



HHS Public Access

Author manuscript

Lancet. Author manuscript; available in PMC 2017 May 21.

Published in final edited form as:

Lancet. 2016 May 21; 387(10033): 2145–2154. doi:10.1016/S0140-6736(15)00516-4.

The World report on ageing and health: a policy framework for healthy ageing

John R Beard, PhD, Alana Officer, MPH, Islene Araujo de Carvalho, MD, Ritu Sadana, ScD, Anne Margriet Pot, PhD, Jean-Pierre Michel, MD, Peter Lloyd-Sherlock, PhD, JoAnne E Epping-Jordan, PhD, G M E E (Geeske) Peeters, PhD, Wahyu Retno Mahanani, MSc, Jotheeswaran Amuthavalli Thiyagarajan, PhD, and Somnath Chatterji, MD

(J R Beard PhD, A Officer MPH, I Araujo de Carvalho MD, R Sadana ScD, A M Pot PhD, J A Thiyagarajan PhD), **Health statistics and information systems** (W R Mahanani MSc, S Chatterji MD), **Consultant** (J A E Epping-Jordan PhD), World Health Organization, Geneva, Switzerland; University of Geneva, Geneva, Switzerland (J-P Michel MD); School of International Development, University of East Anglia, Norwich, UK (P Lloyd-Sherlock PhD); and University of Queensland, School of Public Health, Brisbane, QLD, Australia (G M E E Peeters PhD)

Abstract

Although populations around the world are rapidly ageing, evidence that increasing longevity is being accompanied by an extended period of good health is scarce. A coherent and focused public health response that spans multiple sectors and stakeholders is urgently needed. To guide this global response, WHO has released the first *World report on ageing and health*, reviewing current knowledge and gaps and providing a public health framework for action. The report is built around a redefinition of healthy ageing that centres on the notion of functional ability: the combination of the intrinsic capacity of the individual, relevant environmental characteristics, and the interactions between the individual and these characteristics. This Health Policy highlights key findings and recommendations from the report.

Correspondence to: Dr John R Beard, World Health Organization, Ageing and Life Course, Geneva 1206, Switzerland
beardj@who.int.

Contributors

JRB led the team in conceptualisation, identification of key topics and research questions, data interpretation, and the writing of the paper. AO contributed broadly to the drafting of the paper, including conceptualisation and data interpretation, particularly in sections related to environments. IAdC contributed broadly to the drafting of the paper, including conceptualisation and data interpretation, particularly in sections related to health systems. RS led work related to measurement and research, and issues related to health equity and oversaw the writing and analysis of related sections of the publication. AMP and PL-S contributed broadly to the drafting of the paper, including conceptualisation and data interpretation, particularly in sections related to long-term care systems. J-PM contributed in initial conceptualisation work and provided extensive input both in data interpretation and writing across the whole paper. JAEE-J contributed broadly to the drafting of the paper, particularly in sections related to health systems and long-term care systems. GMEEP contributed to the drafting of the paper, particularly in trends in physical capacity across life, and undertook analysis of the Australian Longitudinal Study on Women. WRM contributed to the drafting of the paper and undertook analysis related to mortality, years of life lost, and years of healthy life lost due to disability. JAT contributed to the drafting of the paper and undertook multiple analyses including work on activities of daily living. SC contributed broadly to the drafting of the paper, including conceptualisation and data interpretation, and undertook data analysis related to intrinsic capacity.

Declaration of interests

We declare no competing interests.

Introduction

Today, for the first time in history, most people can expect to live into their 60s and beyond.¹ In less developed countries, this longevity is largely the result of much reduced mortality at younger ages.² In high-income countries, continuing increases in longevity are now mainly due to rising life expectancy among those who are 60 years or older, although these general trends might not be sustainable and mask substantial inequalities within countries.^{3,4} When combined with falling fertility rates, these increases in life expectancy are leading to the rapid ageing of populations around the world.

These changes are striking and the implications are profound. A child born in Brazil or Burma (Myanmar) today can expect to live 20 years longer than one born only 50 years ago. In Iran, only around one in ten of the population is currently older than 60 years. In only 35 years' time, this proportion will have increased to around one in three. And the pace of change is much faster than was the case in the past.

Longer life is an incredibly valuable resource. It provides the opportunity to reconsider not only what older age might be, but how our whole lives might unfold.⁵ For example, in high-income countries, there is evidence that many people are rethinking rigid notions of what older age might consist of and are looking to spend these extra years in innovative ways, such as a new career, continuing education, or pursuing a neglected passion.⁶ Moreover, as young people start to expect longer lives they, too, might plan their lives differently.

Yet, the extent of the opportunities that arise from these extra years of life will be very heavily dependent on one key factor: health. If people are experiencing these years in good health, their ability to do the things that matter to them will be little different from that of a younger person. If these added years are dominated by decreases in physical or mental capacity, the implications for older people and for society are much more negative.

Although increasing longevity is often assumed to be accompanied by an extended period of good health, little evidence exists that older people today are experiencing better health than their parents did at the same age.⁷ While much research has been done in this area, the findings are very inconsistent and vary geographically.⁸⁻¹⁶ Moreover, even in high-income countries, trends within different subgroups of the population can be quite distinct.^{4,17}

Research reported in 2014 by WHO suggests that although severe disability in older people (that necessitates help from another person for basic activities such as eating and washing) might be decreasing slightly, no substantial change in less severe disability has been noted in the past 30 years.¹⁸

However, although 70 does not yet appear to be the new 60, there is no reason why this cannot become reality in the future. But it will need a coherent and focused response across multiple sectors and stakeholders. To date, this response has largely been lacking.¹⁹ To provide a public health framework for action, WHO has released the first *World report on ageing and health*.²⁰ The report considers ageing from a life-course perspective, but focuses on the second half of life. This Health Policy paper highlights key findings and

recommendations from the report. The authors were mostly members of the core writing group.

In developing the report, WHO brought together both the many departments undertaking work related to ageing and the different levels of the Organization. Report chapters were drafted by a core group of internal and external contributors. They drew on 19 commissioned background papers drafted by largely external experts that were either systematic or scoping reviews, depending on the topic. Most are currently under peer review for separate academic publication (see appendix for details).

The report included various analyses of existing datasets including WHO's Global Health Estimates,^{21,22} the WHO Study on global AGEing and adult health (SAGE),²³ the World Health Survey,²⁴ the Australian Longitudinal Study on Women's Health,²⁵ the Survey of Health, Ageing and Retirement in Europe,²⁶ the Health and Retirement Study,²⁷ the English Longitudinal Study of Ageing,²⁸ and data from the World Bank. The statistical methods for the selected findings presented in this paper are shown in the appendix.

The epidemiology of population ageing

The increases in life expectancy observed globally during the past 50 years have been accompanied by substantial changes in cause of death. Figure 1 shows mortality patterns across the life course for countries at different stages of socioeconomic development. Although data for deaths in older age are far more robust than information about morbidity, even estimates of mortality should be interpreted with caution because high-quality data are scarce for all low-income and most middle-income countries. Biases are also likely to arise in these settings from misreporting of age, the high proportion of deaths being attributed to unspecified causes, and the multimorbidity common in older adults. These factors mean that these estimates are built on whatever data sources are available and modelled for the corresponding country groups.

Despite these quality limitations and although the available data can provide only a cross-sectional snapshot of current mortality patterns, figure 1 suggests the mortality changes that have accompanied socioeconomic development.²⁹ Thus, at some time in the past, the resource-rich countries at the top of the figure are likely to have had similar mortality patterns to the resource-poorer countries shown below them.

The graphs on the right-hand side of figure 1 show the age at which deaths occur in countries divided into World Bank categories of economic development (see appendix for specific countries in each category). High-income members of the Organisation for Economic Co-operation and Development (OECD) are displayed separately from other high-income countries because their epidemiology is quite distinct. In lower-resource settings, by far the most common age of death is early childhood. Deaths are then evenly spread across the rest of life. In general, increasing economic development is associated with a greater proportion of the population surviving childhood, and an increasing likelihood that people will die as adults. In high-income settings, deaths are more likely to occur at older ages, with most deaths being in people older than 70 years.

The left-hand side of figure 1 displays the causes of death at different ages in the same settings. Irrespective of the level of socioeconomic development, the dominant causes of death in older age are non-communicable diseases, although these deaths tend to occur earlier in low-income and middle-income countries than in high-income countries. However, in both low-income and middle-income settings, communicable disease remains an important killer across the life course.

To explore which of these causes of death result in the greatest burden on older people, figure 2 shows years of life lost for people older than 60 years using data from the WHO Global Health Estimates (GHE).²¹ Globally, three disorders dominate mortality in this age group: ischaemic heart disease, stroke, and chronic obstructive pulmonary disease. The burden from all these diseases is far greater in low-income and middle-income countries than in high-income OECD countries. The exceptionally high burden from cardiovascular disease in non-OECD high-income countries can be largely attributed to high rates in Russia, which are probably related to specific lifestyle issues rather than problems with data quality.³⁰

The report also uses WHO GHE data²¹ to identify the greatest causes of years living with disability in people older than 60 years. In order of decreasing burden, these are sensory impairments, back and neck pain, chronic obstructive respiratory disease, depressive disorders, falls, diabetes, dementia, and osteoarthritis. Again, for some, but not all, of these disorders the burden per 100 000 older people is much greater in low-income and middle-income countries. For example, the burden from hearing impairment, cataracts, and refractive errors in low-income countries was almost five times that in high-income OECD settings.

However, approaches such as GHE that are based on mortality patterns and disease prevalence reveal only part of what might make up so-called health in older age. The presence of a health disorder says nothing about the effect it might have. Moreover, older people's self-perceptions of health can be greatly affected by other factors, including their attitudes toward their own ageing.³¹ Nor do these approaches take account of the differing environments or differential access to services between countries that might mitigate the effects on functioning of different disorders.

Furthermore, ageing is also associated with an increased risk of a person having more than one disorder at the same time (multimorbidity). Although no consensus exists about which disorders should be considered, more than half of older people are likely to experience multimorbidity, even in low-income and middle-income countries.^{32,33} Multimorbidity can lead to interactions between disorders; between one disorder and treatment recommendations for another; and between drugs prescribed for different disorders. As a result, the effect of multimorbidity on functioning, quality of life, and mortality risk might be much greater than the individual effects that might be expected from these disorders.³² Predictably, multimorbidity is also associated with increased rates of health-care use and increased costs.³²

Multimorbidity might be an even more important issue for older people in resource-poor settings. One large study from Scotland showed that the onset of multimorbidity occurred 10–15 years earlier in people living in the most deprived areas than for those in the most affluent areas.³⁴ Furthermore, multimorbidity is more prevalent in people of low socioeconomic status.³² In low-income and middle-income countries, these associations might be amplified by the double burden of communicable and non-communicable diseases, the high prevalence of HIV infections, and the earlier onset of common disorders.³⁵

The multifaceted dynamics between underlying physiological change, chronic disease, and multi morbidity can also result in health states in older age that are not captured at all by traditional disease classifications and that are therefore often missing in disease-based assessments of health. These are commonly known as geriatric syndromes, although there is still some debate as to what disorders these include.³⁶

Foremost among the geriatric syndromes is frailty, which can be regarded as a progressive age-related deterioration in physiological systems that results in extreme vulnerability to stressors and increases the risk of a range of adverse outcomes including care dependence and death.^{37,38} This condition is very common with a prevalence in high-income countries at age 50–64 years of around 4%, increasing to 17% in people older than 65 years.³⁹ In both high-resource and low-resource settings the prevalence of frailty is distributed along the socioeconomic gradient such that individuals with less education and income are more likely to be frail.⁴⁰ However, the limited consensus on how to define and measure this complex state presents challenges both for research and clinical practice.

This complexity of health states in older age means that disease-based conceptualisations are inadequate proxies for health in an older person. Rather than the presence or absence of disease, the most important consideration for an older person is likely to be their functioning. Comprehensive assessments of functioning in older age are also much better predictors of survival and other outcomes than the presence of diseases or even the extent of comorbidities.⁴¹

Healthy ageing

In framing a public health response to population ageing, the World report therefore considers the multitude of health characteristics we have described as well as underlying physiological changes and psychosocial changes associated with ageing as interacting to determine an older person's intrinsic capacity. This capacity is defined as the composite of all the physical and mental (including psychosocial) capacities that an individual can draw on at any point in time.

At present, most information about intrinsic capacity comes from research into the period of life when substantial losses in functioning occur—often through measurement of losses of activities of daily living or instrumental activities of daily living. The report suggests that around 15–35% of people aged 75 years or older in Europe need some form of assistance in achieving these tasks. But the report finds the proportion varies greatly between countries

and might be much higher in low-income and middle-income settings, although data comparison is difficult.

Moreover, these measures only identify people with serious losses of functioning and tell us little about the trajectory that has preceded these losses and the factors that have affected this trajectory. To explore how intrinsic capacity varies across age groups, the report drew on SAGE to combine various measures, including physical and cognitive assessments and biometric measures to develop one composite health score that might reflect intrinsic capacity (figure 3; see appendix for details).⁴² These cross-sectional data show a gradual decline in intrinsic capacity with increasing age across the life course. Of course, for individuals, any decrease with increasing age might not be smooth, but instead consist of intermittent setbacks and recoveries. But for the population as a whole, the average reduction shown in this analysis was gradual. There was no age when people suddenly had less capacity and became “old”.

Moreover, the shading around the mean composite scores shows the range of capacity across age groups for each sex. Although intrinsic capacity tended to fall with age, there were some exceptional individuals aged 80 years or over who had maintained intrinsic capacity higher than the mean level seen in young adults, while others had experienced very significant losses of capacity at much younger ages. These trends highlight the diversity that is a hallmark of older age and conflict with the stereotype of a typical older person.

This wide distribution of intrinsic capacity observed across the life course is not random. Figure 4 shows analysis of trends in physical functioning from the Australian Longitudinal Study on Women's Health.²⁵ The figure divides the cohort into categories of income adequacy. The higher the income adequacy, the higher the early-life peak in average physical functioning and this disparity tends to persist across the whole life course (see appendix for details).

Much of this association is a consequence of the cumulative effect of various social and economic determinants of health experienced across an individual's life course.⁴³ One crucial consequence is that in older age the people with the greatest health needs tend to also be those with the fewest resources to call on to address them. This association has major implications for policy, which will need to be crafted in ways that overcome, rather than reinforce, these inequities.

Moreover, intrinsic capacity is only one of the dimensions of functioning of an older person. The environments they inhabit and their interaction with them are also major determinants of what older people can do. These environments provide various resources or barriers that will ultimately decide whether a person with a particular capacity can engage in activities that matter to them. Thus, although an older person with severe osteoarthritis might have restricted intrinsic capacity, they might still be able to do the shopping if they have access to an assistive device (such as a walking stick, wheelchair, or scooter) and live close to affordable disabled-access transport. The report defines this combination of the intrinsic capacity of the individual, relevant environmental characteristics, and the interactions

between the individual and these characteristics as their functional ability. These attributes determine whether people can be and do what they have reason to value.

Building on the two ideas of capacity and ability, the report defines healthy ageing as the process of developing and maintaining the functional ability that enables wellbeing in older age. Healthy ageing thus reflects the ongoing interaction between individuals and the environments they inhabit. This interaction results in trajectories of both intrinsic capacity and functional ability. An optimum trajectory might be one in which an individual lives a long life and maintains high intrinsic capacity throughout. But a less than optimum trajectory can also be improved. For example, resistance training can improve muscle mass and the subsequent trajectory of intrinsic capacity in someone who is frail,⁴⁴ or someone with dementia or advanced heart disease could experience a more positive trajectory of functional ability through access to appropriate care and support and through living in a supportive environment. The report therefore frames healthy ageing as a process that remains relevant to every older person rather than a threshold state of functioning or health.

This emphasis on trajectories of ability and capacity builds on, but is distinct from, previous work on ageing. There is little consensus about what healthy ageing might be, although research often focuses on the absence of disease. Other approaches have sought to identify older people who experience so-called successful ageing and the factors that might be responsible. These often consider functioning and have been very useful from a research perspective.⁴⁵ However, they were not designed as a guide for broader public health policy and are less useful in framing responses that might improve the wellbeing of those below the threshold of success.

Moreover, the report proposes that the focus of public health action on ageing is not on functioning itself—what older people do—but on building the abilities that will allow them to navigate their changing world and to themselves invent new and better ways of functioning. This conclusion is consistent with work in other policy areas that looks to give people the opportunity to achieve the multiple aspects of their lives they have reason to value rather than focus solely on economic utility.⁴⁶

A public health framework for healthy ageing

The report identifies many entry points for action to foster healthy ageing through the shared goal of maximising functional ability. This goal can be achieved in two ways: through the building and maintaining of intrinsic capacity, and through enabling someone with a given level of intrinsic capacity to engage in the things that matter to them. In doing this, the report emphasises the importance of considering not only approaches that ameliorate the losses associated with older age but also those that can reinforce resilience and psychosocial growth. At a population level, the report also emphasises the need for strategies that look to both raise overall levels of ability and to narrow the distribution of ability by paying particular attention to raise those at the bottom.

Key opportunities for action on trajectories of functional ability and intrinsic capacity across the life course are shown in figure 5. The figure identifies three subpopulations of older

people: those with relatively high and stable capacity, those with decreasing capacity, and those with substantial losses of capacity. These subgroups are not rigid, nor do they cover the course of every older person's life. However, if the needs of these population subgroups are addressed, most older people will find their functional ability enhanced.

The report identifies four priority areas for action that can help to achieve this aim. First, health systems need to be aligned to the older populations they now serve. Health care that addresses the multidimensional demands of older age in an integrated way is more effective than services that merely react to specific diseases independently.^{47–49} Yet older people often encounter services that were designed to cure acute diseases or symptoms, that manage health issues in disconnected and fragmented ways, and that lack coordination across care providers, settings, and time. This situation results in health care and other services that not only fail to adequately meet the needs of older people, but that can have great costs both to them and to the health system.⁵⁰ A focus on curing disease, as is the case in most health systems around the world today, detracts from helping older adults to get the help they need to improve their functioning irrespective of the multitude of health disorders they might have. Achievement of the goal of healthy ageing is therefore not merely a case of doing more of what is already being done. Instead, the report emphasises the need to redevelop systems to ensure coverage of integrated services without financial burden, that are centred on the needs and rights of older people, and to deliver care built around a common goal of functional ability. It identifies straightforward strategies that can be incorporated into these systems, such as the use of comprehensive assessments to identify frail patients, prevent polypharmacy, and strengthen links between long-term care and health services.^{49,50} It also highlights the need to build and sustain an appropriately skilled workforce. This process will require all health curriculums to include adequate training on ageing-related issues, as well as opportunities for existing practitioners to advance their skills.

Second, systems should be developed to provide long-term care. In the 21st century, there is no country that can afford *not* to have a comprehensive long-term care system. The goal of these systems should be to maintain a level of functional ability in older people who have, or are at high risk of, substantial losses of capacity, and to ensure this care and support is consistent with their basic rights, fundamental freedoms, and human dignity. However, these systems have many potential benefits beyond enabling care-dependent older people to live lives of dignity. These benefits include reducing inappropriate use of acute health services, helping families avoid catastrophic care expenditures, and freeing women to pursue aspirations beyond caregiving such as education and formal participation in the workforce. By sharing the risks and the burden associated with care dependence, long-term care systems can thus help to foster social cohesion. Only governments can create and oversee these systems. But that does not mean long-term care is solely the responsibility of government. Although the system appropriate to every country or setting will be different, it will need to be based on an explicit partnership with families, communities, institutions, other care providers, and the private sector. Governments can steward this partnership, ensure integration across various services (including with the health sector), ensure the quality of services and directly provide services to those most in need (either because of their low intrinsic capacity or their socioeconomic status). Action is possible even in countries that are most resource-constrained.

Third, everyone should have the opportunity to grow old in an age-friendly environment. The report explores how many sectors can contribute to healthy ageing in five interconnected domains of functional ability that are essential for older people to do the things that they value: meet their basic needs; learn, grow, and make decisions; move around; build and maintain relationships; and contribute. Together these abilities enable an older person to age safely in a place that is right for them, to continue to develop personally and to contribute to their communities while retaining autonomy and health. The environmental actions necessary to foster these abilities take many forms, but operate in two fundamental ways. The first is to build and maintain intrinsic capacity, either through reduction of health risks, encouragement of capacity-enhancing behaviours or removal of barriers to them, or by provision of services that foster capacity. The second is to enable greater functional ability in someone with a particular level of capacity. Action in this area is often framed under the notion of age-friendly environments, which includes both physical and social components. Design features range from straightforward strategies such as ensuring adequate public seating and toilets, to accessible transport, to mechanisms that foster the participation of older people and interaction between generations. There is great momentum to adopt these strategies more widely with, for example, the WHO Global Network of Age-friendly Cities and Communities currently covering more than 113 million people globally.⁵¹

Fourth, improved measurement, monitoring, and understanding is needed. Progress on healthy ageing will need a focused effort to overcome the major knowledge and research gaps that currently exist. These gaps include an absence of consensus about how to define, measure, and analyse key concepts; the exclusion of older people from many population surveys and even from clinical trials for treatments for which they will be the major recipients; and economic analyses that fail to consider the contributions that older people make to society. Ensuring that older people are included in vital statistics and general population surveys, and that analyses of these information resources are disaggregated by age, sex, and important social characteristics will help. But agreement is needed on key concepts, and new metrics, measures, and analytical approaches for healthy ageing are urgently needed. Approaches such as multicountry and multidisciplinary studies that are representative of a population's diversity and that investigate the determinants of healthy ageing and the distinct context of older adults should be encouraged. Research to identify high-quality and cost-effective systems of care that minimise inequities will be crucial.

Although each country will vary in its preparedness to take action, the World report highlights several approaches for each of these areas that are likely to be effective (table). Precisely what needs to be done and in what order will depend very much on national context. Moreover, the many knowledge gaps that exist make it difficult to identify the best approach, even in high-income countries. Filling these gaps and identifying models of health and long-term care that can be scaled up in different settings will be crucial.

A key opportunity for mapping of realistic priorities lies with the development of a Global Strategy and Action Plan on Healthy Ageing currently being undertaken by WHO Member States. The issues identified in this Health Policy paper and the main report will serve as a starting point for these discussions. Although the actions identified will inevitably need

resourcing, they are likely to be a sound investment in society's future—a future that gives older people the freedom to live lives that previous generations might never have imagined.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The views expressed in this paper are those of the authors and do not necessarily reflect the views of WHO. We acknowledge the significant contributions of the many other people who participated in the production of the *World report on ageing and health* (appendix). We are particularly grateful for the editorial guidance provided by Flavia Bustreo, Anne Marie Worning, Anarfi Asamoah-Baah, and Andrew Cassels; the contributions of the other members of the core writing group Lisa Warth, Norah Keating, Aki Kuroda, and Alison Harvey; the authors of the 19 background papers; and the large number of people who gave direct administrative or technical inputs. SAGE is supported by WHO and the US National Institute on Ageing through interagency agreements with WHO (OGHA 04034785, YA1323–08-CN-0020, Y1-AG-1005–01) and through research grants (R01-AG034479, R21-AG034263). GMEEP was funded by the Australian National Health and Medical Research Council centre for research excellence grant (APP1000986)

References

1. UNDESA. World economic and social survey 2007: development in an ageing world. UN Department of Economic and Social Affairs; New York, NY: 2007.
2. Bloom DE. 7 billion and counting. *Science*. 2011; 333:562–69. [PubMed: 21798935]
3. Christensen K, Doblhammer G, Rau R, Vaupel JW. Ageing populations: the challenges ahead. *Lancet*. 2009; 374:1196–208. [PubMed: 19801098]
4. Olshansky SJ, Antonucci T, Berkman L, et al. Differences in life expectancy due to race and educational differences are widening, and many may not catch up. *Health Aff (Millwood)*. 2012; 31:1803–13. [PubMed: 22869659]
5. Beard JR, Bloom DE. Towards a comprehensive public health response to population ageing. *Lancet*. 2015; 385:658–61. [PubMed: 25468151]
6. Age Wave, SunAmerica. Age Wave/SunAmerica Retirement Reset Study. Age Wave, SunAmerica; Los Angeles, CA: 2011.
7. Crimmins EM, Beltrán-Sánchez H. Mortality and morbidity trends: is there compression of morbidity? *J Gerontol B Psychol Sci Soc Sci*. 2011; 66:75–86. [PubMed: 21135070]
8. Manton KG, Gu X, Lamb VL. Change in chronic disability from 1982 to 2004/2005 as measured by long-term changes in function and health in the U.S. elderly population. *Proc Natl Acad Sci USA*. 2006; 103:18374–79. [PubMed: 17101963]
9. Seeman TE, Merkin SS, Crimmins EM, Karlamangla AS. Disability trends among older Americans: National Health And Nutrition Examination Surveys, 1988–1994 and 1999–2004. *Am J Public Health*. 2010; 100:100–07. [PubMed: 19910350]
10. Liao Y, McGee DL, Cao G, Cooper RS. Recent changes in the health status of the older U.S. population: findings from the 1984 and 1994 supplement on aging. *J Am Geriatr Soc*. 2001; 49:443–49. [PubMed: 11347789]
11. Hung WW, Ross JS, Boockvar KS, Siu AL. Recent trends in chronic disease, impairment and disability among older adults in the United States. *BMC Geriatr*. 2011; 11:47. [PubMed: 21851629]
12. Lin S-F, Beck AN, Finch BK, Hummer RA, Masters RK. Trends in US older adult disability: exploring age, period, and cohort effects. *Am J Public Health*. 2012; 102:2157–63. [PubMed: 22994192]
13. Stewart ST, Cutler DM, Rosen AB. US trends in quality-adjusted life expectancy from 1987 to 2008: combining national surveys to more broadly track the health of the nation. *Am J Public Health*. 2013; 103:e78–87. [PubMed: 24028235]

14. Jagger C, Gillies C, Moscone F, et al. the EHLEIS team. Inequalities in healthy life years in the 25 countries of the European Union in 2005: a cross-national meta-regression analysis. *Lancet*. 2008; 372:2124–31. [PubMed: 19010526]
15. LaFortune, G.; Balestat, G. Trends in severe disability among elderly people: assessing the evidence in 12 OECD countries and the future implications. OECD Publishing; Paris: 2007.
16. Wu, Y-T.; Fratiglioni, L.; Matthews, FE., et al. Dementia in western Europe: epidemiological evidence and implications for policy making.. *Lancet Neurol*. 2015. published online Aug 21. [http://dx.doi.org/10.1016/S1474-4422\(15\)00092-7](http://dx.doi.org/10.1016/S1474-4422(15)00092-7)
17. Cheng ER, Kindig DA. Disparities in premature mortality between high- and low-income US counties. *Prev Chronic Dis*. 2012; 9:E75. [PubMed: 22440549]
18. Chatterji S, Byles J, Cutler D, Seeman T, Verdes E. Health, functioning, and disability in older adults—present status and future implications. *Lancet*. 2015; 385:563–75. [PubMed: 25468158]
19. Lloyd-Sherlock P, McKee M, Ebrahim S, et al. Population ageing and health. *Lancet*. 2012; 379:1295–96. [PubMed: 22480756]
20. Beard, J.; Officer, A.; Cassels, A. World report on ageing and health. World Health Organization; Geneva: 2015. <http://www.who.int/ageing/publications/world-report-2015/en/> [Oct 19, 2015]
21. WHO. [July 24, 2015] Global health estimates: deaths, DALYs, YLL and YLD, by cause, age, sex and regional grouping, 2000–2012. 2013. http://www.who.int/healthinfo/global_burden_disease/en
22. WHO. [July 24, 2015] Global health estimates: life expectancy trends by country. 2013. http://www.who.int/healthinfo/global_burden_disease/en
23. Kowal P, Chatterji S, Naidoo N, et al. the SAGE Collaborators. Data resource profile: the World Health Organization Study on global AGEing and adult health (SAGE). *Int J Epidemiol*. 2012; 41:1639–49. [PubMed: 23283715]
24. WHO. [Oct 1, 2015] World health survey (2002–2004). 2004. <http://www.who.int/healthinfo/survey/en/>
25. Lee C, Dobson AJ, Brown WJ, et al. Cohort profile: the Australian Longitudinal Study on Women's Health. *Int J Epidemiol*. 2005; 34:987–91. [PubMed: 15894591]
26. SHARE. [Oct 1, 2015] Survey of Health, Ageing, and Retirement in Europe. 2013. <http://www.share-project.org/>
27. HRS. [Oct 19, 2015] Health and Retirement Study. 2010. <http://hrsonline.isr.umich.edu/>
28. ELSA. [Oct 19, 2015] English Longitudinal Study of Ageing. 2013. <http://www.elsa-project.ac.uk/>
29. Omran AR. The epidemiologic transition: a theory of the epidemiology of population change. 1971. *Milbank Q*. 2005; 83:731–57. [PubMed: 16279965]
30. Leon DA. Trends in European life expectancy: a salutary view. *Int J Epidemiol*. 2011; 40:271–77. [PubMed: 21415000]
31. Low G, Molzahn AE, Schopflocher D. Attitudes to aging mediate the relationship between older peoples' subjective health and quality of life in 20 countries. *Health Qual Life Outcomes*. 2013; 11:146. [PubMed: 23984754]
32. Marengoni A, Angleman S, Melis R, et al. Aging with multimorbidity: a systematic review of the literature. *Ageing Res Rev*. 2011; 10:430–39. [PubMed: 21402176]
33. Arokiasamy P, Uttamacharya U, Jain K, et al. The impact of multimorbidity on adult physical and mental health in low- and middle-income countries: what does the study on global ageing and adult health (SAGE) reveal? *BMC Med*. 2015; 13:178. [PubMed: 26239481]
34. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012; 380:37–43. [PubMed: 22579043]
35. Hearps AC, Martin GE, Rajasuriar R, Crowe SM. Inflammatory co-morbidities in HIV+ individuals: learning lessons from healthy ageing. *Curr HIV/AIDS Rep*. 2014; 11:20–34. [PubMed: 24414166]
36. Inouye SK, Studenski S, Tinetti ME, Kuchel GA. Geriatric syndromes: clinical, research, and policy implications of a core geriatric concept. *J Am Geriatr Soc*. 2007; 55:780–91. [PubMed: 17493201]

37. Fried LP, Tangen CM, Walston J, et al. the Cardiovascular Health Study Collaborative Research Group. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001; 56:M146–56. [PubMed: 11253156]
38. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *Lancet*. 2013; 381:752–62. [PubMed: 23395245]
39. Santos-Eggimann B, Cuénoud P, Spagnoli J, Junod J. Prevalence of frailty in middle-aged and older community-dwelling Europeans living in 10 countries. *J Gerontol A Biol Sci Med Sci*. 2009; 64:675–81. [PubMed: 19276189]
40. Harttgen K, Kowal P, Strulik H, Chatterji S, Vollmer S. Patterns of frailty in older adults: comparing results from higher and lower income countries using the Survey of Health, Ageing and Retirement in Europe (SHARE) and the Study on Global AGEing and Adult Health (SAGE). *PLoS One*. 2013; 8:e75847. [PubMed: 24204581]
41. Lordos EF, Herrmann FR, Robine JM, et al. Comparative value of medical diagnosis versus physical functioning in predicting the 6-year survival of 1951 hospitalized old patients. *Rejuvenation Res*. 2008; 11:829–36. [PubMed: 18729815]
42. WHO. [Oct 19, 2015] WHO Study on global AGEing and adult health (SAGE). <http://www.who.int/healthinfo/sage/en/>
43. CSDH. Final report of the Commission on Social Determinants of Health. World Health Organization; Geneva: 2008. Closing the gap in a generation: health equity through action on social determinants of health..
44. Cesari M, Vellas B, Hsu FC, et al. the LIFE Study Group. A physical activity intervention to treat the frailty syndrome in older persons-results from the LIFE-P study. *J Gerontol A Biol Sci Med Sci*. 2015; 70:216–22. [PubMed: 25387728]
45. Rowe JW, Kahn RL. Successful aging. *Gerontologist*. 1997; 37:433–40. [PubMed: 9279031]
46. Gasper D. What is the capability approach? Its core, rationale, partners and dangers. *J Socio-Economics*. 2007; 36:335–59.
47. Ham C. The ten characteristics of the high-performing chronic care system. *Health Econ Policy Law*. 2010; 5:71–90. [PubMed: 19732475]
48. Low LF, Yap M, Brodaty H. A systematic review of different models of home and community care services for older persons. *BMC Health Serv Res*. 2011; 11:93. [PubMed: 21549010]
49. Eklund K, Wilhelmson K. Outcomes of coordinated and integrated interventions targeting frail elderly people: a systematic review of randomised controlled trials. *Health Soc Care Community*. 2009; 17:447–58. [PubMed: 19245421]
50. Sourdet S, Lafont C, Rolland Y, Nourhashemi F, Andrieu S, Vellas B. Preventable iatrogenic disability in elderly patients during hospitalization. *J Am Med Dir Assoc*. 2015; 16:674–81. [PubMed: 25922117]
51. WHO. [Oct 1, 2015] Age-friendly world. 2015. <https://extranet.who.int/agefriendlyworld/>

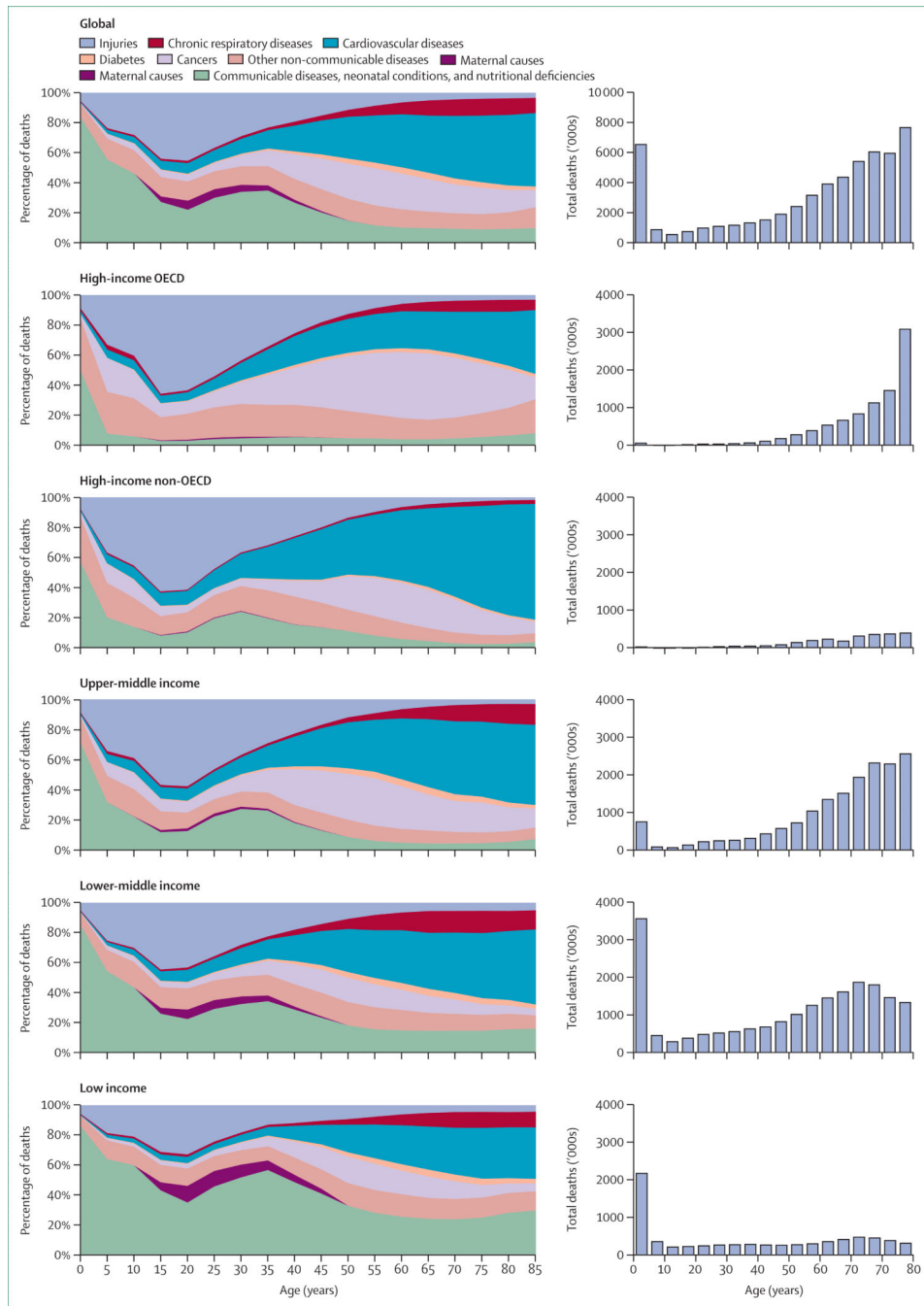


Figure 1. Mortality at different ages for countries of low, middle, and high income, 2012
 OECD=Organisation for Economic Co-operation and development.

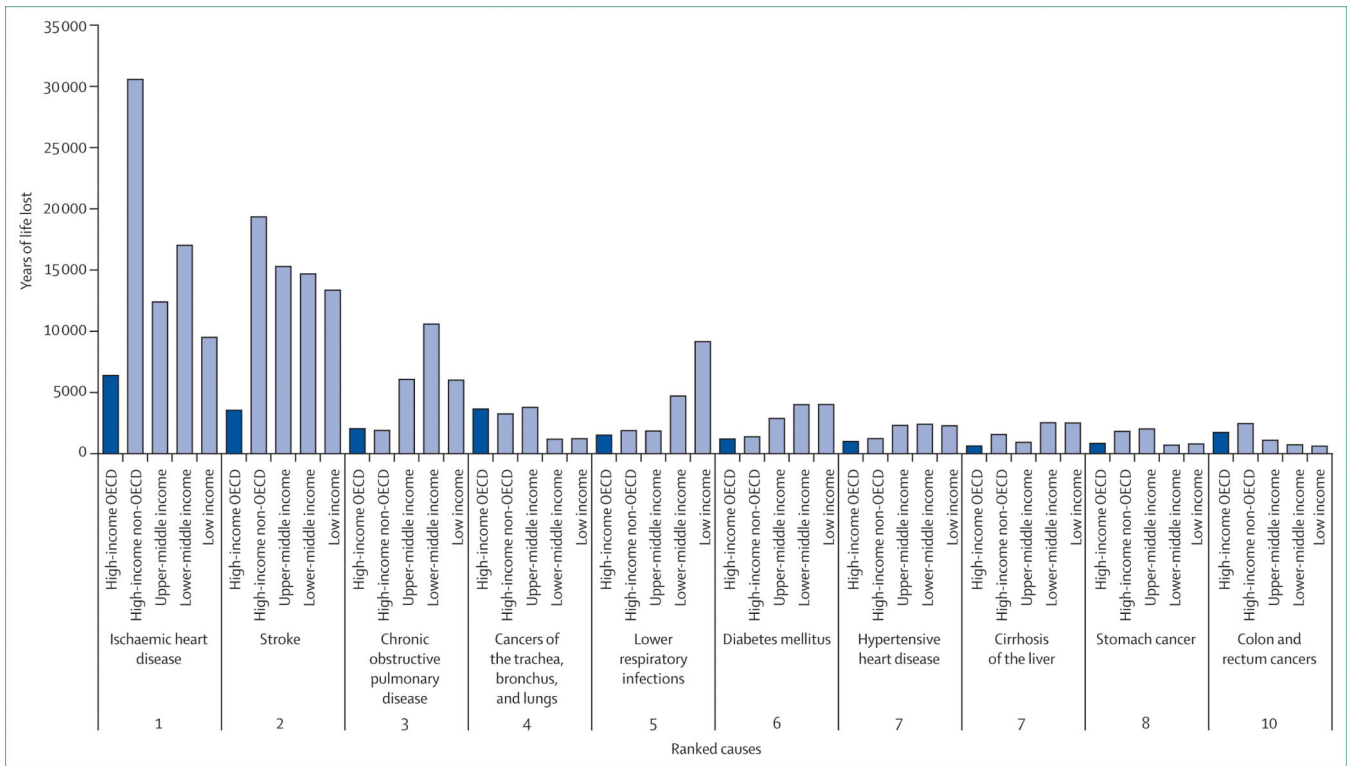


Figure 2.
 Years of life lost per 100 000 population, 2012
 Top ten causes in people aged 60 years or older from WHO Global Health Estimates.²¹
 OECD=Organisation for Economic Co-operation and development.

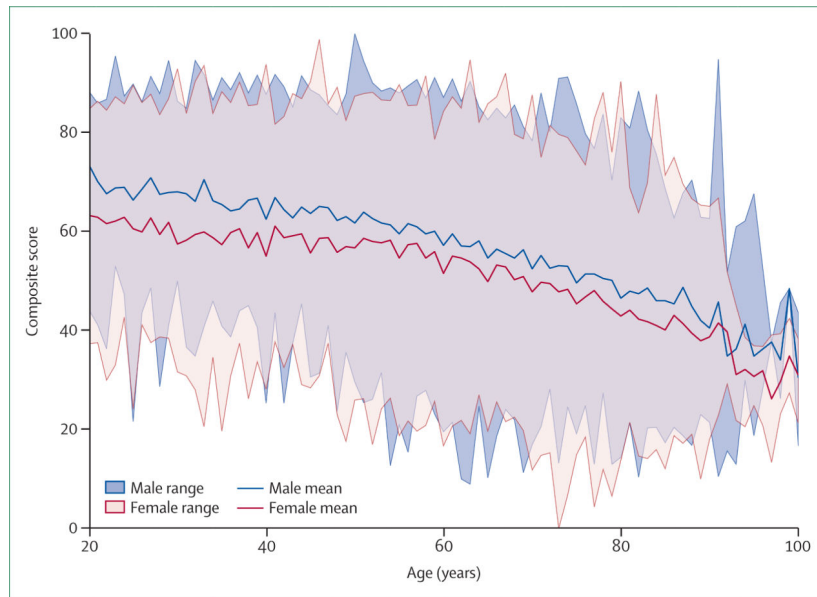


Figure 3. Range and mean intrinsic capacity of men and women in countries in the Study on global AGEing and adult health 2007–2010 (wave 1)⁴²

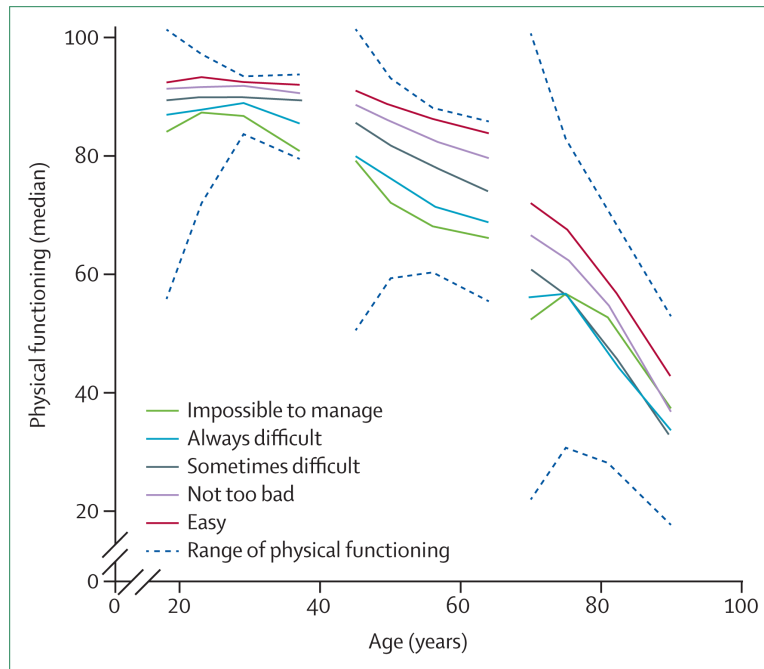


Figure 4. Physical functioning across the life course, stratified by ability to manage on current income. Dashed lines show range between the median of top and bottom quintiles of physical functioning.

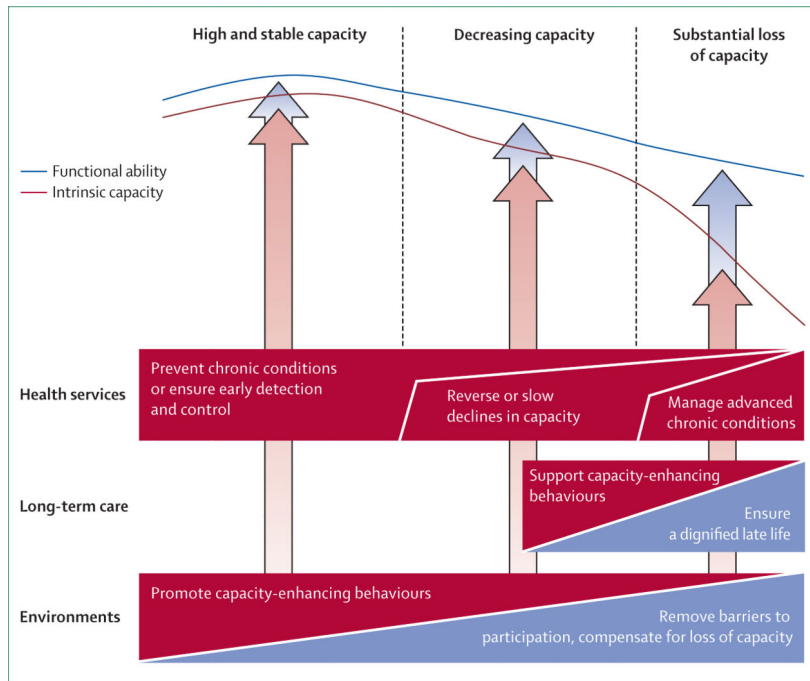


Figure 5.
A public health framework for healthy ageing

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table

Key areas for action on healthy ageing

Action	
Aligning health systems to the needs of the older populations they now serve	
Ensure access to older-person-centred and integrated care	<ul style="list-style-type: none"> Provide services that are close to where older people live Ensure comprehensive assessments and service-wide care planning Build structures that foster multidisciplinary teams Support self-management Ensure access and affordability of medical products, vaccines, and technologies
Orient systems around intrinsic capacity	<ul style="list-style-type: none"> Develop information systems that collect, analyse, and report data for intrinsic capacity Establish performance monitoring, rewards, and financing mechanisms that encourage care that optimises capacity Provide clinical guidelines on trajectories of intrinsic capacity
Ensure a sustainable and appropriately trained health workforce	<ul style="list-style-type: none"> Provide training on ageing and age-related conditions for all health professionals Ensure core geriatric and gerontological competencies in all health curricula Match supply of geriatricians to population need and develop geriatric units for management of complex cases Consider new workforce cadres and extend roles of existing staff to act as care coordinators and self-management counsellors
Develop systems to provide long-term care	
Establish the foundations for a system of long-term care	<ul style="list-style-type: none"> Recognise long-term care as an important public good Assign clear responsibility for the development of a system of long-term care Create equitable and sustainable mechanisms to finance care Define roles of government and develop services that will be necessary to fulfil them
Ensure a sustainable and appropriately trained workforce for long-term care	<ul style="list-style-type: none"> Improve salaries and working conditions and create career pathways Legislate flexible working arrangements or leaves of absence for family caregivers Support caregivers through respite care and accessible training or information resources Raise awareness of the value and rewards of caregiving Support community initiatives that bring older people together to act as a resource for caregiving and development
Ensure the quality of long-term care	<ul style="list-style-type: none"> Provide care protocols or guidelines to address key issues Establish accreditation mechanisms for services and professional caregivers Establish mechanisms for care coordination (including between long-term care and health-care services) Establish quality-management systems focused on functional ability
Ensure everyone can grow old in an age-friendly environment	
Combat ageism	<ul style="list-style-type: none"> Campaign to increase understanding of the ageing process Legislate against age-based discrimination Ensure a balanced view of ageing in the media
Enable autonomy	<ul style="list-style-type: none"> Legislate to protect the rights of older people, support older people in becoming aware of and enjoying their rights, and create mechanisms that can be used to address breaches of their rights Provide services that facilitate functioning Provide mechanisms for advance care planning and supported decision making Create accessible opportunities for lifelong learning and growth
Support healthy ageing in all policies at all levels of government	<ul style="list-style-type: none"> Enable older people to age in a place that is right for them through increasing housing options and assistance with home modifications Introduce measures to protect older people from poverty Provide opportunities for social participation and for having meaningful social roles Remove barriers, set accessibility standards, and ensure compliance in buildings, in transport, and in information technology Ensure town-planning and land-use decisions consider their effect on older people's safety and mobility Promote age diversity and inclusion in working environments
Improve measurement, monitoring, and understanding	
Agree on metrics, measures, and analytical approaches for healthy ageing	<ul style="list-style-type: none"> Reach consensus on metrics, measurement strategies, instruments, tests, and biomarkers for key concepts related to healthy ageing Reach consensus on approaches for assessing and interpreting trajectories of these metrics and measures during the life course Develop and apply approaches for testing clinical and population-based interventions that take account of the different physiology of older people and multimorbidity
Improve understanding of the health status and needs of older populations	<ul style="list-style-type: none"> Include older people in existing populations surveys and disaggregate by age and sex and important social characteristics Establish regular population surveys of older people

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Action	
<p>Increase understanding of healthy ageing trajectories and what can be done to improve them</p>	<p>Map trends in intrinsic capacity and functional ability Identify indicators and mechanisms for the continuous surveillance of healthy ageing trajectories</p> <p>Identify the range and types of trajectories of intrinsic capacity and functional ability, and their determinants in different populations</p> <p>Assess the effect of health care, long-term care, and environmental interventions on trajectories of healthy ageing</p> <p>Better quantify the economic contribution of older people and the costs of providing the services they need and have the right to enjoy</p>