the population. The decline in the proportion of younger people in a population is perceived as leading to a reduction in economic activity, whereas an increase in the proportion of older people is perceived as resulting in an economic burden through the higher requirement for pensions and health care.

Total fertility rates

2005–2010

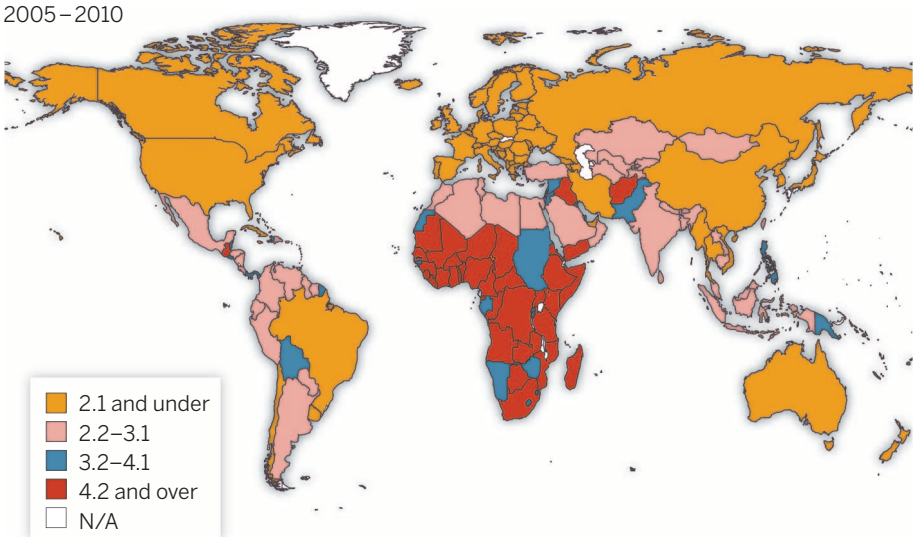

Fig. 2. Map of total fertility rates, 2005–2010. Total fertility rate, expressed as number of children per woman, represents the average number of children a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality. Source: (*1*).

Much of this concern arises from an assumption that the older labor forces of the future will be less productive and less innovative, and that an older population will have lower rates of consumption. These preconceptions, however, are contested by arguments that future cohorts with higher levels of education, skills, and training will be able to maintain high levels of productivity given supportive and conducive working environments (*21*). In addition is the concern that older people will be recipients of publicly funded pensions for an increasing length of time, and will also draw down on savings accumulated in both private and national accounts (*22*).

In terms of the proportion of old and younger dependents in relation to productive adults, most industrialized countries will experience a rapid shift toward increased elderly dependency ratios [EDRs, defined as the number of persons of working age (aged 15 to 64) per person aged 65 or over] over the coming decades (Fig. 3). For example, the EU25 (European Union members, 2004–2006) (*23*) EDR is set to reach 51% by 2050, as the working-age population (15 to 64 years) decreases by 48 million between now and 2050, and the number of those of working age per older person 65+ will halve from 4 to 2 (*24*). Outside Europe, Japan and Korea will also age notably. Korea, the most rapidly aging country, will move from being the third youngest country in the Organisation for Economic Co-operation and Development (OECD) to the second oldest after Japan by 2050, when Japan will have one of the highest total dependency ratios (number of persons aged 15 to 64 per person outside that range) in the world at 74% in 2050.

Addressing the demographic deficit

At the macro level, many governments are exploring policies to compensate for, or even to alter, the age composition of the population by encouraging changes in fertility and migration rates. Another approach is to tackle the labor market directly, and to extend both the economic activity and the general productivity of the older population for as long as possible. This both reduces the need for social security provision for some, and enables further financing of those who are no longer able to remain economically active. In addition, there is a growing recognition that many labor markets have the potential to increase productivity through technological innovation.

Increase childbearing

The two main demographic solutions to the dependency balance are to increase childbearing and to increase migration. Although increasing fertility rates can have a strong influence on altering old-age dependency ratios, very few countries are currently pursuing an active fertility promotion policy. However, there is recognition that "family-friendly" policies, aimed at supporting both child and parents, can allow women to have the number of children they desire, which in most OECD countries tends to be higher than the actual number of achieved births (*25–27*). These policies include affordable child care, parental leave, financial transfers, and tax provisions.

Increase immigration

Alternatively, immigration is seen as a valid policy approach (*28*). Because of the relatively young age structure (and thus the labor potential) of immigrants, immigration has the potential to prevent population decline, maintain the size of the labor force (and thus the support ratio), and slow population aging. There are also the indirect effects of migration on innovation, economic growth, employment, and welfare. Immigration can affect the sustainability gap of public finances as it increases the number of potential taxpayers, even if the migrants' contributions to the present budget are negative (*29*). However, research has suggested that even a considerable expansion of immigration will do little to alter the predicted major capital shortages, tax increases, and reductions in real wages that can be expected as countries progress through the demographic transition (*30*).

Immigration can improve competitiveness and productivity through new trade and international linkages, encourage new investment, and increase innovation and entrepreneurship. In advanced aging economies, migrant workers fill the demand for both highly skilled workers and unskilled employment, particularly in the growing personal care sector.

Change dependency ratios by working longer

In many advanced economies, the rising elderly dependency ratios and the upcoming skills shortage have already led to reconsideration of retirement policies, leading to longer working lives and a more gradual entry into retirement (*31*). New cohorts of highly educated, skilled, and increasingly healthy populations are delaying retirement (*32*). This is in part a response to government social security changes, but is also due to the increased health status of these older generations. Future generations of older adults may have even higher levels of human capital—in terms of education, skills, and abilities—and better health profiles, and this will enable them to remain active, productive, and contributory for far longer, given supportive and conducive working environments (*2*). This has ergonomic and human resource implications for improving physical and psychological working environments. It also raises important questions around the growing need for skills and training across the life course, and of who will pay for this—individuals, employers, or governments. In addition, the substantial contribution made by older adults via the informal sector through providing family and community support and care is now increasingly being recognized (*33*).

Finance and reconfigure health and long-term care provisions

Population aging heralds a series of challenges for economies and societies in relation to the provision of health and social care (*34*).

(i) The total amount of ill health and disability in the population will rise because as societies improve their population life expectancy, the proportion of the population with serious health problems will increase unless there is a considerable improvement in the health of successive birth cohorts (which would manifest as a decrease over time in age-specific prevalence rates). This has been termed "epidemic of frailty" (*35*).

(ii) Changes in the type of ill health will arise from the shift from acute infectious disease to complex chronic long-term ill health and disability. This has been termed the chronic disease burden (*36*, *37*) and will exert pressure for a major shift in the allocation of health care resources and the configuration of services.

OECD demographic deficit

2000–2030

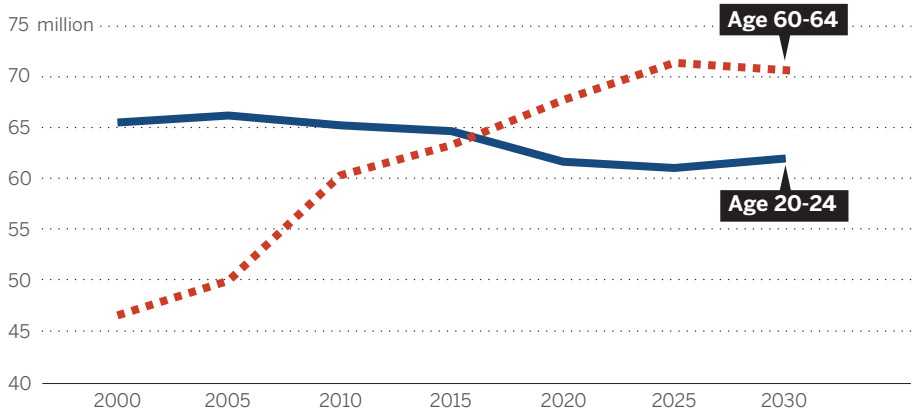

Fig. 3. Demographic deficit in OECD member nations. Observed and projected size of the incoming (20–24) and outgoing (60–64) working-age cohorts in OECD countries, 2000–2030. Source: OECD figures, Oxford Institute of Population Ageing, 2012.

Therefore, even if population aging does not exert pressure for additional resources to be channeled into the health care system, it is likely to exert pressure for the development and improvement of services for people with complex health needs, and this may require a large shift in the allocation of resources as well as large-scale organizational change.

(iii) Population aging will affect a society's capacity to provide workers to care for the older population, as well as its ability to generate income to finance this. The changes in the dependency ratios discussed earlier will particularly affect the health care sector. In addition, demographic change will reduce informal family care through a reduction in the availability of younger family members to provide such care. This will increase the demand for formal care services, at a time when the provision of overseas migrants providing health care is reduced as their own societies start to age. This will also occur at a time when the epidemiological transition is toward labor-intensive chronic disease care.

Addressing the health and social care challenge

One approach is to maintain health among older populations for as long as possible, thus reducing the requirement to provide and finance long-term health and social care. A second approach focuses on the economic relationship between changing age structure and health care costs, and how this might evolve with changing population age structures.

Postponement of frailty and disability

Will declines in mortality be accompanied by declines in morbidity (i.e., disease and disability)? There is currently evidence that through healthy living and disease prevention, the onset of disability is being pushed back into our 80s (*38*). Will these gains in healthy years continue as we increasingly turn to science and technology to extend our lives? The "compression of morbidity" hypothesis (*39*, *40*) suggests that disability and frailty are compressed toward the end of life at a faster pace than death rates. Therefore, people are expected to live not only longer, but also in better health. Alternatively, the "expansion of morbidity" hypothesis (*41*–*43*) claims that the decline in mortality is largely due to the decreasing death rate of diseases, rather than due to a reduction in their incidence. As a result, falling mortality is accompanied by an increase in morbidity and disability. The "dynamic equilibrium" hypothesis (*44*) suggests a counterbalancing effect between the decreasing prevalence/incidence of chronic diseases and the decreasing fatality rates of such diseases. This is leading to longer periods of living with disability toward the end of one's life.

The evidence is equally mixed. Studies from the United States suggest that younger cohorts of elderly persons are living longer in better health (*45*); studies from Japan, the world's oldest country, suggest that as life expectancy reaches very high ages, most of the gained years are lived in poor health (*46*). For now we can conclude that although both life expectancy and healthy, disability-free life expectancy may be increasing, disability as a proportion of life after age 65 is also slowly increasing (*47*). Science, technology, and medicine—the modern drivers of longevity—are not only increasing our life expectancy but are also enabling us to live longer at the end of our lives with disease, disabilities, and frailties (Fig. 4).

Health care costs

Over the past 40 years, health care costs in most advanced countries have been rising on average between 1 and 2% faster than GDP (*48*). The age structure of a population is seen to be an important determinant of health care costs. Costs are high for infant and maternal care, and rise again as we age, from around age 55 for men and 60 for women. Yet, although per capita health spending does increase quite steeply once people reach their 60s, repeated analyses of age-related data on health spending have shown that proximity to death is more important than age per se as a predictor of the consumption of health resources (*49*–*51*). In other words, health care spending is heavily concentrated in the last few years of life, so much so that some analysts have argued that aging per se has virtually no effect on the way that the consumption of health care resources increases with age (*52*). However, in many advanced economies, aging of the large cohorts born in the middle of the 20th century will over the coming decades increase the proportion of the population in close proximity to their death and will inevitably increase health care consumption.

Although a number of cross-national studies have considered the determinants of health care costs, only one has found that the proportion of population aged 65 and over is the explanatory factor (*53*). Indeed, in advanced economies at least, per capita health care costs for those aged 65 years and over have increased at the same rate as for those aged less than 65 (*54*). In many countries, per capita spending on health care is reduced after age 85. This is partly due to the view still held in many societies that spending should be directed to the young when resources are limited; partly due to the lack of research, and thus innovation, in treatments for the very old; and partly due to the lower demands made by these cohorts relative to working-age adults. All three factors are likely to change as the more demanding younger cohorts reach old-old age.

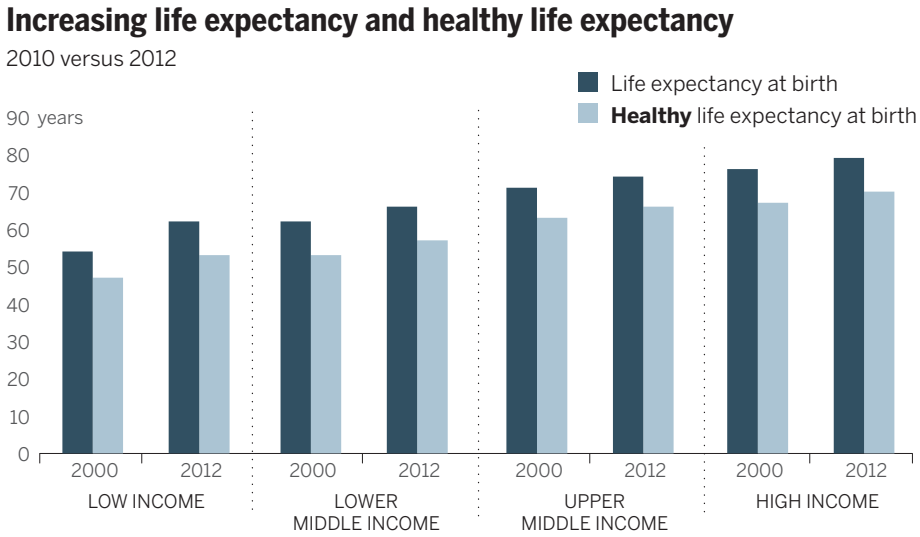

Fig. 4. Life expectancy versus healthy life expectancy. Source: Life expectancy data by World Bank income group; World Health Organization, Global Health Observatory Data Repository (http://apps.who.int/gho/data/view.main.700?lang=en).

It is the wider effects of income, lifestyle characteristics, and new technology, alongside the effects of environmental factors, that are driving up the demand for new advanced medical applications. Indeed, technological change in health care delivery has been the main driver, with up to half of the increase in health care spending in advanced economies over the past 50 years arising from medical technology (*55*). In addition, medical innovations now allow for the treatment of previously untreatable conditions, which also increases medical costs (*56*).

Addressing the social challenge

Change in age composition is altering the structure of families and the life course. Such change also brings into question the traditional contract between the generations, and raises queries around the reconfiguration of social institutions to deal with issues of inter- and intragenerational fairness that may arise as a result of population aging. In particular, inequalities in access to health, economic, and social resources—both between and within generations—are likely to remain a pressing concern over the coming decades.

Changing family structures

Changes in fertility and mortality are leading to a decrease in the number of living relatives within each generation (*16*, *57*). As fertility falls, and as the intervals between the generations increase because of late first childbearing, we may well see a contraction in the number of family generations alive at one time. Longevity is increasing the duration spent in certain kinship roles, such as spouse, parent of nondependent child, and sibling. Falling fertility has reduced the duration of others, such as parent of dependent child, or even the opportunity for some roles, such as sibling.

Delaying life transitions

Paradoxically, while public and legal institutions are generally lowering the age threshold into full legal adulthood, individuals are choosing to delay many of the transitions into full adulthood—full economic independence from parents, formal adult union through marriage or committed long-term cohabitation, and parenting—with a continued increase of age at first marriage, at leaving the parental home, and at first childbirth. Within the family, delayed transitions in younger life lead to subsequent transition delay for both the individual and other kin members. For example, delayed birth of a first child may lead to a long intergenerational interval and a later transition to both parenthood and grandparenthood. Similarly, extended economic dependence on parents not only delays the individual's full transition to independent adulthood, but also delays the experience of the empty-nest syndrome for the parents themselves. Awareness of ever-lengthening life spans may have given individuals at all ages the time and the liberty to delay these transitions as they progress through adulthood (*16*, *18*).

Inter- and intragenerational fairness and the changing intergenerational contract

The question of intergenerational fairness raises the issue of ensuring that both those generations who are working and those who are now retired will benefit from the proceeds of any economic growth. These factors need to be addressed together with intragenerational inequalities, which arise through differential access to education and employment opportunities.

There is also some questioning of the traditional contract between the generations, which has been based historically on a system of intergenerational reciprocity. Adults provide for young dependents (children) and in return, when those young dependents become adults, they provide for older dependents. This is maintained in most societies both directly at the familial level and at a societal level, with adults within the labor market providing via public transfers for both older and younger dependents. The question for an aging population is whether successful cohorts (in terms of both fertility and mortality reduction) pass the cost of such success onto future cohorts via the traditional intergenerational contract or a renegotiated one. This latter contract would require older cohorts to bear the costs of their longer lives, through (for example) higher postretirement contributions to their own welfare and/or a longer working life.

Conclusion

A variety of new policies are now being developed in the light of population aging, including broad, coherent, and integrated multi-pillar approaches to labor markets, health, and social security (*58*). These should enable and promote longer working lives through life long training, education and skills updating, and the provision of appropriate working environments for older workers. They should further ensure that private family or household transfers are integrated into old-age security systems where possible; promote well-being and enable healthy active living to reduce chronic illness and health care costs and support active contributory life for as long as possible; and provide access to education across the life course to ensure that all individuals are prepared physically, mentally, socially, and financially to cope with increasing individual responsibility for old age.

Moreover, it should be recognized that the major concerns listed above are dynamics of current cohorts and current behaviors. They are not fixed. Europe, which has had more than 100 years to prepare for its aging population, is still struggling with these questions. Yet the greatest challenges of global population aging may not be in Europe, but rather in the rapidly changing demography of Asia and Latin America—regions that are moving from being predominantly young to being predominantly old within just 25 years.

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10.1126/science.1254405