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Climate Change and Population Ageing in the Asia-Pacific Region: Status, Challenges and Opportunities

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Acronyms and abbreviations

ADB	Asian Development Bank
AFCC	age-friendly cities and communities
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CAN	Climate Action Network
CO_2	carbon dioxide
DRR	disaster risk reduction
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
FAO	United Nations Food and Agriculture Organization
GDP	gross domestic product
GHG	greenhouse gas emissions
IDMC	Internal Displacement Monitoring Centre
IFRC	International Federation for Red Cross
IPCC	Intergovernmental Panel on Climate Change
MIPAA	Madrid International Plan of Action on Ageing
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns in size
SDG	United Nations Sustainable Development Goal
WHO	World Health Organization
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNECE	United Economic Commission for Europe
UNFPA	United Nations Population Fund
UNGA	United Nations General Assembly
UNHCR	United Nations High Commissioner for Refugees

Abstract

The population of the Asia-Pacific region is rapidly ageing. The number of people aged 60 years or over is projected to increase from 13.6 per cent in 2020 to 24.9 per cent in 2050. This shift in age structure is occurring while human-induced climate change is increasing the frequency and intensity of extreme weather events such as heatwaves, tropical cyclones, storms and droughts. In this context the region has experienced significant climate-related natural disasters and its population is highly vulnerable to future disasters.

The 2002 Madrid International Plan of Action on Ageing (MIPAA) is a global framework for policy action on ageing to build a society for all ages. MIPAA complements the 2030 Agenda for Sustainable Development, since older persons are most at risk from being left behind. In 2022, the Asia-Pacific Intergovernmental Meeting on the Fourth Review and Appraisal of the Madrid International Plan of Action on Ageing will take place; it will provide an opportunity for ESCAP member States and other stakeholders to consider key issues associated with growing old amidst a changing climate.

This paper assesses the latest evidence on climate change and population ageing in the Asia-Pacific region. It outlines implications climate change will have on meeting the objectives of MIPAA and the 2030 Agenda. The paper calls for a coherent policy approach that is inclusive and forward-looking. One that protects older persons from climate impacts, reduces their contribution to greenhouse gas emissions and harnesses their potential in climate action. It outlines several recommendations to support Asia-Pacific countries in considering the intersection between climate change and population ageing in the above-mentioned Regional Review. Importantly, it recognizes that older persons must have a voice in climate action.

1. Introduction

An ageing society, together with a changing climate, has implications for meeting the objectives of the 2030 Agenda for Sustainable Development and the Madrid International Plan of Action on Ageing (MIPAA).[1, 2] This climate-ageing intersection poses both challenges and opportunities for the Asia-Pacific region that will require forward-looking policies to protect older persons and ensure inclusive and active ageing.

The number of people aged 60 years or over in the Asia-Pacific region is projected to increase from 13.6 per cent in 2020 to 24.9 per cent in 2050.[3] By mid-century, one in four people in the region will be aged 60 or over, while individuals aged 80 years or over will represent a fifth of all older persons. This shift in the age structure of the population is occurring when human induced climate change is increasing the frequency and intensity of extreme weather events such as heatwaves, tropical cyclones, storms and droughts.[4, 5] Asia and the Pacific has experienced significant climate-related disasters. Its dependence on natural resources and agricultural sectors, densely populated coastal areas, weak institutions, lack of social protection and high poverty levels among its population make the region highly vulnerable to climate change related risks.[6, 7]

Climate change is having and will continue to have direct and indirect effects on health and well-being. According to WHO, climate change is the single biggest health threat facing humanity.[8] It affects the social and environmental determinants of health, such as clean air, safe

Madrid International Plan for Action on Ageing

The 2002 Madrid International Plan for Action on Ageing (MIPAA) set out a global action plan to "build societies for all ages." MIPAA aims to address the needs of older persons and strengthen their participation in economies and societies. It focuses on three priority areas: older persons and development; advancing health and well-being into old age; and ensuring enabling and supportive environments.

2030 Agenda for Sustainable Development

The 2030 Agenda for Sustainable Development outlines 17 interlinked global Sustainable Development Goals (SDGs) designed to be a blueprint to achieve a better and more sustainable future for all. It complements MIPPA in its aims to ensure that older persons are not left behind. Several countries in the Asia-Pacific region have already designed policies on population ageing. However, existing policies differ in terms of scope, effectiveness and level of implementation.

[1] UN (2020). 'Policy Brief: The Impact of COVID-19 on Older Persons,' United Nations. Available from: https://unsdg.un.org/sites/default/files/2020-05/Policy-Brief-The-Impact-of-COVID-19-on-Older-Persons.pdf.

[2] ESCAP (2017). 'Addressing the challenges of population ageing in the Asian and Pacific', UN Economic Social Commission for the Asia and Pacific, Bangkok, Thailand. Available from: https://www.unescap.org/publications/addressing-challenges-population-ageing-asia-and-pacific-implementation-madrid.

[3] ESCAP (2021a). Available from: https://www.population-trends-asiapacific.org/data/escap.

[4] IPCC (2021a). 'Regional Fact Sheet Asia. Sixth Assessment Report: Working Group I – The Physical Science Basis,' Intergovernmental Panel on Climate Change, Bonn, Germany. Available from: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Asia.pdf.

[5] ESCAP (2021b). Asia-Pacific Disaster Risk Report 2021, available from: https://www.unescap.org/kp/2021/asia-pacific-disaster-report-2021.

[6] ADB (2012). Climate change in Asia and the Pacific. Available from: https://www.adb.org/sites/default/files/publication/159335/adbi-climate-change-asia-and-pacific-how-can-countries-adapt-highlights.pdf

[7] IFRC (2020). 'Come Heat or High Water: World Disaster Report 2020,' International Federation of Red Cross and Red Crescent Societies, Geneva, Switzerland. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/20201116_WorldDisasters_Full_compressed.pdf

[8] For more information, see: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

drinking water, sufficient food and secure shelter. Older persons are at greater risk of climate-related impacts because of exposure and social, economic and health-related vulnerability. Ageism and age discrimination, social isolation, neglect, lack of social protection, gender bias, poverty, migration status and disability are among the many factors that interact with climate change and increase the vulnerability of older persons, in particular women.[9],

1.1. An ageing population

Almost all countries in the Asia-Pacific region are experiencing ageing populations due to rapid declines in fertility and mortality, coupled with increased longevity. However, the time and pace of this demographic transition varies across countries, with some imminently facing a decline in the working-age population. For example, in several countries in East and North-East Asia (China, Japan, Republic of Korea), South-East Asia (Thailand) North and Central Asia (Armenia, Georgia) populations are projected to decline in the not so distant future.

About 651 million people (2021) aged 60 years or older live in the Asia-Pacific region, representing 14 per cent of the total population. By 2050, people aged 60 years or over will represent a quarter of the total population, followed in smaller proportion by people aged 65 or older (18 per cent) and those 80 or older (5 per cent).

Older women outnumber older men because of their higher life expectancy, with 53 per cent of the older population (2021) comprising women.[10] Women represent an even greater majority, 61 per cent, of the "oldest old" population (80 years or older).[11] The countries which had the largest populations of older persons aged 60 or older in 2020 were China (250 million), India (140 million), Japan (43 million), the Russian Federation (33 million), Indonesia (28 million), Pakistan (15 million), Thailand (13 million), Bangladesh (13 million) and the Republic of Korea (12 million).

Older women and men contribute to economies and societies through paid work and unpaid care work. Yet, older persons are at higher risk of becoming poor and often lack access to adequate resources, services and opportunities for participation. With women's life expectancy higher than that of men, they often spend more time living in poverty. They are also more likely to lose their partner, and less likely to remarry. Lower education levels and the need to combine work with childcare means that women are more likely to work in the informal sector and are often paid less than men. Older women, especially widows and those without children, are vulnerable, both economically and socially.[12] All these factors contribute to the vulnerability and resilience of older persons, in particular older women, when it comes to assessing the impacts of climate change.

1.2. A changing climate

Over the next two decades, global temperatures are expected to reach or exceed 1.5°C of heating. This will increase the frequency and intensity of extreme weather events, such as heatwaves and flooding.[13] Human-induced climate change is already affecting weather and climate extremes in the Asia-Pacific

[9] UNGA (2021). 'Analytical study on the promotion and protection of the rights of older people in the context of climate change,' Report of the Office of the United Nations Higher Commissioner for Human Rights. Human Rights Council, Forty-seventh session, 21 June – 9 July 21, New York, USA. A/HRC/47/46. Available from: https://undocs.org/A/HRC/47/46

[10] Ibid., ESCAP (2021a).

[11] UNFPA and HelpAge International (2012). 'Ageing in the Twenty-First Century'. Available from: https://www.unfpa.org/publications/ageing-twenty-first-century

[12] Ibid., UNFPA and HelpAge International (2012).

[13] Ibid., IPCC (2021a).

region.[14] However, compiling information on the demographic characteristics of individuals affected is scarce, which is a challenge when determining the impact of such events on older persons (see table 2).

Climate variability is increasing the frequency, intensity and duration of extreme weather events, such as heavy rain and flooding, drought, hot and cold temperature extremes, storms and wildfires. It may also exacerbate other biological (for example, COVID-19) and natural hazards (for example, earthquakes and tsunamis), and impede progress made in poverty reduction and achieving the SDGs. As discussed below, older persons are disproportionately affected by natural hazards. For example, the Great East Japan Earthquake and Tsunami in 2011 claimed 15,853 lives, of which more than half were people aged 65 years or over.[15] Countries with the highest proportion of older persons living with multi-hazard risks are in East and North-East Asia (for example, China, Japan and the Republic of Korea) and South and South-West Asia (for example the Philippines and Lao People's Democratic Republic).[16]

1.3. Intersection between older persons and climate change

Growing old in the future will bring with it the unique challenge of changing weather and climate that will affect all aspects of life in Asia-Pacific countries.

In old age, individuals experience challenges related to health care, mobility, access to essential services, vulnerability to disease and capacity to deal with natural disasters.[17, 18] While some older persons can cope with the effects associated with extreme weather and other risks, others cannot. For example, they are more susceptible to disease and the impact climate change might have on food supply, water and sanitation, health and social care, housing and transport services.

Vulnerability is further compounded by associated factors, such as gender, ethnicity and disability.[19] Older persons with disabilities are at particular risk of the effects of climate change.[20] Persons with disabilities often face barriers to accessing information and resources, which limit their knowledge and capacity to adapt to climate change.[21] Because of their reduced mobility, disabled older persons are also less able to mobilize themselves in an extreme weather event.[22] For example, about 20 per cent of people most vulnerable to climate change are persons with disabilities, yet they are rarely included in climate action.[23]

While older persons are often seen as casualties of climate change, they, as all other population groups, also contribute to the problem because of the greenhouse gas (GHG) emissions from their consumption patterns. However, little is known about the generational differences in consumption patterns, contributing, for example, to different levels and trends in GHG emissions by age cohort.

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[14] UNESCAP (2019). 'The Disaster Riskscape across Asia-Pacific: Pathways for Inclusion and Empowerment,' UN Economic Social Commission for the Asia and Pacific, Bangkok, Thailand. Available from: https://repository.unescap.org/handle/20.500.12870/1578

[15] Ibid., ESCAP (2017).

[16] Ibid., ESCAP (2021b).

[17] WHO (2015). 'World Report on Ageing and Health,' World Health Organization, Geneva. Available from: https://apps.who.int/iris/handle/10665/186463

[18] UNDP (2017). 'Ageing, Older Persons and the 2030 Agenda for Sustainable Development'. Available from: https://www.undp.org/publications/ageing-older-persons-and-2030-agenda-sustainable-development#modal-publication-download

[19] Ibid., UNGA (2021).

[20] CAN (2021). 'Disability inclusion in the UK climate Action,' Bond Disability and Development Group and Climate Action Network. Available from: https://www.cbmuk.org.uk/wp-content/uploads/2021/10/DDG-Climate-Brief-Formatted-141021-final.pdf

[21] Ibid., CAN (2021).

[22] Schwela, D. (2019). "Climate, Vulnerability, and Older People" in D. Gu, M. E. Dupre (eds.), *Encyclopedia of Gerontology and Population Aging*. Available from: https://doi.org/10.1007/978-3-319-69892-2_466-1

[23] bid., CAN (2021).

Given the challenges of an ageing population and climate change in the region, there is a need for more research and integrated policy approaches. Such approaches need to address three key areas: (1) reduce the contribution of older persons to climate change (mitigation); (2) protect older persons from the impacts of climate change (adaptation/resilience); and (3) harness the potential of older persons in climate action.

2. Contribution of an ageing population to climate change

2.1. Population ageing and consumption

In 2020, the Asia-Pacific region had higher emissions (16.75 billion metric tons of carbon dioxide (CO_2)) than any other region of the world, with China accounting for 60 per cent of the region's CO_2 emissions, and 31 per cent of all global emissions.[24] Economic growth, urbanization, motorization, demographic changes – such as an ageing population and changes in household size – all affect consumption patterns and CO_2 emissions.[25] For example, in 2000, only 15 per cent of Asia's population was part of the "consuming class", which is defined as a group of people who spend more than $11 per day.[26] The income of the remaining three billion people did not support discretionary (non-essential) spending. However, by 2030, 70 per cent, or about three billion people of Asia's total population, are expected to join the "consuming class"; this means higher carbon-related consumption emissions.[27]

The total amount of GHG emissions which results from the individual consumption of goods and services is their carbon footprint. This covers both an individual's direct emissions (for example, home heating and car use) and indirect emissions arising in the production and supply of goods and services consumed from home and abroad.

An individual's needs and pattern of consumption change over the life course, reflecting wealth, age, health and social needs. During old age, basic needs (such as good health and healthy social relations) become more important than general consumption and are also less energy intensive.[28]

Gray consumption can be defined as the use of goods and services (for example, housing, food, heating and personal travel) by an older person, which meets basic needs and improves quality of life.[29] All such activities require energy and produce GHG emissions.

With an ageing population, household consumer behaviour patterns are likely to change. Consumption patterns are shifting, with the average household size declining. Between 1999 and 2020, average household size declined by 10 per cent in Indonesia; by 15 per cent in India, Japan and the Republic of Korea; and by 30 per cent in China.[30] As the number of extended family households declines, there is an increasing number of people living alone which could increase energy consumption and GHG emissions.[31] An older person's consumption habits can, therefore, contribute to rising GHG emissions

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[24] Statista (2021). Available from: https://www.statista.com/statistics/205966/world-carbon-dioxide-emissions-by-region/

[25] O'Neil, B. C., Liddle, B., Jiang, L., Smith, K. R., Pachauri, S., Dalton, M., Fuchs, R. (2012). 'Demographic change and carbon dioxide emissions,' Lancet, vol. 380, p. 157–164. Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)60958-1/fulltext

26 Buchholz, K. (2021). 'Asia's consumer class is growing. This chart shows how. World Economic Forum, 22 October 2022. Available from: https://www.weforum.org/agenda/2021/10/growth-consumers-asia-indonesia-bangladesh-pakistan-philippines/

[27] McKinsey (2020). 'Beyond income: Redrawing Asia's consumer map,' Mckinsey Global Institute, available at https://www.mckinsey.com/featured-insights/asia-pacific/beyond-income-redrawing-asias-consumer-map

[28] Hassan, K. (2015). 'Our ageing populations could help slow greenhouse emissions,' *The Conversation*, 9 June 2015. Available from: https://theconversation.com/our-ageing-populations-could-help-slow-greenhouse-emissions-41711

[29] Haq, G. (2019b). 'Gray Consumption,' in D. Gu, M. E. Dupre (eds.), *Encyclopedia of Gerontology and Population Aging*. Available from: https://doi.org/10.1007/978-3-319-69892-2_468-1

[30] Ibid., Mckinsey (2021).

[31] Yu, B., Wei, Y., Kei, G., Matsuoka, Y. (2019). 'Future scenarios for energy consumption and carbon emissions due to demographic transitions in Chinese households, *Nat Energy*, vol. 3, p. 109—118. Available from: https://www.nature.com/articles/s41560-017-0053-4

and climate change.[32, 33] Yet the impact an ageing population will have on GHG emissions is still unclear, especially in the developing world.

Older multi-generational or single households will demand different products and services than young families. As an example, the UNECE Regional MIPAA Implementation Strategy states that older persons should be recognized as a significant consumer group with shared and specific needs, interests and preferences (Commitment 2).[34] Therefore, governments, service providers and civil society should consider the views of older persons in the design of products and delivery of services.

Evidence suggests that there are generational differences in resource consumption patterns.[35, 36] Some studies suggest that the increased number of 'young old' demand more energy intensive goods and services compared to those in younger age groups, such as personal car use, home heating, and medical care and treatment.[37, 38, 39] Other studies suggest population ageing reduces CO_2 emissions. A 1.0 per cent increase in the proportion of older persons in the Republic of Korea was found to be associated with a 0.4 per cent decrease in CO_2 emissions. In contrast, for the younger population there were increases in CO_2 emissions.[40]

While the impact of population ageing on CO_2emissions remains inconclusive, there is increasing concern about climate change among older persons. The UNDP People's Climate Vote survey of public opinion covering 50 countries found that more than half of participants 60 years or older said that climate change was an emergency in 26 out of the 37 countries with representative data available for this group.

An Ipsos survey found increasing levels of eco-responsibility in some Asian countries, including China and India. A total of 80 per cent of survey respondents stated they had changed their purchases of goods and services because of their climate change concerns.[41] This has also been underlined during the COVID-19 pandemic where spending habits have changed (less discretionary spending, use of savings and a re-focus on health support – precautionary saving).

2.2. Reducing the contribution of an ageing population to climate change

Given the growing number of older persons, there is a need to focus on sustainable healthy ageing. In 2019, urban dwellers (relative to those in rural areas) became a majority in Asia and the Pacific.[42] Many

[32] Estiri, H. and Zagheni, E. (2019). 'Age matters: ageing and household energy demand in the United States, Energy Res Soc Sci, vol. 55, p. 62—17. Available from: https://doi.org/10.1016/j.erss.2019.05.006

[33] Menz, T. and Welsch, H. (2012). 'Population ageing and carbon emissions in the OECD countries: accounting for life-cycle and cohort effects,' Energy Econ, vol. 34, No. 3, p. 842—849. Available from: https://doi.org/10.1016/j.eneco.2011.07.016

[34] Economic Commission for Europe (2002). Regional Implementation Strategy for the Madrid International Plan of Action on Ageing, 2002. Available from: https://unece.org/DAM/pau/RIS.pdf

[35] Kluge, F., Zagheni, E., Loichinger, E. and Vogt, T. (2014). 'The advantages of demographic change after the wave: fewer and older, but healthier, greener, and more productive?' *PLoS ONE*, vol. 9, No. e108501

[36] Zagheni, E. (2011). 'The leverage of demographic dynamics on carbon dioxide emissions: does age structure matter?' *Demography*, vol. 48, p. 371–399.

[37] Haq, G. (2017). 'Growing old in a changing climate,' *Public Policy & Aging Report*, vol. 27, No. 1, p. 8–12.

[38] Long, Y. et al. (2019). 'Unequal age-based household emission and its monthly variation embodied in energy consumption—a cases study of Tokyo, Japan,' *Appl. Energy*, vol. 247, p. 350–362.

[39] Nansai, K., Fry, J., Malik, A., Takayanagi, W. & Kondo, N. (2020). 'Resources, Conservation & recycling carbon footprint of Japanese health care services from 2011 to 2015,' *Resour. Conserv. Recycl.* , vol. 152, No. 104525

[40] Kim, J., Lim, H., Jo, H. (2020). 'Do Aging and Low Fertility Reduce Carbon Emissions in Korea? Evidence from IPAT Augmented EKC Analysis,' *Int. J. Environ. Res. Public Health*, vol. 17, No. 8, p. 2972. Available from: 10.3390/ijerph17082972

[41] IPSOS (2021). 'South East Asia Consumers in 2021: Will we see permanent shifts in consumption patterns?'. Available from: https://www.ipsos.com/sites/default/files/ct/publication/documents/2021-02/shifting-consumption-sea.pdf

[42] United Nations (2019). The Future of Asia and Pacific Cities. Available from: https://www.unescap.org/sites/default/d8files/knowledge-products/Future%20of%20AP%20Cities%20Report%202019.pdf

of these urban residents will become older persons; therefore, building age-friendly cities will be important to provide the requisite infrastructure and services. Initiatives such as the WHO Global Network of Age-friendly Cities and Communities should, thus, address climate change.[43] The provision of goods and services should support a low carbon lifestyle and meet the needs of an ageing population. Actions include accessible low-emission transport, energy-efficient quality housing, well-designed climate resilient open spaces, and social inclusion that promotes climate action and ageing in place.

Since climate change will disproportionately affect older persons, in order to engage them on climate issues it is important to get their commitment to take climate action. This will require promoting greener attitudes and behaviours to influence their individual lifestyle choices and to reduce their carbon footprint. Peer-to-peer approaches to engaging older persons could provide more credibility than top-down approaches.[44]

Often, older persons are activists for resource and environmental conservation.[45] See table 2 for the range of older persons' initiatives, including the promotion of low carbon lifestyles in the region. For example, in Bangladesh, Cambodia, Thailand and Viet Nam, older persons have been involved in carbon capture by converting plant waste into soil enhancer (biochar) which would have been released into the atmosphere. Engaging older persons in small-scale, low-cost production biochar production at the community level can help reduce CO_2emissions, and improve soil and productivity.[46, 47]

Key Messages

1 **Asia and the Pacific has higher CO_2 emissions** than any other region of the world.
2 **Ageing populations and changes in household size are affecting consumption patterns** and CO_2 emissions in the region.
3 **The carbon impact of population ageing remains inconclusive**. A large proportion of older persons follow low carbon lifestyles due to low-income levels. Yet there is a rising number of 'young old' that are demanding more energy intensive goods and services.
4 **There is a need to build age-friendly cities** due to the high number of older persons in urban settings. Such cities should provide appropriate age-friendly infrastructure and services to allow for low carbon living.
5 **Climate concern and activism in older persons is rising** and there is opportunity to engage and mobilize this group in climate action.

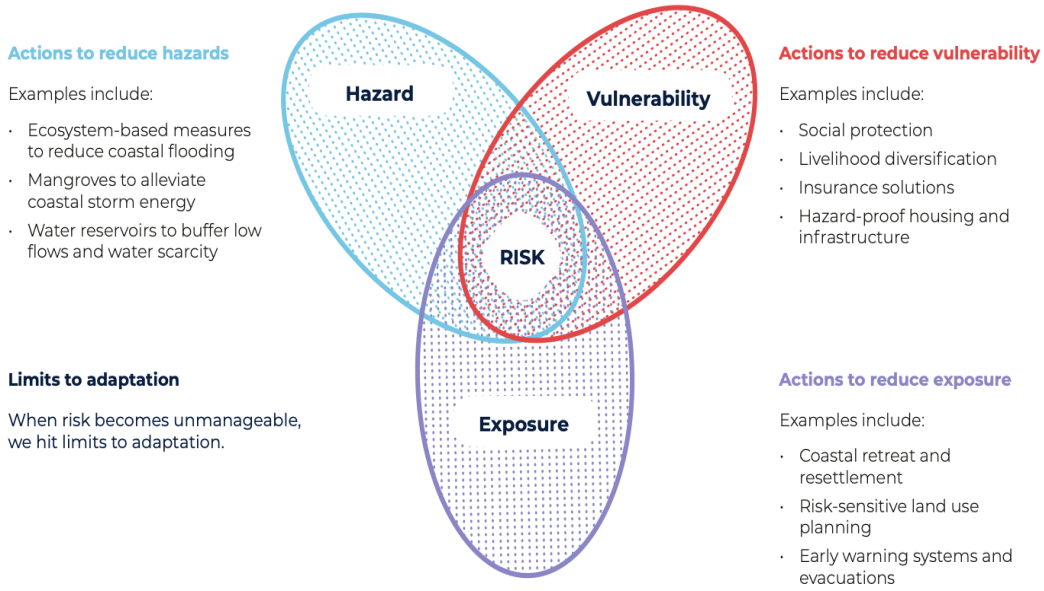
[43] Mavrodaris, A., Mattocks, C., and Brayne, C. E. (2021). 'Healthy ageing for a health planet: do sustainable solutions exist?' *The Lancet*, vol. 2 January 2021. Available from: https://doi.org/10.1016/S2666-7568(20)30067-2
[44] Haq, G., Brown, D., Hards, S. (2010). 'Older People and Climate Change: the Case for Better Engagement,' Stockholm Environment Institute, Sweden. Available from: https://www.sei.org/publications/older-people-climate-change-case-better-engagement/
[45] Wang, Y., Hao, F., and Liu, Y. (2021). 'Pro-Environmental Behavior in an Aging World: Evidence from 31 Countries,' *Int. J. Environ. Res. Public Health*, vol. 18, No. 1748. Available from: https://doi.org/10.3390/ijerph18041748
[46] HelpAge International (2021). 'A rising force for change: older people and climate action,' HelpAge Briefing, October 2021. Available from: https://www.helpage.org/what-we-do/society-for-all-ages/older-people-and-climate-action/
[47] See older persons and biochar video. Available from: https://www.youtube.com/watch?v=lxU-_hAG_wA

3. Protecting older persons from the impacts of climate change

3.1. Climate vulnerability

The Asia-Pacific region has experienced a greater number of climate-related natural disasters compared to other regions in the world and is also more vulnerable to future climate-related natural disasters.[48] The risk climate change poses to the health and well-being of older persons is determined by the interaction of climate-related hazards with the level of exposure and individual vulnerability (see figure 1).

Figure 1: Climate risk



Source: IFRC (2020).[49]

The impact of climate change on the health of an older person depends on pre-exposure health status, psychological well-being and social and economic factors associated with ageing, rather than their age.[50]

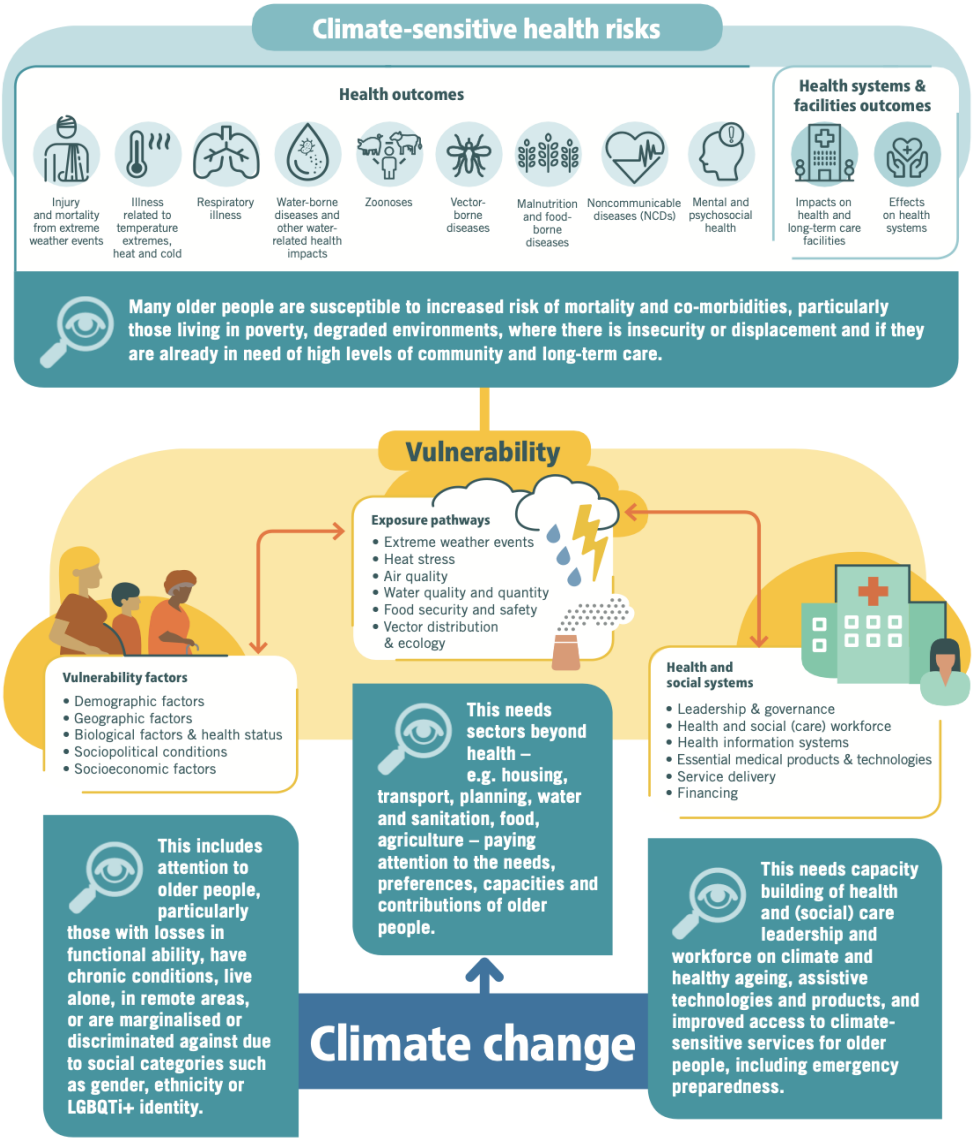
Many older persons lack the physical, cognitive, social and economic resources to avoid or mitigate the effects of exposure to extreme weather events.[51] Heat, extreme temperature and air pollution increase mortality risk in older persons, especially from cardiovascular and respiratory diseases. Floods are linked to higher incidence of post-traumatic stress disorder, depression and anxiety.[52]

[48] Ibid., IFRC (2020).
[49] Ibid., IFRC (2020).
[50] Geller, A. M., Zenick, H. (2005). 'Aging and the environment: a research framework,' *Environ Health Perspect*, vol. 113, No. 9, p. 1257–1262. Available from: https://pubmed.ncbi.nlm.nih.gov/16140638/
[51] McDermott-Levy, R., Kolanowski, A., Fick, D. M., Man, M. E. (2019). 'Addressing the health risks of climate change in older adults,' *Journal of Gerontological Nursing*, vol. 45, No. 11, p. 21–29. Available from: https://doi.org/10.3928/00989134-20191011-04
[52] Leyva, E. R. W., Beaman, A., Davidson, P. M. (2017). 'Health Impact of Climate Change in Older People: An Integrative Review and Implications for Nursing,' *Journal of Nursing Scholarship*, vol. 49, No. 6, p. 670–678. Available from: https://pubmed.ncbi.nlm.nih.gov/29024396/

Vulnerable older persons are, therefore, those individuals who are most likely affected by climate change impacts and who do not have the resilience to be less affected. The most vulnerable groups include the very old, women, older persons with disabilities and those with low incomes and who are easily marginalized or discriminated against, as well as those who have poor social ties and limited opportunities or capacities to exercise autonomy.[53]

The likelihood and magnitude of the hazard, exposure level and coping capacities all interact to determine the extent to which climate impacts will affect an older individual (see figure 2).

Figure 2: Climate vulnerability, health risks and older persons



Source: WHO (2022).[54]

[53] Haq, G., Whitelegg, J. and Kohler, M. (2017). 'Growing old in a changing climate: meeting the challenges of an ageing population and climate change,' Stockholm Environment Institute, Sweden. Available from: https://mediamanager.sei.org/documents/Publications/Climate/climate_change_growing_old.pdf

54 WHO (2022). The UN Decade of Healthy Ageing 2021-2030in a Climate-changing World, Connection Series 3. Available from: https://cdn.who.int/media/docs/default-source/decade-of-healthy-ageing/decade-connection-series-climatechange.pdf?sfvrsn=e926d220_1&download=true

3.1.1. Exposure and sensitivity to climate hazards

Exposure to climate hazards for older individuals can be harmful. The level of harm incurred is linked to the sensitivity and risk of individual exposure to heatwaves, flooding, storms and other hazards. In addition, accumulated exposure over the life course to air pollution, pesticides and other neurotoxins can make older persons more susceptible to health threats by heightening inflammatory responses associated with cardiovascular disease, diabetes, dementia and Parkinson's disease.[55, 56, 57]

Climate hazards can significantly impact older persons in a negative way unless they have the resources to mitigate the effects. The extent an older person will be affected will depend on various factors. These are shown in figure 3 and cover more generic issues regarding disasters, from which climate risk and vulnerability can be derived. Genetic disposition, pre-existing burden of disease or ill health, gender, ethnicity, income, geographic location, social support systems, quality of public health infrastructure and access to relevant local information are some of the factors that should be mentioned in this context.[58]

Ageism also contributes to this vulnerability. The COVID-19 crisis has played a role in entrenching ageism, including age-based discrimination and stigmatization of older persons.[59] Age discrimination – together with gender-based, racial, ethnic, religious, sexual-orientation and disability-related discrimination – creates and intensifies poverty and the marginalization of older persons.

Climate change exacerbates inequalities, especially regarding socially and geographically disadvantaged older adults. Individuals facing discrimination based on age, gender, ethnicity, disability or other factors will be more at risk of being affected by climate change.[60] Since those with these characteristics receive less help to cope with climate impacts, they must fight harder to cope with the impacts and influence decisions about climate mitigation and adaptation.[61]

Women live longer than men, therefore older women often live alone. Physiological differences, physical ability, age and social norms and roles, gender discrimination and inequities in access to resources also increase climate vulnerability.[62] Not only do women experience higher levels of poverty than men, they are more likely to experience chronic diseases and effects of air pollution. They also have higher rates of death and health complications from extreme heat events than men.[63] In contrast, older men are found to be at a greater risk of death during typhoons.[64]

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[55] Ibid, Schwela (2019).

[56] Stein, J. et al. (2008). 'Environmental threats to healthy aging. Greater Boston physicians for social responsibility and science and environmental health network'. Available from: http://www.agehealthy.org/

[57] Cohn, J. MacPhail RC (1996). 'Ethological and experimental approaches to behaviour analysis: implications for eco-toxicology,' *Environ Health Perspect*, vol. 104 (Suppl 2), p. 299–305. Available from: https://pubmed.ncbi.nlm.nih.gov/9182036/

[58] Woodward, A., S. Hales, and P. Weinstein (1998). 'Climate change and human health in the Asia Pacific region: who will be the most vulnerable?' *Climate Research*, vol. 11, p. 31—38.

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[60] Islam, S. N. and Winkel, J. (2017). 'Climate change and social inequality. DESA Working Paper No. 152, ST/ESA/2017/DWP/152,' UN Department of Economic and Social Affairs, New York, USA. Available from: https://www.un.org/en/desa/climate-change-and-social-inequality.

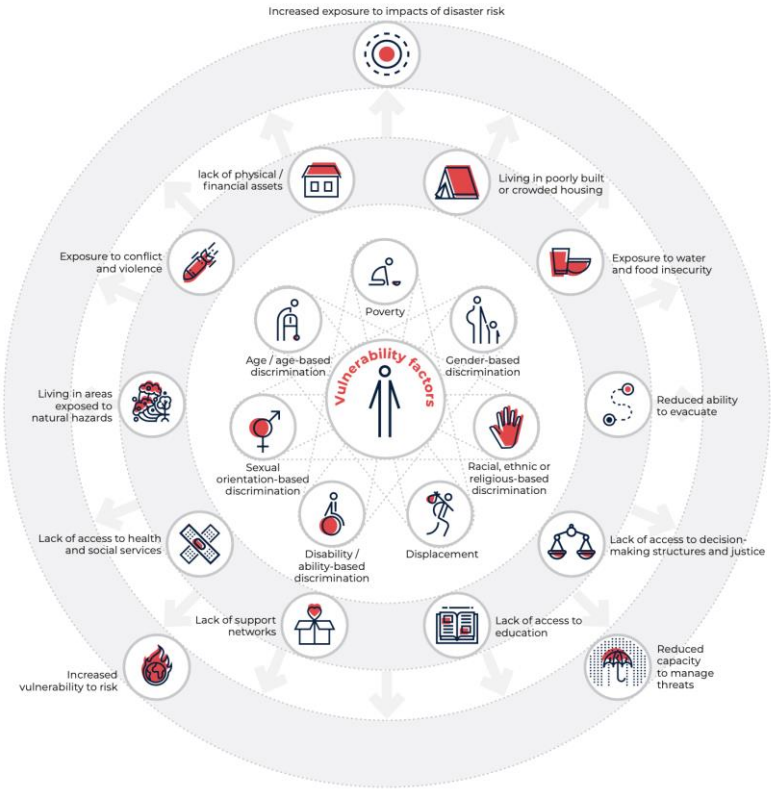
[61] Baird, R. (2008). 'The impact of climate change on minorities and indigenous peoples,' Minority Rights Group International, London, UK. Available from: https://minorityrights.org/wp-content/uploads/old-site-downloads/download-524-The-Impact-of-Climate-Change-on-Minorities-and-Indigenous-Peoples.pdf

[62] CEDAW (2010). 'General recommendation No. 27 on older women and protection of their human rights,' Convention on the Elimination of All Forms of Discrimination against Women, United Nations, New York, USA. Available from: https://www.refworld.org/docid/4ed3528b2.html

[63] Kaltsatou, A., Kenny, G., Flouris, A. D. (2018). 'The Impact of Heat Waves on Mortality among the Elderly: A Mini Systematic Review,'. *J Geriatr Med Gerontol*, vol. 4, No. 053. Available from: doi.org/10.23937/2469- 5858/1510053

[64] Ibid., Levya et al. (2017).

Figure 3: Disaster risk and older persons



Source: IFRC (2020).[65]

Racial, ethnic or other minorities experience disproportionate rates of poverty and discrimination, and enjoy fewer human rights; this situation is compounded by climate change.[66] The worst impact of the 2008 Cyclone Nargis in the Irrawaddy delta of Myanmar was on minority farmers. These farmers were more susceptible to damage due to a lack of effective warning systems and infrastructure, and they thus suffered the most in terms of lost lives, incomes and assets.[67, 68]

3.2. Climate-related threats

Climate-related hazards pose a danger to older persons, placing additional stress on their ability to cope with the many challenges they already face. For example, flooding caused by climate change can cause multiple threats, which include the event itself, disruption and problems of recovery, worry and anxiety of risk of reoccurrence. These threats can cause stress, which, together with pre-existing health conditions, can have a significant impact on health and well-being of the flood victim. Because of floods being unexpected, they may occur when there is no time to have the appropriate mediating factors/care or support.[69] Effective capacity to cope depends on strong educational, health, political and social support systems.

[65] Ibid., IFRC (2020).
[66] Ibid., UN (2021).
[67] Mutter, J. C. (2015). '*Disaster Profiteers: How Natural Disasters Make the Rich Richer and the Poor Even Poorer,'*. New York: St. Martin's Press.
[68] Ibid., Islam and Winkel, (2017).
[69] Tapsell, S. M., Penning-Rowsell, E. C., Tunstall, S. M. and Wilson, T. L. (2002). 'Vulnerability to flooding: health and social dimensions,' *Phil. Trans. Soc. London*, vol. 360, p. 1511–1525. Available from: https://doi.org/10.1098/rsta.2002.1013

Climate-related threats such as extreme temperature, tropical cyclones, flooding, drought and wildfires can disrupt an older individual's way of life and routine. This can force them to mobilize coping resources to avoid a decline in their well-being. Some threats are linked to life stages, such as a decline in health and physical strength, disability, loss of income, and loss of a spouse or members of a social network.[70]

3.2.1 Extreme temperatures

Exposure to hot and cold temperatures is associated with premature deaths. During the period 2000—2019, the Asia-Pacific region had more than half of all excess deaths globally related to temperature largely because Eastern and Southern Asia had the highest deaths due to cold and heat extremes.[71] Box 1 lists key heatwave events in the Asia-Pacific region.

Box 1: ***Heatwaves in the Asia-Pacific region***[72]

2010 – Heat wave resulted in an additional 1,344 deaths in the City of Ahmedabad, State of Gujarat, India.[73]
2015 – There were over 55,000 fatalities in the Russian Federation, 2,200 in India and 1,200 in Pakistan.[74]
2018 – There was a heatwave emergency in the Democratic People's Republic of Korea, with temperatures as high as 40℃ recorded across the country.[75]
2020 – high temperatures were recorded in eastern Australia, Hong Kong, China, Japan, New Zealand, and the Russian Federation.

3.2.1.1 Heatwaves

Heatwaves occur when recorded temperatures exceed given thresholds for at least three consecutive days.[76] Climate change is expected to lead to an increase in the frequency, duration and intensity of heatwaves.[77] Globally, over 166,000 people died because of heatwaves (1998—2017), and around 125 million people were exposed to heatwaves (2000—2016).[78] Older persons are much more susceptible to heat stress than younger adults because of their lowered adaptability, such as lower sweating capacity, reduced skin blood flow and smaller increase in cardiac output. The risk of heat-related illness can be further compounded by use of certain prescription medicines.[79]

[70] Ibid., Haq et al. (2007).
[71] Zhao, Q., Guo, Y., Ye, T., Gasparrini, A., Tong, A., Urban, A. et al. (2021). 'Global, regional, and national burden of mortality associated with non-optimal ambient temperatures from 2000 to 2019: a three-stage modelling study', *Lancet Planet Health*, vol 5, No. e415–25.
[72] Ibid., ESCAP (2021).
[73] Azhar, G. S., Mavalankar D., Nori-Sarma, A., Rajiva A, Dutta, P., et al. (2014). 'Heat-Related Mortality in India: Excess All-Cause Mortality Associated with the 2010 Ahmedabad Heat Wave,' *PLoS ONE*, vol. 9, No. 3: e91831. Available from: 10.1371/journal.pone.0091831
[74] EM-DAT – The International Disaster Database. Available from: https://www.emdat.be
[75] International Federation of Red Cross and Red Crescent Societies (2019). 'Emergency Plan of Action Final Report: DPR Korea: Heat Wave,' 28 July 2019. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/MDRKP010dfr.pdf
[76] Haq, G. (2019). 'Heatwaves and older people' in D. Gu, M. E. Dupre (eds.), *Encyclopedia of Gerontology and Population Aging*. Available from: https://doi.org/10.1007/978-3-319-69892-2_463-1
[77] Perkins, S. E., Alexander, L. V., Nairn, J. R. (2012). "Increasing frequency, intensity and duration of observed global heatwaves and warm spells," *Geophys Res Lett, vol* 39, No. L20714. Available from: https://doi.org/10.1029/2012GL053361
[78] WHO (2017). "Heatwaves," World Health Organization, Geneva, Switzerland. Available from: https://www.who.int/health-topics/heatwaves#tab=tab_1
79 WHO (2022). The UN Decade of Healthy Ageing 2021-2030in a Climate-changing World, Connection Series 3, available at https://cdn.who.int/media/docs/default-source/decade-of-healthy-ageing/decade-connection-series-climatechange.pdf?sfvrsn=e926d220_1&download=true

In Australia, heatwaves have been associated with a significant increase in deaths, with heightened impacts caused by heatwaves of greater intensity across multiple cities (see box 2).[80] The 2018 summer heatwave in Japan resulted in a reported 22,000 people being taken to hospital with symptoms of heat stroke.[81]

Box 2: *Pacific: Heatwaves in Australia*

A study of temperature and death among the Australian older population (aged 75 years or over) in five large cities (Adelaide, Brisbane, Melbourne, Perth and Sydney) over the period 1988 to 2011 found significant associations between heatwaves and mortality, with noticeably higher death rates in the first few days. Heatwaves were associated with a 28 per cent rise in deaths, with greater increases observed for more intense heatwaves across multiple cities.[82]

During this century, heatwaves and humid heat stress will be more intense and frequent, especially in South and South-West Asia. Marine heatwaves will increase in some areas in the Indian, Atlantic and Pacific Oceans.[83, 84] A higher number of people will be exposed to extreme heat in cities in high- and middle-income and transition economies because of the combination of demographic change and climate change.[85, 86, 87] A heatwave exposure at 1°C warming by 2075 in low-income countries is likely to be greater than exposure at the heating level of 2°C in high-income countries.[88]

Another negative consequence of extreme heat is the increase in energy consumption due to air conditioners and air coolers. In 2021, India recorded high temperatures across the northern states of Rajasthan, Haryana, Uttar Pradesh and New Delhi. Temperatures were above 40°C for four consecutive days, which saw a reported 10—15 per cent higher than average energy demand at this time of the year.[89]

[80] Cheng, J., Xu, Z., Bambrick, H., Su, H., Tong, S., Hu, W. (2018). 'Heatwave and elderly mortality: an evaluation of the death burden and health costs considering short-term mortality displacement,' *Environ. Int.*, vol. 115, p. 334–342. Available from: https://doi.org/10.1016/j.envint.2018.03.041

[81] Watts, N., Amann, M., Aveb-Karlsson, S., Belesova, K., Bouley, T., Bovkoff, M. et al. (2018). 'The Lancet countdown on health and climate change: from 25 years of inaction to a global transformation for public health,' Lancet, vol. 391, No. 10120, p.581–630. Available from: https://doi.org/10.1016/S0140-6736(17)32464-9

[82] Cheng, J., Xu, Z., Bambrick, H., Su, H., Tong, S., Hu, W. (2018). 'Heatwave and elderly mortality: an evaluation of the death burden and health costs considering short-term mortality displacement,' *Environ. Int.*, vol. 115, p. 334–342. Available from: https://doi.org/10.1016/j.envint.2018.03.041

[83] IPCC (2021b). 'Regional Fact Sheet Australasia. Sixth Assessment Report: Working Group I – The Physical Science Basis', Intergovernmental Panel on Climate Change, Bonn, Germany. Available from: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Australasia.pdf

[84] IPCC (2021c). 'Regional Fact Sheet Small Island States Sixth Assessment Report: Working Group I – The Physical Science Basis', Intergovernmental Panel on Climate Change, Bonn, Germany. Available from: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Small_Islands.pdf

[85] Ibid., Lancet (2018).

[86] Jones, B., Tebaldi, C., O'Neil, B. C., Oleson, K., Gao, J. (2018).'Avoiding population exposure to heat-related extremes: demographic change vs climate change,' *Climate Change*, vol. 146, p. 423–437. Available from: https://doi.org/10.1007/s10584-017-2133-7

[87] Smid, M., Russo, S., Costa, A. C., Granell, C., Pebesma, E. (2019). 'Ranking European capitals by exposure to heat waves and cold waves,' *Urban Climate*, vol. 27, p. 388–402. Available from: https://doi.org/10.1016/j.uclim.2018.12.010

[88] Russo, S., Sillman, J., Sippel, S., Barcikowska, M. J., Ghisetti, C., Smid, M., O'Neill, B. (2019). 'Half a degree and rapid socioeconomic development matter for heatwave risk,' *Nat Commun*, vol. 10, No. 136. Available from: https://doi.org/10.1038/s41467-018-08070-4

[89] Aljazeera (2021). 'Millions in India's northern states sizzle in severe heatwave,' 2 July 2021. Available from: https://www.aljazeera.com/news/2021/7/2/india-severe-heatwave-northern-states-delhi

3.2.1.2 Cold waves

As the climate warms, an older person's susceptibility to cold may increase, and cold-related deaths could still be of concern, although there may be reduced frequency of cold weather (see box 3). Extreme cold weather has been recorded in the Asia-Pacific region.[90, 91] In 2008, severe winter conditions caused over 1,300 deaths in Afghanistan and affected 77 million people in China. From 2016 to 2019, Mongolia suffered from severe winters that killed large numbers of livestock.[92] In the period from December 2020 to mid-January 2021, three extreme cold events occurred across China, with low temperatures recorded in Beijing City, and Shandong, Hebei and Shanxi Provinces.[93]

Box 3: ***South and South-West Asia: Deaths due to extreme weather in India***

A study examined the trend in extreme weather events and reported deaths in India during 2001–2014. It explored regional, age and gender differentials among such fatalities. The study found that a higher proportion of individuals who were 60 years or older died due to cold (47 per cent) and heat (42 per cent) waves than those in younger age groups. The number of deaths were higher among older males and females for all extreme weather events.[94]

Heat risk is likely to have a greater impact on low-income countries in the Asia-Pacific region, especially older, frail individuals who cannot tolerate heat extremes.[95] Additional deaths during a heatwave are due to heat stress on those older adults with existing cardiovascular disease, rather than heat related (dehydration).[96]

An older population is also vulnerable to extreme cold.[97] For example, countries with poor thermal efficiency standards in housing have a high excess of winter deaths. Older women with respiratory disease are thought to be at particular risk. Older persons in warmer climates are generally more sensitive to cold spells of weather.

Extreme temperatures compound the effect of warmer urban areas. 'Urban heat islands' are built-up areas with high population density, high road density, tall buildings, and lack of trees and blue and green spaces. These areas experience temperatures 1-3°C hotter than the surrounding areas. This is because of the build-up of excess heat by the activities carried out by residents and workers, transport, and industrial processes. The urban heat island can further exacerbate the impact of heatwaves on an ageing urban population.

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[90] Chen, J., Yang, J., Zhou, M., Yin, P., Wang, B., Liu, J., Chen, Z., Song, X., Ou, C., Liu, Q. (2019). 'Cold spell and mortality in 31 Chinese capital cities: Definitions, vulnerability and implications,' *Environment International*, no. 28, p. 271-278. Available from: https://doi.org/10.1016/j.envint.2019.04.049

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[92] Ibid., EM-DAT.

[93] Dai, G., Li, C., Han, Z., Luo, D. and Yao, Y. (2021). 'The nature and predictability of the East Asian extreme cold events of 2020/21,' Advances in Atmospheric Science, 12 May 2021. Available from: https://link.springer.com/article/10.1007/s00376-021-1057-3

[94] Mahapatra, B., Walia, M., Saggurti, N. (2018). 'Extreme weather events induced deaths in India 2001–2014: Trends and differentials by region, sex and age group,' Weather and Climate Extremes, vol. 21, p. 110-116. Available from: https://doi.org/10.1016/j.wace.2018.08.001.

[95] Flynn, A., McGreevy C, Mulkerrin EC (2005). 'Why do older patients die in a heatwave?' *Q J Med*, vol. 98, p. 227–229. Available from: https://doi.org/10.1093/qjmed/hci025

[96] Vandentorren, S. et al. (2006). 'August 2003 health wave in France: risk factors for death of elderly people living at home,' *Eur J Pub* Health, vol. 16, No. 6, p. 583—591. Available from: https://doi.org/10.1093/eurpub/ckl063

[97] Ma, Y., Zhou, L., Chen, K. (2020). 'Burden of cause-specific mortality attributable to heat and cold: a multicity time-series study in Jiangsu province, China,' Environment International, vol. 144, No. 105994. Available from: https://doi.org/10.1016/j.envint.2020.105994

3.2.2 Tropical cyclones

A tropical cyclone, also known as a hurricane or typhoon, refers to a low-pressure system with torrential rain and wind speeds of over 119 km per hour.[98] Climate change is affecting the intensity of tropical cyclones in the Western and North Pacific. During the period from 1978 to 2018, cyclones with a maximum speed of +100 knots (over 185 km per hour) have become stronger, whilst cyclones of 50 knots or less have become weaker. While the number of fatalities associated with cyclones has declined, they still affected 206 million people from 2011 to 2020.[99] In 2013, Typhoon Haiyan disproportionately affected older persons (see box 3). Older persons often live in areas with greater degrees of scarce or contaminated water supplies and are at higher risk of contracting gastrointestinal illnesses.

Box 4: *South-East Asia: 2013 Typhoon Haiyan*

In South-East Asia, Typhoon Haiyan resulted in over 6,300 casualties and $2.86 billion worth of damage in the Philippines alone.[100] Two fifths of those who died during Typhoon Haiyan were older persons, despite them making up only 8 per cent of the total population.[101]

Tropical cyclones pose a particular risk to vulnerable older persons, such as the ill or isolated and those who have limited capacity to cope with the impact of severe storms (see box 4).[102] Mobility difficulties, lack of evacuation help and poor evacuation facilities, and disrupted access to essential health and medical care mean that older persons are more likely to be affected.[103]

Box 5: *South and South-West Asia: Vulnerability of older persons to tropical cyclones in Bangladesh*

A review of the vulnerability and adaptation strategies of older persons to tropical cyclones in Bangladesh found that older persons have fewer assets and depend largely on young adult family members. Poor physical strength and weakened mental capacity make them vulnerable, with many lacking accesses to government income support. During and after a cyclone event, older persons are often deprived of sanitation and hygiene facilities, food security and family care.[104]

3.2.3 Flooding

Global heating is causing a change in rainfall patterns and melting snow and ice. This is affecting the quantity and quality of water resources. Urban expansion into flood plains and coastal zones, together with more frequent and intense rainfall and sea level rises, is resulting in greater flood risk.[105] An

[98] WMO (2017). 'Global guide to tropical cyclone forecasting,' World Meteorological Organisation, Geneva, Switzerland. Available from: https://cyclone.wmo.int/pdf/Global-Guide-to-Tropical-Cyclone-Forecasting.pdf

[99] Ibid., UNESCAP (2021).

[100] Dasallas, L., Lee, S. (2019). 'Topographical analysis of the 2013 Typhoon Haiyan storm surge flooding by combining the JMA storm surge model and the FLO-2D flood inundation model,' *Water vol.* 11, No. 1, p. 144. Available from: https://doi.org/10.3390/w11010144

[101] HelpAge International (2013). 'Older people disproportionately affected by Typhoon Haiyan,' HelpAge International, London. Available from: https://www.helpage.org/newsroom/latest-news/older-people-disproportionately-affected-by-typhoon-haiyan/

[102] Filberto D., Wethingtong, E., Pilmer, K., Wells, N. M., Wysocki, M., Parise, J. T. (2009). 'Older people and climate change: vulnerability and health effects,' *Generations*, Winter 2009–2010.

[103] Harris, C. (2014). 'Disaster resilience in an ageing world,' HelpAge International, London.

[104] Malak, M., Sajib, A., Quader, M. & Anjum, H. (2020). '"We are feeling older than our age": Vulnerability and adaptive strategies of aging people to cyclones in coastal Bangladesh,' International Journal of Disaster Risk Reduction, vol. 48, No. 01595-1-101595-12. Available from: https://ro.uow.edu.au/asshpapers/52/

[105] IPCC (2012). 'Managing the risks of extreme events and disasters to advance climate change adaptation.' A special report of working Groups I and II. Of the intergovernmental panel on climate change, Cambridge University Press, Cambridge. Available from: https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/

assessment of flooding events that have killed more than 10 people between 1951 and 2020 found the most flood-related deaths were in Southern Asia (127,740), Eastern Asia (69,380), and South-East Asia (23,930).[106]

Summer monsoon rainfall is expected to increase in South and South-East Asia and East Asia, while regional mean sea level rises will continue to cause loss of coastal areas.[107] In Australasia, the incidence of heavy rainfall and river floods are also projected to be more frequent. Rising sea levels throughout the region will increase coastal flooding and the retreat of sandy coastlines.[108] Small islands will further experience sea level rises together with storm surges and coastal inundation and retreating shorelines.[109]

Heavy rainfall and floods impact the health and well-being of older persons, which is exacerbated by the destruction of homes, infrastructure and livelihoods. In July 2020, torrential rain and flooding on the Island of Kyushu in Japan affected more than 50 nursing homes and lead to several deaths. This was due to difficulty in the evacuation of older persons.[110]

Flood impacts include immediate injury and death from floodwater to longer term health effects, such as mental illness and the spread of infectious disease.[111] In a flood event, older persons are often trapped in their homes due to decreased mobility and inability to escape.[112] Flooding can also disconnect older persons from health and social support, including the lifeline of the Internet.

3.2.4 Drought

Rising temperatures and changing rainfall patterns due to climate change have increased the frequency and severity of droughts.[113] The availability of water resources influences drought risk and determines the degree of water stress and food security, especially in arid and semi-arid regions where economies depend on crop agriculture.[114] Over the past 30 years, droughts have affected in excess of 66 million people in South-East Asia. This accounts for 17 per cent of the total number of people in the region that are affected by natural hazards – in ranking, after storms (44 per cent) and floods (34 per cent).[115]

Droughts exacerbate rural poverty, resulting in lost income, unemployment, erosion of assets, and increases in food insecurity, hunger and malnutrition.[116] Low-income older persons living in rural areas

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[106] Hamidifar, H., Nones, M. (2021). 'Global to regional overview of flood fatality: the 1951-2020 period,' Natural Hazards and Earth Systems Sciences, 1 December 2021. Available from: https://doi.org/10.5194/nhess-2021-357

[107] Ibid., IPCC (2021a).

[108] Ibid., IPCC (2021b).

[109] Ibid., IPCC (2021b).

[110] Shimbun, N. (2020). 'Japan's nursing care facilities face challenge of safely evacuating during disasters, *The Japan Times*, 24 July 2020. Available from: https://www.japantimes.co.jp/news/2020/07/24/national/japan-nursing-care-facilities-disasters/

[111] Watts, N., Adger, N., Agnolucci, P., Blackstock, J., Byass, P., Cai, W. et al. (2015). 'Health and climate change: policy responses to protect public health,' *Lancet*, vol. 6736, No. 15, p. 60854–60856. Available from: https://doi.org/10.1016/S0140- 6736

[112] Petrucci, O. (2022). 'Review article: Factors leading to the occurrence of flood fatalities: a systematic review of research papers published between 2010 and 2020,' *Natural Hazards and Earth system Sciences*, vol. 22, p. 71-83. Available from: https://doi.org/10.5194/nhess-22-71-2022

[113] FAO (2019). 'Proactive approaches to drought preparedness,' UN Food and Agricultural Organization, Rome, Italy. Available from: https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1242198/

[114] Ahmed, K., Shahid, S., Nawaz, N. (2018). 'Impacts of climate variability and change on seasonal drought characteristics of Pakistan,' *Atmospheric Research*, vol. 214, p. 364—374. Available from: https://doi.org/10.1016/j.atmosres.2018.08.020

[115] Ibid, UNESCAP (2020).

[116] Lin, Y. E., Pereira, J. J., Corlett, R. T., Cui, X., Insarov, G.E., Lasco, R. D., Lindgren, E., and Surjan, A. (2014). 'Asia,' in Barros, V. R., Field, C. B., Dokken, D. J., Mastranderea, M. D. et al. (eds.) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 1327—1370.

and dependent on rain-fed agriculture for their livelihoods are particularly vulnerable to drought.[117] Access to and utilization of food is expected to be further disrupted by indirect climate effects on income, as is access to safe drinking water and health care.

3.2.5 Wildfires

Warmer temperatures will also lead to increased frequency of wildfires and smoke exposure. Countries such as Australia, which have experienced major fire events, could see more wildfires by mid-century, while Southern Asia could emerge as a wildfire hotspot by the end of the century.[118]

Australia experienced wildfires on an unprecedented scale and intensity during the period July 2019 to February 2020. Over 17 million hectares of land were burnt, resulting in drought, extreme heat and strong winds.[119] A total of 33 people lost their lives, 3 billion animals were killed or fled, and more than half of Australia's adult population was affected by smoke.[120] Early estimates of the health impact of the wildfires suggest smoke pollution killed 400 people and was responsible for more than 4,000 hospital attendances.[121]

Older persons are particularly vulnerable to the impact of wildfires (see box 5). This is due to increased risk of health effects and short-term exposure to wildfire smoke and the prevalence of pre-existing lung and heart disease in older persons.[122] Wildland fires not only impact human health, but they also cause loss of life, damage to property and community disruption, and can affect water and air quality, as well as agriculture and natural ecosystems.[123]

Box 6: ***Pacific: Wildfires***

The 2009 Australian "Black Saturday" bushfires resulted in 172 deaths. Almost a third of deaths (30 per cent) were among people aged 60 or older; 9 per cent had a chronic disability and were aged 70 or over.[124]

3.2.6 Air pollution

Climate change can affect air quality by increasing the frequency and duration of weather events that augment air pollution exposure. Higher temperatures can cause changes in air quality affecting levels of ground-level ozone and fine particulate matter ($PM_{2.5}$).[125]

[117] Ibid., FAO (2019).
[118] Gannon, C. S. and Steinberg, N. C. (2021). 'A global assessment of wildfire potential under climate change utilizing Keetch-Byram drought index and land cover classifications,' Environ. Res. Commun., vol. 3, No. 035002. Available from: https://doi.org/10.1088/2515-7620/abd836
[119] Ibid., UNESCAP (2021).
[120] IDMC (2020). 'The 2019-2020 Australian Bushfires: from temporary evacuation to longer-term displacement,' The Internal Displacement Monitoring Centre, Geneva, Switzerland. Available from: https://www.internal-displacement.org/sites/default/files/publications/documents/Australian%20bushfires_Final.pdf
[121] Borchers Arriagada, N., Palmer, A. J., Bowman, D. M. J. S., Morgan, G. G., Jalaludin, B. B., Johnston, F. H. (2020). 'Unprecedented smoke-related health burden associated with the 2019–20 bushfires in eastern Australia,' *MJA*, vol. 213, No. 6. Available from: https://onlinelibrary.wiley.com/doi/10.5694/mja2.50545
[122] Sykes, K. (2019). 'Wildfires and Older People,' in D. Gu, D., Dupre, M. E. (eds.), *Encyclopedia of Gerontology and Population Aging*. Available from: https://doi.org/10.1007/978-3-319-69892-2_465-1
[123] Ibid., Haq (2017).
[124] Handmeer, J., O'Neil S., Killalea D. (2010). 'Review of fatalities in the February 7, 2009, bushfires,' Victorian Bush-fires Royal Commission. Available from: https://www.bushfirecrc.com/sites/default/files/managed/resource/review-fatalities-february-7.pdf
[125] McMichael, T., Montgomery, H., Costello, A. (2012). 'Health risks, present and future, from global climate change,' *BMJ*, vol. 344, No. e1359. Available from: doi:10.1136/bmj.e1359

Some of the most polluted cities in the world are in the Asia-Pacific region.[126] Around 92 per cent of the region's population (4 billion people) are exposed to air pollution levels that exceed the World Health Organization's (WHO) guidelines for protecting human health. Exposures to $PM_{2.5}$ and ground-level ozone are the most damaging pollutants to human health and well-being.[127] In 2016, deaths due to $PM_{2.5}$ in people aged 60 or over were highest in South-East Asia, East Asia, and Oceania (1.87 million) and South Asia (1.78 million).[128]

An assessment of future air pollution deaths in a changing climate in China estimated that, until mid-century, each year an additional 12,100 Chinese will die from $PM_{2.5}$ pollution and 8,900 from ground-level ozone pollution.[129] An ageing population will further increase the estimated deaths from $PM_{2.5}$ pollution and ground-level ozone in 2050 by factors of 1 and 3, respectively.

The risk to older persons from air pollution is especially high in individuals with pre-existing medical conditions, such as chronic obstructive pulmonary disease. There is a high association between levels of nitrogen dioxide and $PM_{2.5}$ pollution and heart and lung disease in older persons, while hospitalization for community-acquired pneumonia is also common. In addition, long-term exposure to traffic-related air pollution increases the risk for asthma hospitalization in older persons.[130] A study of the long-term exposure of older adults to outdoor air pollutants (indicated by $PM_{2.5}$ and black carbon) in Hong Kong, China was found to increase the risk of cardiovascular death.[131] Combinations of heat, varying temperature, poor air quality and pollution exacerbate poor health in older persons, particularly in relation to cardiovascular and respiratory diseases.[132]

3.2.7 Infectious diseases

Extreme temperatures, floods, drought and tropical cyclones affect human health. In this context, climate change, together with a decline in biodiversity, is contributing to an increase in the transmission season and geographical range of infectious diseases.[133, 134] It is also an important driver of the proliferation of vector organisms (for example, fleas, mosquitoes and ticks) and their immediate hosts,

[126] IQAir (2020). 'World Air Quality Report. IQAir", Switzerland. Available from: https://www.iqair.com/world-air-quality-report

[127] CCAC (2019). 'Air Pollution in Asia and the Pacific: Science-based solutions,' Climate and Clean Air Coalition, Paris, France. Available from: https://www.ccacoalition.org/en/resources/air-pollution-asia-and-pacific-science-based-solutions-summary-full-report

[128] Yin, H., Brauer, M., Zhang, J., Cai, W., Navrud, S, Burnett, R. et al. (2021). 'Supplement to: Population ageing and deaths attributable to ambient PM2·5 pollution: a global analysis of economic cost,' Lancet Planet Health 2021; vol. 5, p. e356—67.

[129] Hong, C., Zhang, Q., Zhang, Y., Davis, S. J., Tong, D., Zheng, Y., Liu, Z., Guan, D., He, K., Schellnhuber, H. J. (2019). 'Impacts of climate change on future air quality and human health in China,' *PNAS*, vol. 116, No. 35, p. 17193–17200. Available from: www.pnas.org/cgi/doi/10.1073/pnas.1812881116

[130] Andersen, Z. J., Bennelykke, K., Hvidberg, M., Jensen, S. S., Ketzel, M., Loft, S., Raaschou-Nielsen, O. (2012). 'Long- term exposure to air pollution and asthma hospitalisation in older adults: A cohort study,' *Thorax*, vol. 67, p. 6–11. Available from: doi:10.1136/ thoraxjnl-2011-200711

[131] Yang, Y., Tang, R., Qui, H., Lai, P., Wong, P. et al. (20180. 'Long term exposure to air pollution and mortality in an elderly cohort in Hong Kong,' Environmental International, vol. 117, p. 99-106. Available from: https://doi.org/10.1016/j.envint.2018.04.034

[132] Ibid., WHO (2022).

[133] Kessing, F., Belden, L. K., Dazak, P., Dobson, A. , Harvell, C. D., Holt, R. D., Hudson, P. Jolles, A., Jones, K. E., Mitchell, C. E., Mysers, S. S., Bogich, T. and Ostfeld, R. S. (2010). 'Impacts of biodiversity on the emergence and transmission of infectious diseases,' *Nature*, vol. 468, p. 647–652. Available from: doi:10.1038/nature09575

[134] Caminade, C., McIntyre, K. M., Jones, A. E. (2019). 'Impact of recent and future climate change on vector-borne diseases,' *Ann N Y Acad Sci.*, vol. 1436, No. 1, p. 157–173. Available from: 10.1111/nyas.13950

augmenting the risk of diseases such as malaria, dengue fever, lyme borreliosis and schistosomiasis.[135, 136]

In the Asia-Pacific region, the average number of dengue cases per year increased from 200,000 to over 500,000 between the 1990s and the 2010s. Between 1990 and 2018, there were rapid rises in South and South-West Asia and in South-East Asia.[137] In September 2020, Cambodia reported a total of 9,108 dengue cases and 14 associated deaths, while Pakistan reported 5,758 cases and 10 deaths, and Viet Nam reported 70,585 cases and 7 deaths.[138]

Seasonal flooding caused by climate change can also increase the contamination of clean water and food crops by waterborne and food-borne pathogens. Drinking water, seafood and fresh produce can be affected. Risk of waterborne disease (for example, leptospirosis and norovirus) increases following flooding. Moving to temporary shelters during a flood evacuation may also heighten the risk of contracting other diseases, including COVID-19.[139]

Older persons tend to have weaker immune systems, which make them more susceptible to infection and disease. They are more vulnerable to gastrointestinal disease from waterborne pathogens because of pre-existing medical conditions and changes in immune system and gastrointestinal function that occur with ageing. They may fail to seek prompt medical attention, which can lead to dehydration.

3.3 How climate change affects older persons

Determining whether climate change affects older persons negatively will depend on how it influences their overall living situation and quality of life. In old age, people place value on several factors; this may vary with ethnic background and other characteristics.[140, 141, 142, 143] Factors which older persons value in later life include:

- Residential location: living in a home and neighbourhood that is safe, pleasant and with good access to local amenities (for example, shops, public transport and green spaces).
- Social networks and community: having social interaction with neighbours and friends who offer help and support, engaging in group activities and participating in religious activities.
- Material conditions: having enough money to meet basic needs and take part in society.
- Health and well-being: having good physical and mental health and mobility, keeping independence and control over life, and engaging in hobbies and leisure activities (solo). Also,

[135] Gamble, J. L.et al (2013).'Climate change and older Americans: state of the science,' Environ *Health Perspect*, vol. 121, No. 1, p. 15–22. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC3553435/

[136] Hess, J., Boodram, L. G., Paz, S., Ibarra, A. M. S., Wasserheit, J. N. and Lowe, R. (2020). 'Strengthening the global response to climate change and infectious disease threats,' *BMJ, vol.* 371, No. 081. Available from: http://dx.doi.org/10.1136/bmj.m3081

[137] Ibid., UNESCAP (2021).

[138] WMO (2021). 'State of the Climate in Asia 2020,' World Meteorological Organization, Geneva, Switzerland. Available from: https://library.wmo.int/doc_num.php?explnum_id=10867

[139] Ibid., UNESCAP (2021).

[140] Bajekal, M., Blanc, D., Grewal, I., Kurslon, S. and Nazroo, J. (2004). 'Ethnic differences in influences on quality of life at older ages: a quantitative analysis,' *Ageing & Society*, vol. 24, No. 5, p. 709—28.

[141] Hongthong, D., Somrongthong, R., Ward, P. (2015). 'Factors influencing the quality of life (Qol) among Thai older people in a rural area of Thailand,' *Iran J. Public Health*, vol. 44, No. 4, p. 479—485. Available from: http://ijph.tums.ac.ir

[142] Van Nguyen, T., Van Nguyen, H., Duc Nguyen, T., Van Nguyen, P. The Nugyen, P. (2017). 'Difference in quality of life and associated factors among the elderly in rural Vietnam,' *J Prev Med Hyg*, vol. 58, No. E63—71.

[143] Zin, P. E., Saw, Y. M., Saw, T. N., Cho, S. M., Hlaing, S. S., Noe, M. T. N. et al. (2020). 'Assessment of quality of life among elderly in urban and peri-urban areas, Yangon Region, Myanmar,' *PLoS ONE, vol.* 15, No. 10: e0241211. Available from: https:// doi.org/10.1371/journal. pone.0241211

having a positive psychological outlook and accepting circumstances which cannot be changed.[144, 145, 146]

The threat of climate change to well-being and quality of life in old age will depend on an individual's ability to cope and withstand and/or recover from difficult conditions or crises, and so avoid a bad outcome. Climate change can affect all aspects of life, especially regarding health, transport, cost of living, housing and social care.

3.4 Climate resilience

Resilience in this context refers to how adaptable an individual is to deal with the impact of a climate-related weather event and can recover. An older person's ability to cope will depend on a combination of individual capacities (for example, wealth, education, skills and health), social networks (for instance, family, friends, neighbours, and community institutions such as religious and voluntary groups, and charities) and access to services (for example, transport, communication, health care, social support, and emergency relief and recovery). Inequalities, social injustice, disempowerment, and limited access to key essential services will shape and further exacerbate coping capacity.

All these factors will determine whether an older person will suffer a bad outcome, such as damage or loss, becoming physically weaker, economically impoverished, socially dependent, and humiliated or psychologically harmed.[147] Therefore, building resilience (for example, via healthy lifestyles, coping skills, strong family and other social ties, active interests, savings and assets) will help ensure that people's reserves are, and remain, robust in later life.[148]

Resilience is covered in SDG 1 (No Poverty), that states the need to build resilience of the poor and those in vulnerable situations by 2030, as well as reduce their exposure and vulnerability to climate-related extreme events and other shocks and disasters. Resilience is a core feature of SDG 13 (Climate Action), which aims to strengthen resilience and adaptative capacity to climate-related hazards and natural disasters.

Social protection programmes contribute to building older persons' resilience to climate risks. Many such programmes in ageing societies do not cover the needs of an increasing number of older persons, and too few people of working age are contributing to these programmes. Around half of the Asia-Pacific region's population has no social protection coverage, and only a few countries have comprehensive social protection systems. While older persons receive a pension, gaps remain, and benefits do not cover basic needs. The lack of access to affordable health care is leaving individuals without treatment and their households vulnerable to poverty.[149] A gender gap in the coverage and levels of pensions also exists, which has implications for meeting SDG 5 (Gender Equality).[150] It is therefore important to understand

[144] Ibid., Bajekal et al. (2004).
[145] Gabriel, Z. and Bowling, A. (2004). 'Quality of life from the perspective of older people,' *Ageing & Society*, vol. 24, p. 675—691.
[146] Dorji, N., Dunne, M. P., Seib, C., Deb, S. (2017). 'Quality of life among senior citizens in Bhutan: associations with adverse life experiences, chronic disease, spirituality and social connectedness,' *Asia Pacific Journal of Public Health,* vol. 29, No. 1, p. 35—66. Available from: https://doi.org/ i1.o0r.g1/107.171/1770/10150359359591561668855609
[147] Haq, G. and Gutman, G. (2021). 'Climate resilience and older people,' in Gu, D. and Dupre, E. (eds) Encyclopedia of Gerontology and Population Aging. Available from: https://doi.org/10.1007/978-3-030-22009-9_467
[148] Grundy, E. (2006). 'Ageing and vulnerable elderly people: European perspectives,' *Ageing Soc*, vol 26, No. 1, p. 105—134. Available from: https://doi.org/10.1017/S0144686X05004484
[149]UNESCAP/ILO (2021). 'The Protection We Want,' UN, Bangkok, Thailand. Available from: https://www.unescap.org/sites/default/files/publications/RC5_Social_Outlook-Report.pdf
[150] Jarzebski, M.P., Elmqvist, T., Gasparatos, A. et al. (2021). 'Ageing and population shrinking: implications for sustainability in the urban century,' *Urban Sustai*n, vol. 1, No. 17. Available from: https://doi.org/10.1038/s42949-021-00023-z

how systems at the national and subnational levels can provide reliable and sustainable support structures for current and future older persons that reduce their vulnerability in later life.[151]

In addition, informal support networks can contribute to building resilience in old age. Reciprocal relationships and the value of emotional support contribute to feelings of belonging, security and well-being.[152] Formal and informal support networks allow individuals to maintain a high degree of autonomy in later life, even when they must often depend on others for help.[153]

Connection with different networks of care is important in climate events to avoid discontinuities that could endanger an older person's health and well-being. Local knowledge and local caring networks can also assist in preparedness for extreme weather.[154]

Older persons in good health can help build community resilience. They can contribute to a community in a crisis by being a repository of local knowledge of what works (and does not) in community efforts to mitigate prior extreme weather situations (see box 6).[155]

Box 7: ***Pacific: Loss of traditional environmental knowledge eroding resilience to climate change***

Pacific island wisdom is based on more than 3,000 years of living in "fragile" environments and finding ways to weather a range of environmental challenges. This knowledge is not only a source of great pride, in can act as a practical means of enhancing resilience to cope with such challenges. However, recent years have seen a loss of traditional ecological and environmental knowledge, often contextualized within broader societal changes to associated with globalization and the increased availability of new technologies. This presents challenges, especially due to resilience to climate change being compromised. Conserving any form of traditional knowledge is important as it acts as a unique experiential record representing cultural diversity. This, in turn, can assist Pacific islanders to understand their history in ways that could support them in coping with their future. The relevance of such knowledge is especially valid for coastal communities increasing aware of the fragility of their village locations, typically as a consequence of rising sea levels. Ways of conserving and effectively utilizing traditional knowledge, by incorporating it into adaptation planning for Pacific island communities in rural/peripheral locations, are needed to build resilient communities where older persons can flourish.[156]

Improving the resilience of older persons includes ensuring the provision of systems (for example, health and social cares services, transport and housing) and infrastructure are better planned and designed to make them climate resilient. The Asian Development Bank (ADB) Urban Climate Change Resilience Trust Fund[157] has supported expanding cities in Bangladesh, India, Indonesia, Myanmar, Nepal, Pakistan, the Philippines and Viet Nam to reduce the risks to poor and vulnerable people from floods, storms or droughts. ADB has done this by enabling cities to plan and design infrastructure projects to cushion

[151] Ulrichs, M., Slater, R., Costtella, C. (2019). 'Building resilience to climate risks through social protection: from individualised models to systemic information,' *Disasters*, vol. 43(s), p. S368-S387. Available from: https://www.unescap.org/sites/default/files/publications/RC5_Social_Outlook-Report.pdfhttps://doi.org/10.1111/disa.12339

[152] Ibid., Haq and Gutman (2019).

[153] Duner, A. and Nostrom, M. (2007). 'The roles and functions of the informal support networks of older people who receive formal support: a Swedish qualitative study,' *Ageing Soc*, vol. 27, No. 1, p. 67—85. Available from: https://doi.org/10.1017/S0144686X06005344

[154] Wistow, J. Dominelli, L., Oven, K. J., Dunn, C. E., Curtis, S. E. (2015). 'The role formal and informal networks in supporting older people's care during extreme weather events,' *Policy Polit*, vol. 43, No. 1, p. 119—135. Available from: http://dx.doi.org/10.1332/030557312X655855

[155] Cohen, O., Geva, D. Lahad, M., Bolotin, A., Leykin, D et al. (2016). 'Community resilience throughout the life-span – the potential contribution of health elders,' PLOS One, vol. 11, No. 2, e0148125. Available from: 10.1371/journal.pone.0148125

[156] Janif, S. Z., Nunn, P. D., Geraghty, P., Aalbersberg, W., Thomas, F. R., Camailakeba, M. (2016). 'Value of traditional oral narratives in building climate-change resilience: insights from rural communities in Fiji,' *Ecology and Society,* vol. 21, No. 2., p. 7. Available from: https://www.ecologyandsociety.org/vol21/iss2/art7/

[157] See: https://www.adb.org/what-we-do/funds/urban-climate-change-resilience-trust-fund

impacts. Over the years 2013—2021, around 25 infrastructure projects and other resilience measures were funded to protect around 2 million poor and vulnerable people in targeted cities.

3.5 Protecting older persons from climate impacts

Older persons are at higher risk of death and disability from climate effects; they are also disadvantaged in recovery assistance. Reducing their vulnerability to extreme weather events requires ensuring they reach later life with sufficient reserves to better manage the challenges they face in old age, and to provide them with adequate health care and social protection. Personal wealth, gender, age, ethnicity, disability, rural or urban residence, property-owning or tenancy, education, family and friendship structure, and access to health and social care all determine an older person's vulnerability.[158]

Building individual resilience and that of provisioning systems on which older persons are dependent (for example, health and social care, transport and housing) can reduce vulnerabilities in a way central to meeting the SDGs.[159] This means implementing climate mitigation, and both climate adaptation and disaster risk reduction plans that address the needs and vulnerability of older persons.

The United Nations Office for Disaster Risk Reduction (UNDRR) has called for a more inclusive approach in disaster risk and reduction (DRR) that meets the specific needs of older persons. For example, older persons with disabilities may require assistive technology (such as, hearing aids and toilet commodes) in an emergency because of losing a device, short-term injury and/or long-term permanent injury resulting from the emergency. The availability of assistive technology in such a situation can have a positive impact on independence, vulnerability reduction and resilience building for persons with disabilities in humanitarian crises.[160]

An inclusive DRR approach also requires the collection of data on age and sex/gender to ensure vulnerable older persons are supported in DRR and encourage them to share their knowledge, skills and wisdom to shape DRR policy and practice.

UNDRR *Chapter 14 for Older People in Disaster Risk Reduction* outlines 14 minimum standards to incorporate the needs of older persons in DRR (see table 1).[161] These are categorized as easy wins (1-star actions) to best practices (3-start actions)

Table 1: Minimum stands of older persons in disaster risk reduction

Standard	Minimum standard
★	Older persons are mentioned in national disaster management and climate policies, requiring direct action in planning, budgeting and training.
★	Older persons have been consulted in the development of national and local disaster and climate risk assessment and their vulnerabilities and capacities are included.
★	Early warning signals and information are available, understandable and actionable by older persons.
★	Evacuation plans at the community level have specific actions to ensure older persons can evacuate and are protected during operations, including actions specific to mobility, sight, hearing and mental impairments and isolation.
★	Disaster supplies and stockpiles include specialist items, medication and food required by older persons and are accessible to them during emergency distribution.

[158] Ibid., Schwela (2019).
[159] Ibid., Haq and Gutman (2020).
[160] HelpAge International (2021). 'Access to age-assistive technology: A resilience building measure for older people'. Available from: https://ageingasia.org/access-to-age-assistive-technology-report/
[161] UNISDR/Help Age International (2014). 'Chapter 14 for older people in disaster risk reduction,' UN Office for Disaster Risk Reduction. Available from: https://www.unisdr.org/2014/iddr/documents/Charter14.pdf

★	Evacuation and rest centres are age responsive, with off-floor seating, wheelchair accessible facilities, handrails and privacy for women and men.
★★	Sex-, age- and disability-disaggregated data are collected, including for the following older age groups: 50—59, 60—69, 70—79 and 80+ years, in all disaster management and analysed regarding the impact of all DRR initiatives.
★ ★	Emergency personnel in health, search and rescue, management, coordination and protection and livelihoods have been trained in working with older persons and addressing their specific needs and strengths in emergencies.
★★	Older persons knowledge, skills and contributions to disaster risk management are acknowledged and promoted.
★★	Older persons have access to cash transfers and livelihood recovery initiatives following disasters.
★★	Resilient and climate-smart livelihood initiatives are inclusive of people who continue to work in old age.
★★★	Older persons are represented in DRR management and governance from the community to the national level to ensure that their voices are heard.
★★★	Social protection systems, such as pensions, are available and can be accessed within days of a disaster and utilized as emergency cash transfer mechanisms.
★★★	Older persons have access to affordable disaster insurance and risk-transfer mechanisms.

Some countries have integrated older persons in DRR (see, for example, box 7). For instance, Cambodia prioritizes older persons in disaster evacuation. In the Philippines, the National Economic and Development Authority mandates the collection of age-disaggregated data in its Disaster Rehabilitation and Recovery Planning Guide. Civil society initiatives in Cambodia and the Philippines seek to take older persons into account in disaster response and risk reduction.[162]

Box 8: *Older persons in disaster risk reduction in Bangladesh*

In Bangladesh, the Government has given attention to older persons in several climate and disaster laws and policies. The Emergency response and disaster risk reduction: Older people Strategy and legislation Sixth Five-Year Plan 2011-15 states that vulnerable groups, including older persons, will be primary beneficiaries of all disaster management efforts. The National Policy for Older Persons 2014 includes aims to:

- Consider the aspects of older persons in all the programmes of climate change and ensure their participation, while prioritizing older persons in risk reduction plans, including disaster alerts, rescues, shelter, relief and post-disaster rehabilitation initiatives
- Provide support and protection to older persons in allocating emergency humanitarian aid
- Locate older persons during emergencies and identify their needs and vulnerability
- Make the people associated with different relief agencies aware of the physical and health concerns of older persons and identify ways to support their basic needs
- Protect older women from physical, mental and sexual repression, as well as financial exploitation in emergencies, while also considering the potential risks faced and raising public awareness
- Identify the adverse effects of climate change on older persons and mitigate them
- Initiate the utilization of older persons' knowledge and experiences in coping with climate change
- Engage older persons in DRR plans at all levels and consider ageing issues in these

[162] Ibid., UNGA (2021).

- Ensure accessibility for older persons during relief, adopting policy and programmes to ensure selection of age-friendly relief by both government and non-governmental organizations
- Adopt age-friendly rehabilitation programmes[163]

In Bangladesh, the non-governmental organization Young Power in Social Action, which provides housing assistance to climate-displaced persons, includes the presence of older persons within a family in its criteria for prioritizing aid recipients.[164]

In Ahmedabad (India), the Mahila Housing SEWA Trust has used innovative approaches to tackle climate change and urban inequality. It has empowered women (of all ages) to be climate champions, by providing them with the knowledge and tools to bring about bottom-up transformation to their neighbourhoods. Solutions include household-level interventions, such as white paint to reflect the sun off rooftops and reduce temperatures within homes, and sprinkler taps that allow for control of water use. This has increased awareness of community climate resilience, which has benefited the whole community.[165]

Regarding access to climate information, Iraq has launched media campaigns to inform older persons of risks related to infectious and communicable diseases.[166]

Peer-to-peer learning is a valuable strategy to enhance the resilience of older persons and communities. It is a modality that involves people learning with and from each other as equals.[167] This includes the sharing of existing knowledge and the co-creation of new knowledge. It is a collective process that connects individuals to each other and helps to build new and enrich existing networks.

Protecting older persons will require that they and their communities can manage change and are better prepared to withstand and recover from the economic, social and environmental impacts associated with climate change. Resilience-building activities include issues such as health, gender, DRR, livelihoods, climate change adaptation, social protection, peace building and natural resource management.[168]

As highlighted in figure 1, vulnerability of older persons to climate risks can be addressed by providing inclusive and affordable universal social protection schemes, insurance solutions or hazard-proof housing and infrastructure. Action to reduce exposure to climate risks would include resettlement from areas at high risk of climate change impacts, risk-sensitive land use planning and early warning systems and evacuations that take into account accessibility and mobility constraints of older persons.

Besides MIPAA and the SDGs, other international policy frameworks exist which contribute to building resilience of older persons (see box 8).

[163] Williamson, C. (2015). 'Policy mapping on ageing in Asia and the Pacific: analytical report', HelpAge International. Available from: https://www.refworld.org/pdfid/55c9e6664.pdf
[164] Ibid., UNGA (2021).
[165] WRI (2020). 'Women's Action Towards Climate Resilience for the Urban Poor,' World Resources Institute, Washington, DC, USA. Available from: https://prizeforcities.org/project/womens-action-towards-climate-resilience
[166] Ibid., UNGA (2021).
[167] Oxfam (2017). 'Community stories of resilience building in ASEAN Strengthening Community Resilience through Peer–to-Peer Learning'. Available from: https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620395/cs-resilience-community-stories-asean-111217-en.pdf;jsessionid=108EE24E31AF350F26125C5EE4EF3485?sequence=1
[168] HelpAge International (2014). 'Disaster resilience in an ageing world: How to make policies and programmes inclusive of older people'. Available from: https://www.unisdr.org/2014/iddr/documents/DisasterResilienceAgeingWorld.pdf

Box 9: *Policy frameworks that contribute to building resilience*

United Nations Decade of Healthy Ageing (2021—2030)[169]
WHO is leading efforts on the United Nations Decade of Healthy Ageing.[170] The key action points to be addressed are: changing how people think and feel about ageing; developing communities in ways that foster the abilities of older persons; delivering person-centred, integrated care and primary health services that respond to older persons; and providing them access to long-term care when they need it.

Regional Roadmap for Implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific[171]
The Regional Roadmap identifies DRR and building resilience as a priority for Asia and the Pacific. It calls for promoting capacity-building regarding climate resilience, including climate-related DRR, through policy dialogue and the sharing of experience and information. In the context of leaving no-one-behind, it calls for facilitating regional and subregional dialogue to address population ageing.

Sendai Framework for Disaster Risk Reduction [172]
The Framework (2015—2030), among other issues, refers to older persons in policymaking: "including in humanitarian contexts and, in particular, in disaster risk reduction policies, strategies and practices and in emergency response, *considering their specific requirements, vulnerabilities and capacities."*

United Nations Convention on the Rights of Persons with Disabilities[173]
This document, signed in 2008 by 172 countries, contains Article 11, which focuses on situations of risk and humanitarian emergencies (although not specific to climate change): *States Parties shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters.*

Incheon Strategy to "Make the Right Real" for Persons with Disabilities in Asia and the Pacific
In 2012, ESCAP member States adopted the Ministerial Declaration on the Asian and Pacific Decade of Persons with Disabilities, 2013–2022,[174] and the Incheon Strategy to "Make the Right Real" for Persons with Disabilities in Asia and the Pacific.[175] The Strategy was the first document to outline specific disability-inclusive indicators within its Goal 7. It provides measurable targets and goals in DRR. Though not linked directly with climate change, it can assist in preparing persons with disabilities for the potential effects of disasters and for their inclusion in the response phase.

WHO Age-Friendly Cities and Communities
In 2002, WHO launched the Age-friendly Cities and Communities initiative.[176] The concept of active ageing shows that older persons can remain contributors to societies with better health, security and participation. WHO developed a guideline for Age-friendly Cities and Communities (2007).[177] This

[169] See: https://www.who.int/initiatives/decade-of-healthy-ageing
[170] Ibid., UN (2021).
[171] See: https://www.unescap.org/sites/default/files/publications/SDGs-Regional-Roadmap.pdf
[172] See: https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030
[173] See: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html
[174] See: https://www.unescap.org/resources/escap-resolutions-asian-and-pacific-decade-persons-disabilities-2013-2022
[175] See: https://www.unescap.org/resources/incheon-strategy-make-right-real-persons-disabilities-asia-and-pacific-and-beijing
[176] See: https://extranet.who.int/agefriendlyworld/age-friendly-cities-framework/
[177] Desjardins, R., Olsen, D. S., Midtsundstad, T. (2019). 'Active ageing and older learners—Skills, employability and continued learning. *'Eur. J. Educ.*, vol. 54, p.1–4.

concept contains a series of "services, policies and structures" to ensure older persons have access to suitable urban environments and facilities to realize active ageing. By 2020, over 1,000 cities and communities worldwide had enrolled in the WHO Global Network of Age-friendly Cities and Communities, with a commitment to becoming more age-friendly. There are eight domains of an age-friendly city that are interconnected and identify and seek to address barriers to the well-being and participation of older persons. These are: social participation, communication and information; civic participation and employment; housing; transport; community support and health services; outdoor spaces and buildings; respect; and social inclusion.

Human Rights Council resolutions on human rights and climate change[178]
Resolution 44/7 (July 2020): The Council recognized that the negative effects of climate change affected the rights of older persons. It requested OHCHR to conduct a study on the issue and decided that a panel discussion on this topic would be held at the 47th session of the Council.
Resolution 42/21 (July 2019): The Council recognized that the rights of persons with disabilities were affected by the negative effects of climate change. It requested the Office to prepare an analytical study on the promotion and protecting the rights of persons with disabilities in the context of climate change and a panel discussion at its 44th session on the same topic.
Resolution 38/4 (July 2018): The Council recognized that integrating a gender-responsive approach to climate policies would increase the effectiveness of climate change mitigation and adaptation, requesting an analytical study and a panel discussion on the topic.

United Nations Economic Commission for Europe Guidelines for Mainstream Ageing (2021)
UNECE recommends mainstreaming ageing in various domains including urban planning.[179] This involves all generations and stakeholders for people-centred local development planning and to avoid working in silos, while cooperating across sectors to connect different realms of city life. Developing age-friendly physical environments in cities can enhance the lives of older persons, contribute to sustainability, encourage resilient and inclusive communities, and contribute to economic prosperity.

Key Messages

1 **Asia and the Pacific is highly vulnerable to climate change related disasters. Many of the countries most at risk are also home to a growing number and share of older persons.**

2 Older persons in the region are highly vulnerable to climate risks due to their **personal circumstances, including health-related issues, the lack of social protection, high levels of poverty and degraded environments. Women** might be at a particularly high risk of being affected by climate change, given a lifetime of inequality and gender bias.

3 **Older persons are at higher risk of death and disability from climate effects** and are more disadvantaged in recovery assistance than other segments of the population.

4 **Extreme temperatures, tropical cyclones, flooding, drought and wildfires pose a danger to older persons**, placing additional stress on their ability to cope.

5 **Climate risk is determined by the interaction of climate-related hazards, exposure and the vulnerability of older persons**. These factors determine the extent they will be affected by climate change.

6 **Older adults need to reach later life with sufficient capital reserves to reduce the challenges they face in old age,** and to provide them with adequate health and social protection. This will diminish their vulnerability to extreme weather events.

[178] See: https://www.ohchr.org/EN/Issues/HRAndClimateChange/Pages/HRClimateChangeIndex.aspx
[179] UNECE (2021). 'Guidelines for mainstreaming ageing,' United Nations Economic Commission for Europe, Geneva, Switzerland. Available from: https://unece.org/sites/default/files/2021-03/ECE-WG.1-37_Guidelines_for_Mainstreaming_Ageing.pdf

4. Harnessing the potential of older persons in climate action

4.1 Older persons and climate action

Climate action requires mobilizing everyone, regardless of age, to address the challenge of a changing climate. SDG 13 (Climate Action) aims to improve education, raise awareness and enhance capacity to mitigate, adapt and reduce the impacts of climate change. Older persons provide an untapped resource of skilled, healthy and active individuals who can, under certain conditions, engage in climate action at the local level. Older persons often provide financial support to family and the community through informal work and contribute to decision-making and conflict resolution. They have voting and economic power that can be mobilized for effective climate policy.[180]

Older persons can possess traditional knowledge of the local environment, its vulnerabilities and how the community has responded in the past. This allows them to play a key role in adapting to and reducing the negative impact of climate-related disasters. Their knowledge of coping mechanisms can be critical when developing local DRR and adaptation plans. It also provides a holistic understanding of the natural environment and human responsibility for environmental change. Furthermore, it includes how to live more sustainably, relying less on material goods and reusing materials, enabling older persons to be potential leaders in a circular economy. Older persons can thus be a resource to support undertaking citizen science, including by collating data to monitor local environmental change. Intergenerational dialogue and communication will ensure that knowledge is transferred and there is greater understanding of climate change impacts on different age cohorts.

The concept of legacy motivates many older persons. This involves leaving behind attitudes, values and an intact world for future generations.[181,182] Leaving an environmental legacy can be a motivation for older persons to contribute to climate action and protect the environment for future generations to enjoy.[183,184] Place attachment, the formation of emotional and cognitive bonds with a particular place, can have strong implications for older persons.[185] Both legacy and place attachment have been found effective in raising climate concern and inducing climate action for adults of all ages, including older persons.

Climate action by older persons, therefore, provides an opportunity to address the climate emergency and build local community resilience.[186] It can also allow better social integration in later life, with benefits both to the individual (for instance, health and well-being) and community (such as social cohesion).[187] For example, volunteering that involves contact with nature has shown positive benefits

[180] Ibid., UN (2021).
[181] Smyer, M. A. and Pachana, N. A. (2019). 'Older adults and environmental volunteerism,' in D. Gu, M. E. Dupre (eds.), *Encyclopedia of Gerontology and Population Aging*. Available from: https://doi.org/10.1007/978-3-319-69892-2_469-1
[182] Frumkin, H. (2001). 'Beyond toxicity: human health and the natural environment,' *Am J Prev Med* vol. 20, p. 234–240. Available from: https://doi.org/10.1016/s0749-3797(00)00317-2
[183] Warburton, J. Gooch M (2007). 'Stewardship volunteering by older Australians: the generative response,' *Local Environ*, vol. 12, No. 1, p. 43–55. Available from: https://doi.org/10.1080/ 13549830601098230
[184] Villar, F. (2012). 'Successful ageing and development: The contribution of generativity in older age,' Ageing Soc, vol. 32, No. 7, p. 1087–1105. Available from: https://doi.org/ 10.1017/S0144686X11000973
[185] Wickersham, R. H., Zaval, L., Pachana, N. A., Smyer, M. A. (2020). 'The impact of place and legacy framing on climate action: A lifespan approach,' *PLoS ONE*, vol. 15, No. .2: e0228963. Available from: https://doi.org/10.1371/journal.pone.0228963
186 Skyes, K. (2021). 'The Gerontological Case Against Fossil Fuels,' Innovation in Aging, 2021, vol. 5, No. 4, p. 1–4. Available from: https://doi.org/10.1093/geroni/igab045
[187] Pillemer, K., Wagnet, L. P., Goldman, D., Bushway, L., and Meador, R. (2010). 'Environmental volunteerism in later life: benefits and barriers,' Generations, vol. 33, No. 4, p. 58—63.

for the individual, including greater social contact.[188, 189, 190] The benefits to older persons and those around them from engaging in environmental action, civic engagement, political involvement and volunteerism include:[191]

- Health benefits, such as increased physical activity, which can be beneficial in terms of quality of life and life expectancy.
- Psychological benefits, including how empowerment received by participating in climate action can enhance a feeling of self-efficiency and psychological well-being.
- Leaving a legacy, for instance through motivating individuals to take part in climate action and extend their influence into the future.
- Promoting resilience, such as by sharing traditional knowledge, which can contribute to climate mitigation and adaption.

Climate activism of older persons exists throughout the Asia-Pacific region. For example, in India, Gramin Vikas Vigyan Samiti (GRAVIS)[192] is a civil society organization in the Thar Desert which has been organizing intergenerational learning groups to bring girls, women, and older women together to share their knowledge, understand the climate emergency and build political influence and empowerment.[193] However, activism of older persons is often ignored for better known younger groups, such as the school strikes for the climate (see table 2).

If older person climate action is to reach its full potential, the cultural, income, health and practical barriers need to be removed, with discrimination, along with negative perceptions and attitudes, challenged and dispelled.[194] This means stereotypes of older persons being incapable of engagement, passive or disinterested need to be abandoned. It also requires respecting, protecting and fulfilling older persons' right to meaningful participation in climate action.

Further efforts should be made to mobilize the increasing number of older persons and remove barriers to their volunteering, such as insurance restrictions, health and safety regulations, and lack of access for disabled persons.[195] Major barriers that may limit older persons' engagement in environmental actions include:[196]

- Age differences in environmental attitudes, with younger adults frequently being more concerned about climate than older individuals.
- Perceived lack of knowledge and expertise, with older persons often feeling they lack sufficient knowledge of environmental issues, as well as science and information technology, to make an effective contribution.
- Lack of awareness of opportunities for environmental action, such as the accessible resources that outline the range of environmental engagement opportunities.
- Lack of resources as barriers for some less wealthy older persons to engage in climate action, especially in low- and middle-income countries.

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[188] Ibid., Frumkin (2001).
[189] O'Brien, L., Townsend, M., Ebden, M. (2010).'Doing something positive': Volunteers' experiences of the well- being benefits derived from practical conservation activities in nature,' *Volunt Int J Volunt Nonprofit Org,* vol. 21, No. 4, p. 525–545. Available from: https://doi.org/10.1007/s11266- 010-9149-1
[190] Scott, T. L., Masser, B. M., Pachana, N. A. (2015). 'Exploring the health and well-being benefits of gardening for older adults,' *Ageing Soc,* vol. 35, No. 10, p. 2176–2200. Available from: https://doi.org/ 10.1017/S0144686X14000865
[191] Pillemer, K., Cope, M. T., Nolte, J. (2021). 'Older people and action on climate change: a powerful but underutilized resource,' HelpAge International. Available from: https://www.unescap.org/sites/default/d8files/event-documents/KPillemer_paper.pdf
[192] See: https://www.gravis.org.in/index.php/what-is-gravis
[193] Ibid., HelpAge International (2021).
[194] Ibid., Pillemer et al. (2010).
[195] Ibid., Haq and Gutman (2017).
[196] Ibid., Pillemer et al. (2021).

Table 2: Examples of environmental activism involving older persons in the Asia-Pacific region

Type	Description	Examples	Location	Website
Government initiatives	Developed and funded by governments	***Green Climate Fund*** is an intergovernmental fund created by the United Nations Framework Convention on Climate Change to help developing countries fight climate change, with 150 projects supporting vulnerable societies and populations, including older adults.	International (developing countries)	https://www.greenclimate.fund/
National initiatives	Focused on national advocacy	***Sanctuary Nature Foundation's Mud on Boots Project*** is a programme to support on-ground conservationists in India with the goal of documenting traditional environmental knowledge held by indigenous communities and their elders.	India	https://www.sanctuarynaturefoundation.org/projects/mud-on-boots
		Klima Action Malaysia is a non-profit organization that calls for representative climate action in Malaysia by empowering vulnerable and marginalized groups, including older adults.	Malaysia	https://en.klimaactionmalaysia.org/

Type	Description	Examples	Location	Website
International initiatives	Focused on international advocacy	***Climate and Development Knowledge Network*** is an international alliance that supports climate compatible development for those most vulnerable to climate change, including by combining traditional knowledge from elders with research and technology.	International (Africa, Asia, Latin America, Caribbean)	https://cdkn.org
		Senior Environmental Corps is a programme of the Environmental Alliance for Senior Involvement, a non-profit entity with organizations in 20 countries supporting older-person volunteers to improve their communities and the global environment.	International (20 countries)	https://www.easi.org/
		The Elders is an independent group of global leaders with a climate change programme focused on ensuring a just transition to a low carbon economy and encouraging innovative solutions to tackling climate change.	International (worldwide)	https://theelders.org/programmes/climate-change

Type	Description	Examples	Location	Website
Inter-generational initiatives	Concerning intergenerational activities with older persons and youth	***INTERSECTION*** a cross-national intergenerational project of the University of Sheffield in the United Kingdom, China, and Uganda that examines consumption and awareness of environmental problems across different generations.	International (United Kingdom, China, Uganda)	https://www.sheffield.ac.uk/intersection
Local initiatives	Focused on local advocacy	***Local Biochar Initiatives*** involve many local organizations engaging older persons as participants in efforts to support safe, economically viable biochar systems.	International	https://biochar-international.org/regional/
	Community action - planting trees	National campaign to plants trees. By the end of 2016, VAE and their members had planted over 50 million trees.	Viet Nam	http://hoinguoicaotuoi.vn/c/nguoi-cao-tuoi-va-chuong-trinh-phoi-hop-bao-ve-moi-truong-4240.htm
		A 67-year-old woman and her group planted more than 2 million trees in the desert in North China.	China	http://en.people.cn/n3/2016/0315/c90000-9030020.html
		Ms. Saalumarada Thimmakka, at 105-years old, and her foundation work to protect the environment by planting trees and promoting awareness and actions to protect the environment.	India	https://inhabitat.c om/meet-the-105-year-old-woman-from-india-planted-300-trees-because-she-couldnt-have-children/

Type	Description	Examples	Location	Website
		Four examples of older persons in Thailand – sharing their knowledge and experience planting trees and protecting forest	Thailand	https://www.yout ube.com/watch?v=WkMUNNh3Ud8 https://www.youtube.com/watch?v=zIpUzBkPur0 https://www.youtube.com/watch?v=lg9ddfGPOKk https://www.youtube.com/watch?v=Mc4dL0-pkFI
	Community and individual action - Biochar	Five examples of older persons in Thailand – sharing their knowledge and experience in making and using biochar	Thailand	https://www.youtube.com/watch?v=SHJ6CZ6R3k4 https://www.youtube.com/watch?v=TVCIlyq7I64 https://www.youtube.com/watch?v=U_QPcG6VmiM https://www.youtube.com/watch?v=hcAn_eqoHTg https://www.youtube.com/watch?v=ov3sHOhQ8Eo
Citizen science initiatives	Engagement of citizens in generating scientific data	***Earth Challenge 2020*** is the world's largest ever coordinated citizen science campaign to enable people around the world – including older adults – to address the world's most pressing environmental challenges through technology.	International (worldwide)	https://www.earthday.org/campaign/global-earth-challenge/

Source: Pillemer et al. (2021).[197]

[197] Ibid., Pillemer et al. (2021).

4.2 Harnessing the potential of older persons in climate action

The wealth of knowledge, skills, experience and resilience of older persons enables them to contribute to efforts to mitigate and adapt to climate change and make them agents of change in climate action. There is a need to harness this potential by removing barriers (for example, perceived lack of awareness, interest, knowledge, ability and resources) and ensuring relevant programmes engage older persons. This could include increasing the profile of issues pertinent to older persons, such as climate risks and opportunities associated with pensions and investment, household energy, low-carbon mobility and extreme weather warning systems.[198] In addition, climate communication should be better targeted to older persons and awareness should be raised at the individual and community levels.

Key Messages

1 **Climate activism of older persons can complement activism of younger people**. This will contribute to intergenerational solidarity in the climate movement for the benefit of all.

2 **Older persons can play a key role in adapting to and reducing climate impacts.** They possess traditional knowledge of the local environment, its vulnerabilities, and how the community has responded in the past.

3 **There is a need for greater climate change communication aimed at older persons.** A generation gap still exists between younger and older persons, and more sharing of ideas and reflections at the local, subregional and regional levels is needed to overcome the gap in communication.

4 **Climate action by older persons can address the climate emergency.** It can build local community resilience and allow for better social integration in later life, with benefits both to the individual and society.

5 **Climate action by older persons can also contribute to climate change mitigation** by changing, for example, farming techniques or adopting renewable energy sources.

6 **Major barriers limit older persons' engagement in climate action, including lack of access to knowledge and information technology**. Efforts should be made to mobilize the increasing number of older persons and remove barriers to their volunteering and other forms of capacity.

[198] Jones, A. and Hiller, B. (2021). 'Why the climate movement must do more to mobilise older people,' *The Conversation,* 2 June 2021. Available from: https://theconversation.com/why-the-climate-movement-must-do-more-to-mobilise-older-people-161732

5. Conclusion and recommendations

In 2021, the COP26 United Nations Climate Conference agreed upon the Glasgow Climate Pact, which maintains the target of limiting global heating to no more than 1.5°C. The Pact aims to speed up the pace of climate action to mitigate and adapt to a changing climate.

The Asia-Pacific region is experiencing higher frequencies and intensities of climate-related natural disasters than any other region in the world.[199] Many of the countries highly affected by climate-related natural disasters, now and in the future, have a growing number and share of older persons. Future climate impacts threaten the well-being and quality of life of older persons, who are expected to represent about a quarter of the population by mid-century. Climate affects access to food, water, sanitation, housing, health and social care, as well as work and mobility. These effects are made worse by poverty, discrimination, ageism, gender, disability, ethnicity and migratory status.[200]

Understanding the factors that contribute to older persons' vulnerability and resilience can strengthen the capacity of governments to prevent and minimize climate-related effects on this demographic group.

Older persons also contribute to GHG emissions from their lifestyles and consumption patterns. There is a need for a better understanding of how consumption patterns change over the life course and how the provision of goods and services (for example, health and social care, transport and housing) influences consumption patterns and how these are affected by climate change.

Older individuals possess substantial knowledge, experience and skills, and can contribute to the global effort to climate mitigation and adaptation. Context-specific policy and practice interventions are required not only to reduce the carbon footprint of older persons but leverage opportunities that older persons offer to climate action.[201] The Glasgow Climate Pact identifies six elements of action for climate empowerment, namely education, training, public awareness, public access to information, public participation and international cooperation. All these action areas apply to older persons and should be considered for engagement with older persons for climate action in a structured way.

Greater policy coherence at the national, subregional, regional and global levels is needed to address this intersection of climate change and population ageing in the Asia-Pacific region. Policies should recognize older persons not only as potential victims of climate change but also contributors to GHG emissions and a powerful resource in climate action.

Countries will need to respond to a changing climate and population age structure if they are to deliver on the 2030 Agenda and MIPAA. Tables 4 and 5 summarize how climate change might affect older persons and the implementation of the 2030 Agenda and MIPAA.

This policy paper assesses the latest evidence on climate change and population ageing in the Asia-Pacific region. It outlines implications climate change will have on meeting the objectives of MIPAA and the 2030 Agenda. It will also inform the Fourth Regional Review and Appraisal of MIPAA in Asia and the Pacific, scheduled to be convened from 29 June to 1 July 2022. In doing so, it calls for a coherent policy approach that is inclusive and forward-looking, and makes the following recommendations to address three key action areas:

[199] IFRC (2020). 'Come Heat or High Water: World Disaster Report 2020,' International Federation of Red Cross and Red Crescent Societies, Geneva, Switzerland. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/20201116_WorldDisasters_Full_compressed.pdf
[200] Ibid., UN (2021).
[201] Ibid., Jarzebski et al. (2021).

Protect older persons from climate impacts

Protecting older persons from climate change impacts requires policies that build individual resilience and reduce vulnerabilities. It is therefore important to:

- Consider the needs of older persons in climate change and DRR measures, ensuring they are age- and gender-responsive, and disability inclusive.
- Engage older persons in the planning of action to address climate impacts on human health to ensure they are age- and gender-responsive, and disability inclusive.
- Provide affordable and accessible social protection systems, including universal health and social care that consider the climate vulnerability of older persons and build individual and community resilience.
- Ensure to reduce older persons' propensity or predisposition to be adversely affected by climate change by addressing location-specific risk factors, by providing hazard proof housing and infrastructure.
- Ensure basic services are accessible and affordable during climate change induced disasters.
- Attain better understanding of the social, economic and environmental factors determining older persons' resilience and ability to adapt and recover from climate change impacts, including collection and analysis of data/information on how older persons were affected.
- Mainstream concerns related to older persons in policies addressing climate change and related issues and build capacity among government representatives regarding climate-related threats to older persons and share good practices to address such threats

Reduce older persons' contributions to greenhouse gas emissions

- Gain a better understanding of age-specific consumption patterns and how climate change, together with demographic change, may influence the carbon footprint of older persons.
- Invest in climate communication/education of older persons, including sustainable lifestyles.
- Engage older persons in policymaking and planning of action to develop sustainable, liveable and age-friendly cities, and carefully consider their diverse needs and rights.
- Enable the participation of older persons in a just transition to sustainable livelihoods, including job and skill training.

Mobilize the potential of older persons in climate action

To mobilize older persons in climate action requires increasing awareness of climate issues and opportunities that exist for older persons to make a difference. It is therefore important to:

- Target communication at older persons to raise awareness of climate risks and climate action.
- Provide later life learning opportunities for older persons to enhance their capacity and allow for their voices to be heard, especially how climate change is affecting their lives.
- Address the participation barriers to climate action faced by older persons through exploring creative ways of engaging them in environmental volunteerism and other initiatives.
- Enable the inclusion of traditional knowledge and experience of older persons to be included in climate solutions.
- Promote and strengthen intergenerational support for climate action to build sustainable societies for all ages.
- Share experiences and good practices in climate action between countries and strengthen international cooperation in this regard.

The Fourth Regional Review and Appraisal of MIPAA in Asia and the Pacific provides an opportunity to address the intersection of population ageing and climate change. Meeting participants are recommended to propose a series of more coherent policy responses that reduce the contribution of older persons to GHG emissions, protect older persons from climate impacts, and harness the potential of older persons in climate action.

Table 3: Interaction between climate change and older persons in the Sustainable Development Goals

SDG	Goal	Target	Ageing population and climate change interaction
	End poverty in all its forms everywhere	1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters	Climate change can push older persons into poverty because of the absence of social protection and support in disaster recovery. Poverty in old age can also increase vulnerability to climate change effects and reduce resilience. Providing an adequate income level can enable older persons to access resources to build their resilience.
	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding, and other disasters and that improve land and soil quality	Climate change impacts can affect agricultural production and food security. Poverty and food insecurity are linked to poor health and disease in older persons, making them more vulnerable to extreme weather effects.
	Ensure healthy lives and promote well-being for all at all ages	3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being 3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	Climate change can exacerbate existing weaknesses in health and social provision, further increasing the vulnerability of older persons. As people age, they require greater access to integrated health and social care support, especially in emergency situations.

SDG	Goal	Target	Ageing population and climate change interaction
	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development	The promotion of lifelong learning enables older persons to develop the skills to cope with later life and the effects of climate change. This will enable them to reduce exposure to climate risks and increase their resilience.
	Achieve gender equality and empower all women and girls	5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels	Climate change effects can exacerbate existing gender inequalities, especially regarding access to services such as education, health and social care. Gender inequalities can make older women more vulnerable to the impact of negative climate-inducted weather events.
	Ensure availability and sustainable management of water and sanitation for all		Climate change can increase the incidence of flooding, while excessive rainfall can reduce water quality and access to sanitation. Older persons are likely to be affected due to weak immunity making them more susceptible to microbial infection.

SDG	Goal	Target	Ageing population and climate change interaction
	Ensure access to affordable, reliable, sustainable, and modern energy for all		Extreme weather events can disrupt the access of older persons to clean and sustainable energy. Many are already in energy poverty. For example, in Sri Lanka, as an age group, those aged 65 or over have the highest level of energy poverty (e.g. access to electricity and cooking fuel).[202]
	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	Climate-induced weather events can affect vulnerable infrastructure, which could reduce access of older persons to vital services.
	Reduce inequality within and among countries	10.2 By 2030, empower and promote the social, economic, and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	The negative effects of inequalities accumulate over the years and are exacerbated in old age due to ageism and age discrimination. This increases vulnerability of older persons and reduces their resilience to climate change effects. As a result, older persons, especially women, are disproportionately affected.

[202] Jayasinghe, M., Selevanathan, E. A., Selevanathan, S. (2021). 'Energy Poverty in Sr Lanka,' *Energy Economics*, vol. 10, No. 105450. Available from: https://doi.org/10.1016/j.eneco.2021.105450

SDG	Goal	Target	Ageing population and climate change interaction
	Make cities and human settlements inclusive, safe, resilient, and sustainable	11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels	Climate change can test existing disaster response and recovery. Poor disaster planning disproportionately affects older persons. Inclusive urban design gives older persons with disabilities autonomy and independence. Safe and accessible public transport enhances social interaction.
	Ensure sustainable consumption and production patterns	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	Hotter or cooler weather extremes caused by climate change can increase the energy demand of older persons. If fossil fuel based, this can increase GHG emissions.
	Take urgent action to combat climate change and its impacts	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Further global heating can demand greater climate action. Older persons can participate in climate activism to reduce emissions, build resilience and adapt to further reduce climate change.

SDG	Goal	Target	Ageing population and climate change interaction
	Strengthen the means of implementation and revitalize the global partnership for sustainable development	17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed 17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries 17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships Data, monitoring and accountability Indicators 17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts	Older persons can contribute to technology transfer, participate in multi-stakeholder partnerships, and support in collection of age-related data. All of these can contribute to understanding the risks of climate change to an ageing population and how to tackle it.

Table 4: Summary of the interaction between climate change and ageing populations in the context of the MIPAA objectives

Priority Area 1: Older Persons and Development				**Impact of climate change**
Issue 1	**Objective 1**	**Objective 2**	**Objective 3**	
Active participation in society and development	*Recognition of the social, cultural, economic, and political contribution of older persons.*	*Participation of older persons in decision-making processes at all levels.*		Older persons have substantial knowledge and experience and can contribute to climate mitigation, adaptation and building community resilience. They provide a growing resource for climate activism, but information and opportunities are needed to allow them to participate.
Issue 2				
Work and the ageing labour force	Employment opportunities for all older persons who want to work			Evidence is unclear on the contribution of working in later life on GHG emissions. Working older persons can have access to financial and social resources, making them more resilient to climate change impacts.
Issue 3				
Rural development, migration, and urbanization	*Improvement of living conditions and infrastructure in rural areas*	*Alleviation of the marginalization of older persons in rural areas*	*Integration of older migrants within their new communities.*	Climate change impacts on agricultural and food security can affect older persons in rural areas, and force migration to urban centres.
Issue 4				
Access to knowledge, education, and training	*Equality of opportunity throughout life with respect to continuing education, training and retraining as well as vocational guidance and placement services.*	*Full utilization of the potential and expertise of persons of all ages, recognizing the benefits of increased experience with age.*		Older persons need access to information on climate change risks to their health and well-being to take necessary mitigation actions. Training and education of older persons can help in climate mitigation, adaptation and building community resilience.

Priority Area 1: Older Persons and Development				Impact of climate change
Issue 5				
Intergenerational solidarity	*Strengthening of solidarity through equity and reciprocity between generations.*			In some societies, young climate activists have been adopting an intergenerational unfairness narrative, blaming older persons for overconsumption and climate inaction.[203] Climate action can provide a common cause to strengthen solidarity among generations.[204]
Issue 6				
Eradication of poverty	*Reduction of poverty among older persons. Actions*			Impact of climate change-induced weather events, such as flooding and tropical cyclones, can force older persons into poverty.
Issue 7				
Income security, social protection/social security, and poverty prevention	*Promotion of programmes to enable all workers to acquire basic social protection/social security, including where applicable, pensions, disability insurance and health benefits.*	*Sufficient minimum income for all older persons, paying particular attention to socially and economically disadvantaged groups.*		Poor income security and social protection can make older persons vulnerable to climate change impacts, reducing their resilience.
Issue 8				
Emergency situations	*Equal access by older persons to food, shelter and medical care and other services during and after natural disasters and other humanitarian emergencies.*	*Enhanced contributions of older persons to the re-establishment and reconstruction of communities and the rebuilding of the social fabric following emergencies.*		Climate change impacts can increase the frequency of emergencies and the need for rebuilding communities and social fabric. This can exacerbate existing inequities older persons face regarding, among others, food, shelter and medical care.

[203] Karpf, A. (2020). 'Don't let prejudice against older people contaminate the climate movement', *The Guardian*, 18 January 2020. Available from: https://www.theguardian.com/commentisfree/2020/jan/18/ageism-climate-movement-generation-stereotypes

[204] Haq, G. (2021). 'The Forgotten Generation: older people and climate change,' in Bell, K. *Diversity and inclusion in environmentalism*, Routledge, London.

Priority Direction II				**Impact on climate change**
Issue 1				Climate change impacts can increase the frequency of emergencies and the need for rebuilding communities and social fabric. This can exacerbate existing inequities older persons face regarding, among others, food, shelter and medical care.
Health promotion and well-being throughout life	*Reduction of the cumulative effects of factors that increase the risk of disease and consequently potential dependence in older age*	*Development of policies to prevent ill-health among older persons*	*Access to food and adequate nutrition for all older persons*	
Universal and equal access to health-care services	Elimination of social and economic inequalities based on age, gender, or any other ground, including linguistic barriers, to ensure that older persons have universal and equal access to health care.	Development and strengthening of primary health-care services to meet the needs of older persons and promote their inclusion in the process.	Development of a continuum of health care to meet the needs of older persons.	
Issue 3				
Older persons and HIV/AIDS	Improvement in the assessment of the impact of HIV/AIDS on the health of older persons, both for those who are infected and those who are caregivers for infected or surviving family members.	Provision of adequate information, training in caregiving skills, treatment, medical care, and social support to older persons living with HIV/AIDS and their caregivers.	Enhancement and recognition of the contribution of older persons to development in their role as caregivers for children with chronic diseases, including HIV/AIDS, and as surrogate parents.	

Priority Direction II				Impact on climate change
Issue 4				
Training of care providers and health professionals	Provision of improved information and training for health professionals and para-professionals on the needs of older persons.			
Issue 5				
Mental health needs of older persons	Development of comprehensive mental health-care services ranging from prevention to early intervention, the provision of treatment services and the management of mental health problems in older persons.			Recovering from climate change-induced weather events can affect the mental health of older persons, increasing demand for support.[205, 206]
Issue 6				
Older persons and disabilities	Maintenance of maximum functional capacity throughout the life course and promotion of the full participation of older persons with disabilities.			Climate change impacts can hamper disaster reduction and recovery, and disproportionately affect disabled older persons.[207]

[205] Bei, B., Bryand, C., Gilson, K. M., Koh, J., Gibson, P., Komiti, A., Jackson, H., Judd, F. (2013). 'A prospective study of the impact of floods on the mental and physical health of older adults,' *Aging Mental Health*, vol. 17, No. 8, p. 992–1002. Available from: https://doi.org/10.1080/13607863.2013.799119

[206] Cianconi, P., Betro, S. and Janiri, L. (2020). 'The Impact of Climate Change on Mental Health: A Systematic Descriptive Review,' Psychiatry. Available from: https://doi.org/10.3389/fpsyt.2020.00074

207 Morchen, M., Ocasiones, E., Relator, R., Lewis, D. (2020). 'Climate Change, Vulnerability, and Disability: Do We "Leave No One Behind", letter to the editor, Disaster Medicine and Public Health Preparedness, 30 June 2020. Available from: https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness

Priority Direction III				Impact on climate change
Ensuring enabling supportive environments	Promotion of "ageing in place" in the community with due regard to individual preferences and affordable housing options for older persons.	Improvement in housing and environmental design to promote independent living by taking into account the needs of older persons in particular those with disabilities.	Improved availability of accessible and affordable transportation for older persons.	Enabling supporting environments and provision of social care, all contribute to building resilience in old age.
Care and support for caregivers	Provision of a continuum of care and services for older persons from various sources and support for caregivers.	Support the caregiving role of older persons, particularly older women.		
Neglect, abuse, and violence	Elimination of all forms of neglect, abuse, and violence of older persons.	Creation of support services to address elder abuse.		
Images of ageing	Enhancement of public recognition of the authority, wisdom, productivity and other important contributions of older persons.			